Multi-Jurisdictional Hazard Mitigation Plan

Clallam County

2024 Plan Update

PORT of Port Angeles

PENINSULA COLLEGE

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Acknowledgements

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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	

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.

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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Volume 2

Section 1.0: Introduction

1.1 Importance of Hazard Mitigation Planning

Natural hazards and human-generated disasters cause loss of life and property and substantial damage to buildings and critical infrastructure. These disaster events have devasting consequences on a communities' economic and social well-being and the environment within that area. Natural hazards are exacerbated by climate change, increasing the frequency and magnitude of these hazard events, including extreme storms, flooding, landslides, drought, wildfire and heat waves. Climate change also amplifies long-standing social inequities experienced by underserved and overburdened communities, contributing to persistent disparities in the resources needed to prepare for, respond to and recover from natural disasters. Reducing the threats these disasters pose to lives, properties, the economy and the environment is the cornerstone of hazard mitigation planning.

An effective hazard mitigation plan identifies and quantifies all hazards (natural and human-caused) that threaten a community, assesses the level of risks and vulnerabilities to such hazards and develops proactive, cost-effective mitigation and adaptation strategies (projects, programs, policies, educational outreach and the establishment of collaborative partnerships) that reduces loss of life, lessens the economic hardship suffered by the community (especially those facing social inequities) and seeks to successfully break the cycle of repetitive damage and reconstruction. Clallam County, its participating jurisdictions (the Cities of Forks, Port Angeles and Sequim), Tribal partners (Jamestown S'Klallam Tribe and Lower Elwha Klallam Tribe) and Clallam County participating special districts (Port of Port Angeles, Clallam PUD #1 and Peninsula College) have created this updated 2024 Multi-Jurisdiction Hazard Mitigation Plan (MJHMP) to protect lives, preserve property, protect the environment, lessen economic hardship, address social inequity and break the repetitive damage cycle.

1.2 Plan Authority

1.2.1 Federal

The federal Robert T. Stafford Disaster Relief and Emergency Act (Stafford Act), as amended by the Disaster Mitigation Act of 2000 (DMA 2000) and supported by various regulations, directs hazard mitigation planning activities, including creation of this plan. The Stafford Act requires State, local, and tribal governmental entities that wish to be eligible for federal hazard mitigation grant funds to a FEMA approved hazard mitigation plan, identifying the natural and man-made hazards, risks, and vulnerabilities of each jurisdiction (United States Code [USC] Title 42, Section 5156[a]). FEMA has promulgated Code of Federal Regulations (CFR) Title 44, Part 201 to carry out the hazard mitigation planning requirements in the Stafford Act. These regulations direct the planning process, plan content, and FEMA approval of hazard mitigation plans. This MJHMP complies with the Stafford Act and DMA 2000, along with the applicable sections of Title 44 of the CFR, including parts 201, 206 and 322. This MJHMP also incorporates the latest policy guidance from the Federal Emergency Management Agency (FEMA) Local Mitigation Planning Policy Guide, released April 19, 2022, and made effective April 19, 2023. In particular, this MJHMP adheres to updated policy guidance to incorporate into mitigation planning the impacts of climate change, the impacts of natural hazards on socially vulnerable populations, and the application of equity in developing mitigation and climate adaption strategies that best serve our communities, with special attention to overburdened and underserved populations.

1.2.2 State

In addition to federal requirements, Washington state is responsible for reviewing local plans for compliance with state regulations. The Washington Emergency Management Division (EMD is responsible for reviewing local hazard mitigation plans against state requirements and coordinating FEMA review and approval.

1.2.2.1 Climate Planning under Recent WA State Law and FEMA Policy Guidance

In 2023, Washington State signed into law HB 1181 adding a climate goal to the Growth Management Act (GMA) and requiring local jurisdiction comprehensive plans to have a climate element. The climate element must maximize economic, environmental, and

social co-benefits and prioritize environmental justice in order to avoid worsening environmental health disparities.

Under Washington State's Department of Commerce's Climate Element Planning Guidance (Intermediate- December 2023) (hereinafter, "Commerce's Climate Planning Guidance"), the climate element can take the form of a single comprehensive plan chapter or be integrated into several chapters/elements. Commerce's Climate Planning Guidance includes a FEMA/Commerce Crosswalk delineating the relationship between hazard mitigation planning and the Climate Resilience Sub-element planning that jurisdictions like Clallam County and its Cities are to perform. Under Commerce's Climate Planning Guidance (at pg. 5), "a natural hazard mitigation plan in substantial conformance with the guidance could be adopted by reference to satisfy the resilience sub-element requirements."

Every effort has been made to follow Commerce's Climate Planning Guidance and the FEMA Region 10/Commerce Crosswalk for incorporating into the 2024 MJHMP the climate change vulnerability and risk analysis and the creation of climate mitigation and adaptation strategies to reduce the threat of natural disasters and strengthen the resilience of our communities. In addition, the 2024 MJHMP adheres to FEMA's April 2023 Local Mitigation Planning Policy Guide (*Section 1.3: Hazard Mitigation Planning in Clallam County*) which outlines policy planning for climate change and equitable outcomes in local jurisdiction hazard mitigation plans.

After its approval by FEMA and the County, this 2024 MJHMP will be incorporated by reference into Clallam County's 2025 Comprehensive Plan and the County's 2025 Comprehensive Plan will also include a separate climate policy chapter addressing specific policies relating to the other sectors impacted by climate change: Agriculture & Food Systems, Buildings & Energy, Cultural Resources & Practices, Economic Development, Health & Well-being, Ecosystems, Transportation, Waste Management, Water Resources and Zoning & Development. The all-sector climate policy work (i.e., the hazard mitigation impact and all other sectors' climate impact) has been concurrently performed during this 2024 hazard mitigation planning effort so that the County's comprehensive planning relating to climate change is both internally and externally consistent. The Climate Worksheets created under this all-sector climate policy work is attached to this 2024 MJHMP. Certain climate policy work will be further

refined based upon these Climate Worksheets and continued public engagement as the County and its Cities continue their 2025 comprehensive planning.

1.3 Hazard Mitigation Planning in Clallam County

FEMA approved Clallam County's 2019 MJHMP on January 25, 2020. Participating jurisdictions in the Clallam County 2019 MJHMP have remained the same for this 2024 MJHMP update:

- City of Forks
- City of Port Angeles
- City of Sequim
- Jamestown S'Klallam Tribe
- Lower Elwha Klallam Tribe
- Special Districts
    - Clallam Public Utilities District (PUD) #1
    - Peninsula College
    - Port of Port Angeles

By working collaboratively, the County and participating jurisdictional partners seek to improve the resilience in our communities through joint capital improvement projects, joint innovative planning, and coordinated emergency management practices.

Clallam County's Emergency Management Division of the Clallam County Sheriff's Office (CCEM) led the development of the initial Multi-Jurisdictional Hazard Mitigation Plan in 2009 and CCEM led the update of that original plan in 2019. In 2024, CCEM and Clallam County's Department of Community Development jointly led the update process to create this substantially revised MJHMP. The hazard mitigation strategy of this 2024 MJHMP incorporates the latest scientific information and lessons learned since the previous plans were adopted.

The main purpose of the MJHMP is to identify risks posed by hazards and to present viable strategies to reduce the impact of hazard events in Clallam County. The plan meets the following objectives:

- Meet or exceeds requirements of DMA 2000 for Clallam County, its participating Cities, its participating Tribal partners and participating Special District entities;

- Enables all plan participants to apply for federal grant funding to reduce hazard risk through mitigation and provides opportunities to apply for such grants jointly;
- Meets the planning needs of each plan participant;
- Creates a comprehensive hazard risk assessment that focuses on Clallam County's unique hazards of concern; and
- Creates a single planning document that integrates all planning partners into a blueprint framework that supports partnerships and collaboration within the County and places all planning partners on the same planning cycle for updates.

The 2024 MJHMP does not supersede any participating jurisdictions internal plans or strategies. Rather, the 2024 MJHMP enhances their ability to identify, inform and mitigate hazard risks unique to Clallam County. Information in this plan will be used to help guide and coordinate mitigation actions and serve as a tool for County and jurisdictional decision-makers to specifically direct mitigation activities and resources.

1.3.1 Hazard Mitigation and Climate Resilience (HMCR) Steering Committee

As a part of the 2024 MJHMP planning process, a joint **Hazard Mitigation and Climate Resilience (HMCR) Steering Committee** was convened. The HMCR Steering Committee included forty-one individuals from government, Tribal, business, environmental and social service entities from Clallam County and its neighbor Jefferson County, including representatives from: Clallam County, City of Forks, City of Sequim, City of Port Angeles, the Jamestown S'Klallam Tribe, Lower Elwha Tribe, Makah Tribe, Quileute Tribe, Hoh Tribe, several fire districts, US Coast Guard, and other government entities. In addition, there are non-government entities represented from hospitals and social services organizations and local businesses. The HMCR Steering Committee was essential to MJHMP development ensuring that community values and priorities were deeply embedded throughout this plan, as well as providing critical community context to help identify vulnerabilities to hazards. A detailed description of the HMCR Steering Committee including members and their role in developing the MJHMP is provided in Section 2.0: *Planning Process*.

1.4 Plan Organization - How To Use This Plan

This plan is divided into two volumes to clearly separate jurisdiction-specific elements from those that apply to the entire planning area.

Volume 1 encompasses all federally required elements of a hazard mitigation plan relevant to the entire planning area. Volume 1 is organized into seven sections to reflect the logical progression of activities undertaken to develop the MJHMP and includes all relevant documentation required to meet the necessary criteria for FEMA approval. Each section is briefly described below.

- **Section 1.0: Introduction** describes the background and purpose of the Plan, as well as the authority established for its development.
- **Section 2.0: Planning Process** describes the 10-step MJHMP planning process, as well as the meetings and outreach activities undertaken to engage County officials, staff, stakeholders and members of the public.
- **Section 3.0: Community Profile** provides the history, geography, demographics, and socioeconomics of the Clallam County, including land use and development trends. This section also evaluates social vulnerability through a variety of environmental justice indices and identifies applicability to the planning area.
- **Section 4.0: Hazards Assessment** identifies and profiles the natural and human-caused hazards affecting the County, identifies the vulnerability and risk associated with each hazard, and provides a vulnerability assessment to critical facilities in relation to each of those hazards.
- **Section 5.0: Mitigation Strategy** identifies the mitigation strategy and actions to reduce potential risks to the County's critical facilities, residents, and business owners and assesses the County's capabilities to implement and achieve the objectives of the mitigation actions.
- **Section 6.0: Plan Maintenance** discusses implementation of the Plan, including the process to monitor, evaluate, update, and maintain the MJHMP, and identifies opportunities for continued public involvement.
- **Section 7.0:** References identify the various resources utilized throughout the MJHMP.

Volume 1 also includes the following Appendices:

- **Appendix A – Plan Adoption Resolutions**
- **Appendix B – HMCR Steering Committee Materials**
- **Appendix C – Community Outreach Materials**
- **Appendix D – Vulnerability Summary**
- **Appendix E – HAZUS Results**
- **Appendix F – Annex Coordination**

Volume 2 includes all federally required jurisdiction-specific elements, in annexes for each participating jurisdiction. This includes a summary of the jurisdiction's participation in the planning process, a jurisdictional profile, a jurisdiction-specific hazards assessment and mitigation strategy for each participating jurisdiction.

All participating jurisdictions will adopt **Volume 1** in its entirety and adopt its individual jurisdiction specific annex in **Volume II** together with any appendix thereto.

1.5 Hazard Mitigation Goals

Through collaboration with participating jurisdictions, community engagement and consultant input, the County has developed the following hazard mitigation goals for the 2024 update of the MJHMP:

- **Goal 1**: Reduce the impacts of natural hazards on community lifeline infrastructure and services (including transportation routes, communication systems, utilities, and emergency services) and other critical assets through resiliency and reliability enhancement efforts, modernization, and redundancy of critical infrastructure such as dams.
- **Goal 2**: Emphasize the role of sustainable development and climate adaptation in hazard mitigation in order to minimize risks and vulnerabilities caused in part by climate change.
- **Goal 3**: Increase community capabilities and leverage interagency and public-private coordination to mitigate losses and prepare, respond, and recover from disasters. Prioritize effective long-term partnerships across all levels of government.

- **Goal 4**: Minimize property damage and reduce repetitive losses to property from natural hazards.
- **Goal 5**: Champion and prioritize people-centered mitigation actions in addition to property-centered actions.
- **Goal 6**: Enhance public outreach, education, and preparedness for all hazards, including effective strategies for reaching underserved and vulnerable populations. Empower the public to reduce personal vulnerability and enhance preparedness.

These goals reflect certain priority changes from the 2019 mitigation goals including:

- emphasis on climate risk reduction through climate adaptation strategies;
- focus on an all-community lifeline[1] approach to hazard mitigation;
- assessing our underserved vulnerable populations and formulating equitable mitigation outcomes.

The overall guiding principle for this MJHMP has remained the same: protect lives, preserve property, protect the environment, and restore the economy after a disaster.

[1] Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function (Ex. Health and Medical; Food, Hydration, Shelter; Transportation).

1.6 Plan Update – What Has Changed

This MJHMP update includes updated mitigation goals, the addition of newly profiled hazards and hazard profiles, a newly created analysis of socially vulnerable populations, the inclusion of quantitative climate change analysis and the identification of hazard mitigation projects that seek to reduce hazard risks, including risks exacerbated by climate change and social inequities.

The previous 2019 MJHMP mitigation goals were reviewed and updated by the HMCR Steering Committee and jurisdictional partners during HMCR Steering Committee meetings as described in Section 2.0: *Planning Process*. The updated mitigation goals are presented in Section 1.5 above. Documentation of the process to update the mitigation goals is presented in Appendix B: *HMCR Steering Committee Materials*.

The MJHMP Planning Team re-evaluated potential hazards that are applicable to the planning area and decided to incorporate additional hazards into this MJHMP. New hazards included in this updated MJHMP include:

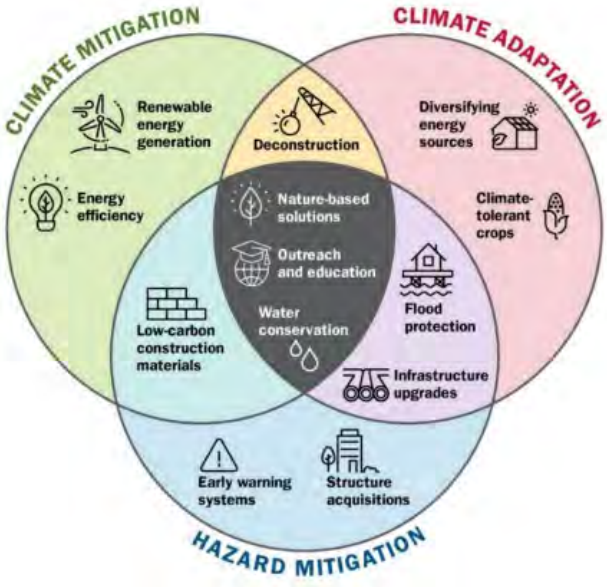
- Dam & Reservoir Failure
- Pandemic
- Human-Caused Hazards (Maritime Disasters, Supply Chain Interruption [Secondary Impacts])
- Sea Level Rise (Coastal/Bluff Erosion)
- Severe Weather (Windstorm/Tornado, Extreme Heat)
- Wildfire Smoke

All hazards identified include at least one hazard mitigation action, as identified in Section 5.0: *Mitigation Strategy*.

This MJHMP update includes a new identification and integration of Socially Vulnerable Populations (SVP) into the hazard mitigation planning process. The analysis of SVPs was based on the Center for Disease Control and Prevention Social Vulnerability Index, US Census and American Community Survey data at the census tract level, US Council on Environmental Quality's Climate and Economic Justice Screening Tool, and relevant

state and federal definitions of environmental justice and disadvantages, refer to Section 3.8: *Socially Vulnerable Populations and Determination*. The findings of the SVP analysis were considered on a hazard-by-hazard basis in Section 4.0: *Hazards Assessment*, and informed specific mitigation actions presented in Section 5.0: *Mitigation Strategy*.

Also included in the 2024 MJHMP are specific considerations of future conditions including quantitative analyses of climate change and the compounding impacts on a hazard-by-hazard basis. This update recognizes the overlap between climate mitigation, hazard mitigation and climate adaptation. These concepts were integrated into the hazard assessments and the hazard mitigation strategy development in identifying solutions involving climate adaptation consistent with FEMA's Climate Adaption Planning Guidance for Emergency Managers (April 2024), emphasized in the FEMA created figure below (pg. 3 of Guidance).



Where applicable, the direct and compounding impacts of climate change were assessed for each hazard profile in Section 4.0: *Hazards Assessment*. These considerations informed the vulnerability summary and probability of future events, including the type, location and range of anticipated intensities of identified hazards. Climate change considerations also informed specific mitigation actions presented in Section 5.0: *Mitigation Strategy*.

Each of these changes and/or additions reflect changes in the hazard mitigation priorities of the MJHMP Planning Team and updated state and federal requirements and policy guidance for hazard mitigation planning.

Table 1-1. Summary of Plan Changes, summarizes how major changes in this 2024 plan compare to the 2019 plan and are compliant with 44 CFR requirements.

Table 1-1. Summary of Plan Changes

44 CFR Requirement	Previous Plan	Updated Plan
§201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: **(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;** **(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and**	The 2019 MJHMP planning process included 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. The previous MJHMP was provided for public review prior to plan approval.	The 2024 MJHMP planning process includes a comprehensive community outreach strategy including a dedicated webpage, community surveys, various notification efforts, community outreach events, and distribution of a draft Plan for public review; refer to Section 2.1.7. Various stakeholders and jurisdictional partners were invited to participate in the planning process as members of the HMCR Steering Committee including businesses, academia and other private and non-profit interests; refer to Section 2.1.5. The HMCR Steering Committee reviewed and incorporated existing

44 CFR Requirement	Previous Plan	Updated Plan
(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.		plans, studies, reports and other technical information into the MJHMP; refer to Table 2-7.
§201.6(c)(2): The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.	The 2019 MJHMP provided a risk assessment of 12 identified natural and human-caused hazards which was used to identify and prioritize the mitigation strategy of the MJHMP.	The 2024 MJHMP includes a risk assessment of over 21 identified natural and human-caused hazards. The risk and vulnerability assessment of these hazards informed the mitigation strategy of the MJHMP. Refer to Section 4.0.
§201.6(c)(2)(i): [The risk assessment shall include a] description of the … location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.	The hazard profiles in the 2019 MJHMP included the following descriptions and discussions as sub-sections for each identified hazard: • Hazard Description • Location • Previous Occurrence/History	Hazard profiles in the 2024 MJHMP have been updated and now include the following descriptions and discussions as sub-sections for each identified hazard: • Description • Location/Extent • Previous Occurrences

44 CFR Requirement	Previous Plan	Updated Plan
	• Potential Impacts from Future Climate Conditions • Extent and Probability • Cascading Impacts Vulnerability	• Probability of Future Occurrences • Climate Change • Vulnerability and Risk Assessment Socially Vulnerable Populations
§201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i). This description shall include an overall summary of each hazard and its impact on the community.	The 2019 MJHMP included a description of the vulnerability to each identified hazard in their respective hazard profiles including an overall summary of the impacts on the community.	The 2024 MJHMP includes a summary of vulnerability for each identified hazard. Hazard profiles contain a summary of vulnerabilities and impacts to the community, the Vulnerability and Risk Assessment and Socially Vulnerable Populations sub-sections of each hazard profile in Section 4.0.
§201.6(c)(2)(ii): [The risk assessment] must also address National Flood Insurance Program insured structures that have been repetitively damaged floods.	The 2019 MJHMP addressed structures insured under the National Flood Insurance Program including repetitive loss properties and severe repetitive loss structure in Clallam County.	The 2024 MJHMP identifies and addresses the vulnerabilities of repetitive and severe repetitive loss properties in Section 5.5.2. The MJHMP includes FIRM information and FEMA flood data used to map flood zones.
§201.6(c)(2)(ii)(A): The plan should describe	The 2019 MJHMP summarized vulnerable	The 2024 MJHMP summarizes vulnerable

44 CFR Requirement	Previous Plan	Updated Plan
vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.	critical facilities by infrastructure type in each hazard profile. A detailed vulnerability analysis by critical facility is appended to the previous plan.	critical facilities by community lifeline in each hazard profile. A detailed vulnerability analysis by critical facility is provided in Appendix D-2: *Vulnerability Summary*.
§201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) and a description of the methodology used to prepare the estimate.	The 2019 MJHMP did not include loss estimation values.	Loss estimation values are summarized in each hazard profile. A detailed vulnerability analysis including loss estimation values is provided in Appendix D-2: *Vulnerability Summary*. The methodology of the vulnerability assessment including how loss values were estimated is provided in Section 4.3.
§201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.	The 2019 MJHMP included a discussion of land use and development trends and how vulnerability has changed since development of the previous MJHMP (2010).	The 2024 MJHMP includes an analysis of existing land use, and each hazard profile discusses vulnerability and how projected growth and development may result in changes in vulnerability over the 5-year planning period of the MJHMP. The findings of the vulnerability

44 CFR Requirement	Previous Plan	Updated Plan
		assessment informed the mitigation strategy.
§201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.	The 2019 MJHMP included jurisdictional annexes for each participating jurisdiction which assess jurisdiction-specific vulnerabilities.	The 2024 MJHMP includes jurisdictional annexes for each participating jurisdiction which assess jurisdiction-specific vulnerabilities.
§201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.	The 2019 MJHMP included a mitigation strategy and various mitigation actions that were developed to accomplish the goals of the MJHMP and mitigate impacts identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.	The 2024 MJHMP includes a mitigation strategy and various mitigation actions and climate adaptation actions that were developed to accomplish the goals of the MJHMP and mitigate impacts identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.
§201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.	The 2019 MJHMP identified 6 mitigation goals for Clallam County which were developed to reduce long-term vulnerabilities.	The 2024 MJHMP includes updated mitigation goals in Section 5.1, *Table 5-2*, which were developed by the HMCR Steering Committee and plan participants to reduce long-term impacts and

44 CFR Requirement	Previous Plan	Updated Plan
		vulnerabilities to Clallam County.
§201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.	The 2019 MJHMP included a list of mitigation strategy which considered a range of mitigation actions to reduce the effects of each hazard.	The 2024 MJHMP includes and updated mitigation strategy which considers a comprehensive range of mitigation actions to address the vulnerabilities of each identified hazard and emphasizes existing assets and future development.
§201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program, and continued compliance with the program's requirements, as appropriate.	The 2019 MJHMP addressed participation in the National Flood Insurance Program and included continued compliance with program requirements in the mitigation strategy.	The 2024 MJHMP addresses participation in the National Flood Insurance Program in in Section 5.5.2. Mitigation actions are included to maintain participation in the NFIP and mitigate losses of NFIP insured properties.
§201.6(c)(3)(iii): [The mitigation strategy shall describe] how the actions identified in Section (c)(3)(ii) will be prioritized, implemented, and administered by the local	Each mitigation action in the 2019 MJHMP was prioritized by the planning team based on maximizing loss reduction, STAPLE/E	Each mitigation action in the 2024 MJHMP is prioritized by the plan participants using a STAPLEE analysis and identifies a priority level, timeframe, and

44 CFR Requirement	Previous Plan	Updated Plan
jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.	analysis, and mitigation effectiveness.	responsible agencies/departments with an emphasis on the extent of benefits.
§201.6(c)(4)(i): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.	The 2019 MJHMP included a section on program implementation which included the method and schedule of monitoring, evaluating, and updating the mitigation plan.	The 2024 MJHMP includes Section 6.0: *Plan Maintenance*, which includes the method and schedule for updating the plan within five years and describes the process for monitoring, evaluating, and updating the mitigation plan.
§201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.	The 2019 MJHMP included a discussion integration of mitigation into existing planning mechanisms and how to incorporate the plan into standard policies and procedures as well as long-term planning documents and budgets.	The 2024 MJHMP includes Section 6.0: *Plan Maintenance*, which sets forth the process by which Clallam County will incorporate the requirements of the mitigation plan into other planning mechanisms, including the County's 2025 Comprehensive Plan.
§201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on	The 2019 MJHMP included a description of how Clallam County with	The 2024 MJHMP includes Section 6.6, Continued Public Involvement, which

44 CFR Requirement	Previous Plan	Updated Plan
how the community will continue public participation in the plan maintenance process	continue public involvement through a Mitigation Progress Report providing an update on the implementation of the plan.	describes how Clallam County will continue public involvement throughout the 5-year planning period. This includes regular updates on mitigation action progress as well as through the promotion of emergency preparedness, trainings, interagency coordinated outreach efforts, drills and other hazard awareness campaigns as included in Section 5.0 as mitigation actions.
§201.6(c)(5): [The local hazard mitigation plan shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commission, Tribal Council)	Documentation of the plan adoption was included in the 2019 MJHMP.	Documentation of plan adoption will be included in Appendix A: *Plan Adoption Resolutions*, upon plan approval.

1.7 Plan Adoption

Following FEMA approval of the MJHMP, the Board of County Commissioners and all participating cities, tribes, and special districts (participating jurisdictions) will formally adopt the MJHMP. Copies of the resolution are provided in Appendix A: *Plan Adoption Resolutions*.

1.8 Plan Maintenance

Section 201.6.(d)(3) of Title 44 of the Code of Federal Regulations requires that hazard mitigation plans be reviewed, revised if appropriate, and resubmitted for approval to remain eligible for benefits awarded under the DMA. Monitoring the progress of the mitigation actions will be on-going throughout the next five-year period between the adoption of the 2024 MJHMP and the next update effort. The HMCR Steering Committee will meet on an annual basis to monitor the status mitigation action implementation and develop updates as necessary.

Section 2.0: Planning Process

Hazard mitigation planning in the United States is guided by the statutory regulations described in the DMA 2000 and implemented through 44 Code of Federal Regulations (CFR) Parts 201 and 206. FEMA's hazard mitigation plan guidelines outline a specific planning process for the development and approval of hazard mitigation plans. The MJHMP followed the prescribed series of planning steps which included organizing resources, assessing risk, developing the mitigation strategy, drafting the plan, reviewing and revising the plan, adopting and submitting the plan for approval. Within this planning framework, there was an emphasis on public outreach and assuring the creation of a community-oriented plan focused on effective, doable mitigation actions tailored to the communities' needs and local government's capabilities and resources. Each planning stage is further described in this section.

2.1 Organizing Resources

The first step in the planning process involved organization of resources, including identifying the MJHMP Project Management Team, and convening the Hazard Mitigation and Climate Resilience (HMCR) Steering Committee and performing document review.

2.1.1 Project Management Team

The MJHMP Project Management Team was responsible for the day-to-day coordination of the MJHMP work program, including forming and assembling the HMCR Steering Committee and stakeholders; scheduling meetings; preparing, reviewing, and disseminating meeting materials; coordinating, scheduling, and participating in community engagement activities and meetings; and coordinating document review. The MJHMP Project Management Team included Clallam County staff from the Sheriff's Office (Diane Harvey), Deputy Director of Department of Community Development (Holden Fleming), and Director of Department of Community Development (Bruce Emery).

2.1.2 Clallam County Staff

In addition to members of the Project Management Team, internal staff members from various Clallam County departments participated as part of the HMCR Steering Committee. The role of County staff primarily included document review, participating in community outreach and meetings, and providing information to inform the MJHMP update. County staff on the HMCR Steering Committee represented the following departments:

- Community Development (DCD)Health and Human Services
- Information Technology (IT)
- Public Works

2.1.3 Sheriff's Office – Emergency Management Division: MJHMP Participating Jurisdictions

The MJHMP Project Management and County staff worked directly with representatives from each participating jurisdiction for MJHMP development. Participating jurisdictions were also invited to participate on the HMCR Steering Committee.

Representatives from each participating jurisdiction were involved throughout the planning process and engaged in the MJHMP planning process through one-on-one meetings, HMCR Steering Committee Meetings, and community outreach. Each participating jurisdiction was also responsible for updating and amending the information presented in their respective jurisdictional annex of the MJHMP. The jurisdictional annexes include the following participating cities, tribes, and special districts:

- City of Forks
- City of Port Angeles
- City of Sequim
- Jamestown S'Klallam Tribe
- Lower Elwha Klallam Tribe
- Clallam County Public Utilities District (PUD) #1
- Port of Port Angeles
    - Peninsula College

NOTE: Fire Districts cannot be included the Participating Jurisdiction List at this time. They would have to have separate Annexes, and we do not have current data on wildfire planning with the last CWPP created in 2009. After the new CWPP is developed in 2026, the annex can be created as an amendment.

2.1.4 MJHMP Consultant Team

The MJHMP Project Management Team, County staff, and Participating Jurisdictions worked directly with the MJHMP Consultant Team throughout development of the MJHMP. The Consultant Team included hazard mitigation/planning professionals from Michael Baker International performing work as a subconsultant under Cascadia Consulting Group. Cascadia Consulting Group served as the project coordinator on behalf of Clallam County and provided guidance and support to the County and through facilitation of the planning process, data collection, community engagement, meeting materials, and document development. Together the Project Management Team, County staff, Participating Jurisdictions, the Consultant Team and various representatives from neighboring jurisdictions/tribes, utilities, professional organizations, community-based organizations, schools/academia and other non-profits/NGOs made up the HMCR Steering Committee.

2.1.5 Hazard Mitigation and Climate Resilience (HMCR) Steering Committee

Concurrent to developing the MJHMP, Clallam County was also developing the Climate Element, a new requirement to integrate climate mitigation and resilience policies into the periodic Comprehensive Plan update. The Climate Element and MJHMP development aligned well as two planning efforts to address hazards and build resilience. The HMCR Steering Committee was formed for key partners to guide both planning processes.

Consistent with 44 CFR 201.6(b)(2), the MJHMP Project Management Team sought to create a HMCR Steering Committee that represented a diverse range of stakeholders, including local governments, utilities, professional organizations, community-based organizations, schools/academia, private local businesses, non-profits/NGO's, Tribal partners, and representatives from our neighboring jurisdiction, Jefferson County. The focus was to represent a cross section of relevant community lifelines. Community

lifelines are defined by FEMA as a fundamental service in the community that, when stabilized, enables all other aspects of society. When disrupted, decisive intervention (e.g., rapid service re-establishment or employment of contingency response solutions) is required. Community lifelines are categorized as follows:

- **Safety and Security**: Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety.
- **Food, Water, Shelter:** Food, Hydration, Shelter, Agriculture.
- **Health and Medical:** Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management.
- **Energy:** Power Grid, Fuel.
- **Communications:** Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch.
- **Transportation:** Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime.
- **Hazardous Materials:** Facilities, HAZMAT, Pollutants, Contaminants.
- **Water Systems:** Potable Water Infrastructure, Wastewater Management.

Stakeholders were notified via email, advising of the County's efforts to update the existing MJHMP and requesting their involvement in preparation of the Plan, including an invitation to attend the HMCR Steering Committee meetings. The list of stakeholders included in this invitation effort are summarized in *Table 2-1. HMCR Steering Committee and Community Lifelines* and *Table 2-2. HMCR Steering Committee Invitees*, below.

Table 2-1. HMCR Steering Committee and Community Lifelines

Agency or Utility Name	Community Lifeline
Local and Regional Agencies Involved in Hazard Mitigation Activities	
City of Forks	Safety and Security; Communications
City of Port Angeles	Safety and Security; Communications
City of Sequim	Safety and Security; Communications

Agency or Utility Name	Community Lifeline
Clallam County Sheriff's Office	Safety and Security; Communications
Clallam County Fire Protection Districts	Safety and Security; Communications
Clallam County Public Utilities District	Energy
Clallam Transit	Transportation
Jamestown S'Klallam Tribe	Safety and Security; Communications
Lower Elwha Klallam Tribe	Safety and Security; Communications
Agencies with the Authority to Regulate Development	
United States Coast Guard – Port Angeles	Safety and Security
Peninsula Housing Authority	Food, Water, Shelter; Safety and Security
North Olympic Development Council (NODC)	Food, Water, Shelter
Agencies of Neighboring Communities	
Hoh Tribe	Food, Water, Shelter; Safety and Security; Communications; Transportation
Jefferson County	Food, Water, Shelter; Safety and Security; Communications; Transportation
Makah Tribe	Food, Water, Shelter; Safety and Security; Communications; Transportation
Quileute Tribe	Food, Water, Shelter; Safety and Security; Communications; Transportation
Representatives of Business, Academia, and other Private Organizations	
Peninsula College	Food, Water, Shelter; Safety and Security; Communications;
Cascadia Water	Food, Water, Shelter
7 Cedars Resort	Food, Water, Shelter
Finnriver Farm & Cidery	Food, Water, Shelter

Agency or Utility Name	Community Lifeline
LifeFlight	Communications
North Olympic Library System	Communications, Safety and Security
Representatives of Nonprofit Organizations/Community Based Organizations	
American Red Cross	Food, Water, Shelter; Communications
Habitat for Humanity Clallam County	Food, Water, Shelter
Healthy Families of Clallam County	Food, Water, Shelter
Local 20/20	Food, Water, Shelter
OlyCap	Food, Water, Shelter
Olympic Humane Society	N/A
Olympic Medical Center	Health and Medical
Peninsula Behavioral Health	Health and Medical; Food, Water, Shelter
Port Angeles Food Bank	Food, Water, Shelter
Serenity House of Clallam County	Food, Water, Shelter
Washington Sea Grant	N/A

Table 2-2. HMCR Steering Committee Invitees

Name	Title	Organization	Topic Area
Sarah T. Martinez	Executive Director	Peninsula Housing Authority	Housing Services
Wendy Sisk	Executive Director	Peninsula Behavioral Health	Behavioral Health Services
Crystie Kisler	Co-Owner Finn River	Finn River Cider	Business & Agriculture
Cindy Jayne		Climate Group (NAME)	Climate Change
Bruce Emery	Director Community Development	Clallam County	Community Development

Name	Title	Organization	Topic Area
Holden Fleming	Chief Deputy Director Community Development	Clallam County	Community Development
Laurn Hinkle	Director	Olympic Humane Society	Dog/Cat Shelter
Lauren Lesser	Planning & Community Engagement Director	NODC	Economic Development & Climate
Karen Affeld	Executive Director	NODC	Economic Development & Climate
Marty Martinez	Director of Emergency Management	Peninsula College	Education
Noah Glaude	Executive Director	North Olympic Library System	Education
Meghan Sullivan	Library's Public Service Director	North Olympic Library System	Education
Megan Lyke	PIO	Sequim School District	Education
Lora York	Outreach	LifeFlight	Emergency Services
Erika Lindholm	Acting Executive Director	North Olympic Land Trust	Environment & Natural Resources
Lexi Wagor	Community Relations Manager	North Olympic Land Trust	Environment & Natural Resources
Kim Bray	Interim Natural Resources Director	Hoh Tribe	Environment & Natural Resources
Bill Paul	Fire Chief Clallam 1	Clallam 1 Fire Department	Fire & Emergency Services
Derrell Sharp	Fire Chief City of Port Angeles		Fire & Emergency Services

Name	Title	Organization	Topic Area
Jake Patterson	Fire Chief Clallam 2	Clallam 2 Fire Department	Fire & Emergency Services
Greg Waters	Fire Chief Clallam 4	Clallam 4 Fire Department	Fire & Emergency Services
Tony Hudson	Fire Chief	Clallam 3 Fire Department	Fire & Emergency Services
Heather Quinones	Fire Chief Clallam 5	Clallam 5 Fire Department	Fire & Emergency Services
Scott Swaggerty	Fire Chief 3 Rivers	Clallam 6 Fire Department	Fire & Emergency Services
Chip Keen	Fire Commissioner - 3 Rivers	Clallam 6 Fire Department	Fire & Emergency Services
Tim Wade		Forks Community Hospital	Fire & Emergency Services
Bill Wheeler	Volunteer	American Red Cross	Fire & Emergency Services
Blaine Zechenelly	CERT Lead/ Fire Rescue	CC Fire District 3	Fire & Emergency Services
Keith Koehler	Fire Rescue	CC Fire District 3	Fire & Emergency Services
Dennis Burnett	Emergency Management Coordinator	City of Sequim	Fire & Emergency Services
Willie Bence	Director of EM	Jefferson County	Fire & Emergency Services
Deb Stinson	Fire Commissioner	Jefferson County	Fire & Emergency Services
Ellen Chappelka	Coastal Resilience Specialist	Washington State Emergency Management Division	Fire & Emergency Services

Name	Title	Organization	Topic Area
Colleen Robinson		Habitat for Humanity Clallam County	Food & Housing Services
Kathy Morgan		OlyCAP	Food & Housing Services
Leslie Bond		Healthy Families of Clallam County	Food & Housing Services
Shawn Washburn		Healthy Families of Clallam County	Food & Housing Services
Sharon Maggard	Executive Director	Serenity House of Clallam County	Food & Housing Services
Emily Dexter	Director	Port Angeles Food Bank	Food & Housing Services
Andra Smith	Director	Sequim food Bank	Food & Housing Services
Jennifer Garcelon	Director of Environmental Services	Clallam County	Health & Human Services
Julie Black	Director	Olympic Medical	Hospital
Heidi Anderson	Chief Executive Officer	Forks Community Hospital	Hospital
Adria Williams	Ambulance Supervisor	Forks Community Hospital	Hospital
Mark Doten	IT Director	Clallam County	IT
Elizabeth Miller	LTJG	USCG AIRSTA PORT ANGELE (USA)	Military
Tom Sanford	Executive Director	North Olympic Land Trust	Natural Resources
Rod Fleck	City Planner/City Attorney	City of Forks	Planning

Name	Title	Organization	Topic Area
Charisse Deschenes	Deputy City Manager	City of Sequim	Planning
Shannen Cartmel	Deputy Director Community Services	City of Port Angeles	Planning
Lindsey Sehmel	Director of Community Development	Sequim	Planning
Will Habel	Natural Resource Planner and Grant Administrator	City of Port Angeles	Planning & Natural Resources
Paul Jarkiewich	Executive Director	Port of Port Angeles	Port
Jesse Waknitz		Port of Port Angeles	Port
Jim Fetzer	General Manager	Clallam Transit	Public Transportation
Rhiana Barkie	Clallam County Public Works Department	Clallam County	Public Works
Ron Garcelon	Clallam County Public Works Department	Clallam County	Public Works
Megan Uecker	Analyst	City of Sequim	Public Works
Joe Donisi	County Engineer/Deputy Director Public Works	Clallam County	Public Works - Roads
Steve Gray	Deputy Director Public Works - Utilities & Waste	Clallam County	Public Works - Transportation

Name	Title	Organization	Topic Area
Ian Miller	Scientist/Researcher	Washington Sea Grant	Research Environment/Climate
Lorraine Shore	Undersheriff/Director of Emergency Management	Clallam County	Sheriff's Office
Diane Harvey	Special Assistant to Sheriff's Command Staff	Clallam County	Sheriff's Office
Anne Chastain	Senior EM Coordinator	Clallam County	Sheriff's Office
Justine Chorley	EM Coordinator	Clallam County	Sheriff's Office
Glenn Roggenbuck	Director of EM	Lower Elwha Klallam Tribe	Tribal & Natural Resources
Tinker Lucas	Emergency Management Coordinator	Makah Tribe	Tribal & Natural Resources
James Roubal	Quileute Natural Resources Planner	Quileute Tribe	Tribal & Natural Resources
Frank Geyer	Quileute Natural Resources Director	Quileute Tribe	Tribal & Natural Resources
Julie Koelinger	Natural Resources Director	Hoh Tribe	Tribal & Natural Resources
Robert Knapp	Environmental Planning Manager	Jamestown S'Klallam Tribe	Tribal Planning
Luke Strong-Cvetich	Tribal Planning Director	Jamestown S'Klallam Tribe	Tribal Planning
Shailesh Shere	General Superintendent	Clallam PUD	Utility
Culley Lehman	General Manager	Cascadia Water	Water Services

The HMCR Steering Committee worked together to develop an MJHMP that reflects the priorities of Clallam County communities, and is responsible for its implementation and future maintenance. The HMCR Steering Committee's key responsibilities included:

- Participation in HMCR Steering Committee meetings
- Collection of valuable local information and other requested data
- Decision on plan process and content
- Development and prioritization of mitigation actions for the MJHMP
- Review and comment on plan drafts
- Coordination and involvement in the public engagement process

Table 2-3. HMCR Steering Committee, identifies the MJHMP Project Management Team, County staff, Participating Jurisdictions, Consultant Team and representatives from the various agencies and organizations that participated in the planning process which comprise the HMCR Steering Committee. The table identifies participating members, along with their title, jurisdiction/agency, meetings attended and role in plan development.

Table 2-3. HMCR Steering Committee

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
MJHMP Project Management Team				
Diane Harvey	Project Lead	Clallam County	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24	Project Manager – Organization of HMCR Steering Committee and meetings, development of and participation in community outreach, hazard identification, capabilities assessment,

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
			HMCR Workshop 8/7/24	mitigation actions and prioritization, plan coordination and review.
Holden Fleming	Comprehensive Planning Lead	Clallam County	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Workshop 8/7/24	Organization of HMCR Steering Committee and meetings, development of and participation in community outreach, hazard identification, capabilities assessment, mitigation actions and prioritization, plan coordination and review.
Bruce Emery	Comprehensive Planning	Clallam County	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24	Organization of HMCR Steering Committee and meetings, development of and participation in community outreach, hazard identification, capabilities

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
			HMCR Meeting 6/6/24 HMCR Workshop 8/7/24	assessment, mitigation actions and prioritization, plan coordination and review.
Clallam County Staff				
Anne Chastain	Emergency Management	Clallam County	HMCR Meeting 3/25/24	Project roles and responsibilities discussion, resource identification, hazard identification.
Jen Garcelon	Environmental Health Director	Clallam County	HMCR Meeting 3/25/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24	Project roles and responsibilities discussion, resource identification, hazard identification, critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
Jesse Goodman	Public Works Engineer	Clallam County	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization.
Justine Chorley	Emergency Management	Clallam County	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Workshop 8/7/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities discussion, risk assessment and vulnerability discussion, mitigation strategy discussion.

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
Mark Doten	IT Director	Clallam County	HMCR Meeting 3/25/24	Project roles and responsibilities discussion, resource identification, hazard identification.
Rhiana Barkie	Project Coordinator	Clallam County	HMCR Meeting 4/29/24 HMCR Meeting 6/6/24	Goals and objectives identification, hazard prioritization, risk assessment and vulnerability review, mitigation discussion.
Ron Garcelon	Utilities Manager	Clallam County	HMCR Meeting 4/29/24 HMCR Meeting 6/6/24	Goals and objectives identification, hazard prioritization, risk assessment and vulnerability review, mitigation discussion.
Tim Havel	Planner	Clallam County	HMCR Meeting 5/28/24 HMCR Workshop 8/7/24	Critical facilities review, risk assessment and vulnerability discussion, mitigation

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
				strategy discussion.
Participating Jurisdictions				
Rod Fleck	City Planner/City Attorney	City of Forks	HMCR Meeting 5/28/24	Critical facilities review, risk assessment and vulnerability discussion.
Brian Weekes	Planning Committee	City of Forks	HMCR Meeting 3/25/24	Project roles and responsibilities discussion, resource identification, hazard identification.
Will Habel	Environmental Planner	City of Port Angeles	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24 HMCR Workshop 8/7/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
				discussion, risk assessment and vulnerability review, mitigation discussion.
Meggan Uecker	Resource Analyst	City of Sequim	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Workshop 8/7/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion, mitigation strategy discussion.
Charisse Deschenes		City of Sequim	HMCR Meeting 3/25/24	Project roles and responsibilities discussion, resource identification,

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
				hazard identification.
Dennis Burnett	Emergency Management	City of Sequim	HMCR Meeting 4/29/24 HMCR Meeting 6/6/24	Goals and objectives identification, hazard prioritization, risk assessment and vulnerability review, mitigation discussion.
Lindsey Sehmel		City of Sequim	HMCR Meeting 6/6/24	Risk assessment and vulnerability review, mitigation discussion.
Matthew Huish	City Manager	City of Sequim	HMCR Meeting 3/25/24	Project roles and responsibilities discussion, resource identification, hazard identification.
Paul Bucich	Public Works Director	City of Sequim	HMCR Workshop 8/7/24	Critical facilities discussion, risk assessment and vulnerability discussion, mitigation strategy discussion.

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
Robert Knapp	Environmental Planning Manager	Jamestown S'Klallam Tribe	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization.
Luke Strong-Cvetich	Tribal Planning Manager	Jamestown S'Klallam Tribe	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24 HMCR Workshop 8/7/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
				review, mitigation discussion.
Alex Scagliotti	Environmental Planner	Jamestown S'Klallam Tribe	HMCR Workshop 8/7/24	Critical facilities discussion, risk assessment and vulnerability discussion, mitigation strategy discussion.
Jackie Johnson	Tribal Communications & Publications Specialist	Jamestown S'Klallam Tribe	HMCR Workshop 8/7/24	Critical facilities discussion, risk assessment and vulnerability discussion, mitigation strategy discussion.
Jenna Ziogas		Jamestown S'Klallam Tribe	HMCR Workshop 8/7/24	Critical facilities discussion, risk assessment and vulnerability discussion, mitigation strategy discussion.
Kim Kettel	Executive Assistant	Jamestown S'Klallam Tribe	HMCR Workshop 8/7/24	Critical facilities discussion, risk assessment and vulnerability discussion,

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
				mitigation strategy discussion.
Loni Greninger	Tribal Vice Chair	Jamestown S'Klallam Tribe	HMCR Workshop 8/7/24	Critical facilities discussion, risk assessment and vulnerability discussion, mitigation strategy discussion.
Ricky Johnson	Elders Service Manager	Jamestown S'Klallam Tribe	HMCR Workshop 8/7/24	Critical facilities discussion, risk assessment and vulnerability discussion, mitigation strategy discussion.
Wendy Clark-Getzin	Transportation Program Manager	Jamestown S'Klallam Tribe	HMCR Workshop 8/7/24	Critical facilities discussion, risk assessment and vulnerability discussion, mitigation strategy discussion.
Glen Roggenbuck	Director of EM	Lower Elwha Klallam Tribe	HMCR Meeting 5/28/24	Critical facilities review, risk assessment and vulnerability

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
			HMCR Meeting 6/6/24	discussion, risk assessment and vulnerability review, mitigation discussion.
Marty Martinez	Emergency Management Director	Peninsula College	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion.
Shailesh Shere	General Superintendent	Clallam County PUD #1	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Workshop 8/7/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
				identification, hazard prioritization, critical facilities discussion, risk assessment and vulnerability discussion, mitigation strategy discussion.
Mike Hill	Engineering Manager	Clallam County PUD #1	HMCR Meeting 4/29/24	Goals and objectives identification, hazard prioritization.
Jesse Waknitz	Environmental Manager	Port of Port Angeles	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24 HMCR Workshop 8/7/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
				vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.
Consultant Team				
Noelle Anderson	Hazard Mitigation Plan Lead	Michael Baker Intl.	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24 HMCR Workshop 8/7/24	MJHMP Lead – Organization of HMCR Steering Committee and meetings, development of and participation in community outreach, hazard identification, capabilities assessment, mitigation actions and prioritization, plan coordination and review.
Mary Ann Rozance	Project Manager & Climate Resilience Lead	Cascadia Consulting	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24	Project roles and responsibilities discussion, resource identification, hazard identification,

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
			HMCR Meeting 5/28/24 HMCR Meeting 6/6/24	goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.
Casey Marchese	Hazard Mitigation Analyst	Michael Baker Intl.	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion, risk assessment and

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
				vulnerability review, mitigation discussion.
Jake Poland	Hazard Mitigation Analyst	Michael Baker Intl.	HMCR Meeting 5/28/24 HMCR Meeting 6/6/24	Critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.
Abigail Lambert	Climate and Policy Analyst	Cascadia Consulting	HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24	Goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.
Alyssa Rodriguez	Engagement Lead	Cascadia Consulting	HMCR Meeting 3/25/24	Project roles and responsibilities discussion, resource identification,

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
			HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24	hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.
Victoria Alvarez-Conn		Cascadia Consulting	HMCR Meeting 5/28/24 HMCR Meeting 6/6/24	Critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.
Megan Horst		Cascadia Consulting	HMCR Meeting 6/6/24	Risk assessment and vulnerability review, mitigation discussion.

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
Kristina Zeynalova		Cascadia Consulting	HMCR Meeting 3/25/24	Project roles and responsibilities discussion, resource identification, hazard identification.
Jim Buck	Strategic Advisor		HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24 HMCR Workshop 8/7/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.
Representatives/Stakeholders				

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
Colin Young			HMCR Meeting 4/29/24	Goals and objectives identification, hazard prioritization.
Brandy Hooley	Security and Valet Manager	7 Cedars Resort	HMCR Workshop 8/7/24	Critical facilities discussion, risk assessment and vulnerability discussion, mitigation strategy discussion.
Amy Lehman	Administrative Manager	Cascadia Water	HMCR Meeting 4/29/24	Goals and objectives identification, hazard prioritization.
Culley Lehman	General Manager	Cascadia Water	HMCR Meeting 3/25/24	Project roles and responsibilities discussion, resource identification, hazard identification.
Jake Patterson	Fire Chief	Clallam County Fire District #2	HMCR Meeting 4/29/24 HMCR Meeting 5/28/24	Goals and objectives identification, hazard prioritization, critical facilities

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
			HMCR Meeting 6/6/24	review, risk assessment and vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.
Blaine Zechenelly		Clallam County Fire District #3	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24 HMCR Workshop 8/7/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
Keith Koehler		Clallam County Fire District #3	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24 HMCR Workshop 8/7/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.
Tony Hudson	Deputy Chief	Clallam County Fire District #3	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
				prioritization, critical facilities review, risk assessment and vulnerability discussion.
Chip Keen	Commissioner	Clallam County Fire District #6	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.
Jim Fetzer	General Manager	Clallam Transit	HMCR Meeting 3/25/24	Project roles and responsibilities discussion, resource

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
			HMCR Meeting 4/29/24	identification, hazard identification, goals and objectives identification, hazard prioritization.
Crystie Kisler		Finnriver/Jefferson County Climate Action Committee; Roots of Resilience	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion.
Julie Ann Koehlinger	Natural Resources Director	Hoh Tribe	HMCR Meeting 4/29/24 HMCR Meeting 5/28/24	Goals and objectives identification, hazard prioritization, critical facilities

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
				review, risk assessment and vulnerability discussion.
Cindy Jayne		Local 20/20	HMCR Meeting 4/29/24 HMCR Meeting 6/6/24	Goals and objectives identification, hazard prioritization, risk assessment and vulnerability review, mitigation discussion.
Tinker Lucas	Emergency Management Coordinator	Makah Tribe	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 6/6/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, risk assessment and vulnerability review, mitigation discussion.

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
Karen Affeld		North Olympic Development Council	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 6/6/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, risk assessment and vulnerability review, mitigation discussion.
Erika Lindholm		North Olympic Land Trust	HMCR Meeting 5/28/24	Critical facilities review, risk assessment and vulnerability discussion.
Lexi Wagor		North Olympic Land Trust	HMCR Meeting 5/28/24 HMCR Meeting 6/6/24	Critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
Tom Sanford		North Olympic Land Trust	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization.
Noah Glaude	Assistant Library Director	North Olympic Library System	HMCR Meeting 4/29/24 HMCR Meeting 5/28/24	Goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion.
Julie Black		Olympic Medical Center	HMCR Meeting 3/25/24	Project roles and responsibilities discussion, resource identification, hazard identification.

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
Sarah Martinez	Executive Director	Peninsula Housing Authority	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion.
Derrell Sharp	Fire Dept. Chief	Port Angeles Fire	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Workshop 8/7/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
				vulnerability discussion.
James Roubal		Quileute Tribe	HMCR Meeting 3/25/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24	Project roles and responsibilities discussion, resource identification, hazard identification, critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability review, mitigation discussion.
Ellen Chappelka	Coastal Resilience Specialist	Washington EMD	HMCR Meeting 4/29/24 HMCR Meeting 5/28/24 HMCR Meeting 6/6/24	Goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion, risk assessment and vulnerability

Name	Title/Role	Jurisdiction/ Agency	Meetings Attended	HMCR Steering Committee Role
				review, mitigation discussion.
Ian Miller	Coastal Hazard Specialist	Washington Sea Grant	HMCR Meeting 3/25/24 HMCR Meeting 4/29/24 HMCR Meeting 5/28/24	Project roles and responsibilities discussion, resource identification, hazard identification, goals and objectives identification, hazard prioritization, critical facilities review, risk assessment and vulnerability discussion.

A series of HMCR Steering Committee meetings were hosted from March to August, 2024. Five HMCR Steering Committee Meetings were hosted to introduce the MJHMP, outline the planning process, identify resources, discuss roles and responsibilities, develop goals, identify and prioritize hazards, identify critical facilities, assess risks, and develop mitigation strategies for the MJHMP. Stakeholders were invited to participate and provide input during each meeting. Meetings were held virtually to accommodate stakeholders distributed throughout the region along with remote staff serving on the MJHMP Consultant Team. It is noted that some meeting and engagement events served a dual planning purpose regarding the MJHMP update and Climate Element preparation process. Meeting materials, including PowerPoint presentations, sign-in sheets, agendas, notes, and other relevant handouts may reflect information on the MJHMP and Climate Element which are provided in Appendix B: *HMCR Steering Committee Materials*.

The meeting series was concluded with the NODC Energy Futures Conference. The meeting series is summarized below in Table 2-4. *HMCR Steering Committee Meeting Summary*.

In addition to the virtual HMCR Steering Committee Meetings, the HMCR Steering Committee hosted an HMCR community workshop in August, 2024. The community workshop was attended by HMCR Steering Committee members as well as community members. This event is included in Table 2-4 below to show stakeholder participation; additional details related to public engagement is presented in Section 2.1.7, *Public Outreach*.

Table 2-4. HMCR Steering Committee Meeting Summary

Meeting	Date/Time	Attendees	Discussion Items
HMCR Meeting #1	March 25, 2024 10:00 – 11:30 am	HMCR Steering Committee	• Project Roles/Responsibilities • Resource Identification • Hazard Identification
HMCR Meeting #2	April 29, 2024	HMCR Steering Committee	• MJHMP Goals and Objectives • Hazard Prioritization

Meeting	Date/Time	Attendees	Discussion Items
	1:00 – 3:00 pm		
HMCR Meeting #3	May 28, 2024 1:00 – 2:00 pm	HMCR Steering Committee	• Critical Facilities Review • Risk/Vulnerability Discussion
HMCR Meeting #4	June 6, 2024 1:00 – 3:00 pm	HMCR Steering Committee	• Risk/Vulnerability Review • Mitigation Actions Discussion
HMCR Workshop	August 7, 2024 1:30 – 3:30 pm	HMCR Steering Committee and Community Members	• MJHMP Planning Process Update • Critical Facilities • Risk/Vulnerability • Mitigation Strategy
HMCR Meeting #5	October 10, 2024 11:30 am – 2:00 pm	HMCR Steering Committee	• MJHMP Plan Maintenance • Notice of Public Review
NODC Energy Futures Conference Climate Element Policy Workshop	October 30,2024 12:50 – 3:50 pm	HMCR Steering Committee and other attendees	• MJHMP Updates and Next Steps • Climate Element Development Process • Climate Element Policy Review

2.1.6 Jurisdictional Annex Coordination

Direct coordination with each participating jurisdiction occurred throughout the planning process in addition to the meetings above. Representatives from each participating jurisdiction coordinated with the MJHMP Project Management Team and Consultant

Team to develop content for their respective jurisdictional annexes. This was accomplished via email; data requests and instructional worksheets were provided for each participating jurisdiction to review and update. Each data request was designed to guide participating jurisdictions in providing the following information for their jurisdictional annex:

- Data Request #1 (distributed April 15, 2024):
  - Interlocal/Voluntary Participation Agreement
  - Critical Facilities Review and Update
  - Repetitive Loss Properties
- Data Request #2 (distributed May 15, 2024):
  - Hazard Identification and Prioritization
  - Capabilities Assessment Review and Update
- Data Request #3 (distributed June 15, 2024):
  - Previous Mitigation Action Review
  - Past and Future Development and Growth Information
- Data Request #4 (distributed August 15, 2024):
  - New/Updated Mitigation Actions Worksheet

The information gathered from these data requests was used to develop each jurisdictional annex. Coordination with participating jurisdictions is documented in Appendix F: *Annex Coordination*.

The draft MJHMP was electronically circulated to the HMCR Steering Committee on November 18, 2024, for an internal 2-week review period concluding on December 2, 2024. At the conclusion of the internal review period, minor comments, edits and points of clarification were addressed in the MJHMP. Documentation of this process is included in Appendix B: *HMCR Steering Committee Materials*.

2.1.7 Public Outreach

The public outreach and engagement strategy was developed to maximize public involvement in the MJHMP planning process. The strategy included a dedicated webpage, community survey, promotion and outreach at community events, and distribution of a draft Plan for public review. Each public outreach and engagement effort is summarized below; refer to Appendix C: *Community Outreach Materials*. The

MJHMP public outreach process was specifically designed to maximize participation and input from all community members, including underserved groups and vulnerable populations.

2.1.7.1 Webpage

A dedicated webpage was developed on the Clallam County website for the MJHMP update and Climate Element planning processes. The webpage provided information on the MJHMP, and opportunities for the public to be involved in the planning process. A link to complete the community survey was posted to encourage participation. The survey summary was also posted once complete. HMCR Steering Committee meeting notes and slides were made available. The webpage also provided the opportunity to submit comments online, and contact information was included for additional comments or questions via email. The website was updated throughout the planning process and provided notifications and access to MJHMP materials.

The webpage provided the opportunity for individuals can access all project information at their own convenience and have the ability to communicate directly regarding questions or comments.

The draft MJHMP was also made available for public review on this webpage, available here: https://www.clallamcountywa.gov/1822/Hazard-Mitigation-Plan-Update.

2.1.7.2 MJHMP Community Survey

A community survey was developed and administered to obtain input from the community about various hazard mitigation topics, including identifying specific safety concerns, what hazards they felt were most likely to impact their community, and current preparedness and what actions they had taken to be more resistant to hazards. The survey was made up of four main sections:

1. **About you:** To understand more about the survey respondent, what jurisdiction they live in and general priorities.
2. **Natural Hazards:** To understand current knowledge of natural and human-caused hazards and preference for mitigation action types.
3. **Vulnerability to Natural Hazards:** To better understand how vulnerable communities may be to hazards.

4. **Optional demographics:** Included questions about age, race, ethnicity, and household income.

The survey was promoted via a press release through the Clallam County Sheriff's Office on March 12, 2024. The survey link was posted on the County MJHMP webpage. The survey was also promoted at the KONP Home Show, Kiwanis Club presentation, and KONP Radio Show segment. Members of the HMCR Steering Committee also distributed the survey link to colleagues and constituents within their jurisdiction. Each of these outreach efforts are further described below. The survey specifically provides outreach with underserved and vulnerable populations who may not have the capacity or ability to attend in-person outreach events or hearings. A detailed community outreach summary is included in Appendix C: *Community Outreach Materials*.

The survey was live from March 6, 2024, and closed May 10, 2024. A total of 619 responses were received. Of the 619 participants, approximately 31 percent are residents of Sequim, 28 percent are residents of Port Angeles, and 26 percent are residents of Unincorporated Clallam County; refer to Table 2-5. *MJHMP Survey Respondents by Jurisdiction*. Respondents were also asked about which socioeconomic factors make community members more vulnerable to hazards; refer to Table 2-6. *MJHMP Survey Vulnerability Factors*. Age and disability were among the highest concerns; this feedback was used to guide the mitigation strategy in addressing community-specific socially vulnerable populations (SVP). Survey respondents were asked about their level of concern for each hazard as well as about which hazards they have experienced in the past. Survey respondents expressed the highest levels of concern for earthquake, wildfire and wildfire smoke, power outage, windstorm and drought, refer to Figure 2-1 below. Respondents also noted that they have previously experienced power outages, windstorms, wildfire smoke, and winter storms once or multiple times per year while residing or working in Clallam County, refer to Figure 2-2 below. Survey responses allow the HMCR Steering Committee to better target future outreach and engagement activities regarding the MJHMP.

Table 2-5. MJHMP Survey Respondents by Jurisdiction

Jurisdiction	Survey Responses	Percentage
Port Angeles	176	28.4%

Jurisdiction	Survey Responses	Percentage
Sequim	193	31.2%
Forks	29	4.7%
Jamestown S'Klallam Tribe	6	1.0%
Elwha Klallam Tribe	0	0.0%
Quileute Nation	1	0.2%
Makah Tribe	16	2.6%
Unincorporated Clallam County	160	25.9%
Other (please specify)	38	6.1%
Total	619	100%

Table 2-6. MJHMP Survey Vulnerability Factors

Vulnerability Factors	Responses	Percentage
Age (children under the age of 18 or seniors over the age of 65)	471	76.1%
Disability Status (e.g., mobility, sensory, or developmental)	441	71.2%
Lack of Vehicle or Reliable Transportation	282	45.6%
Single-Parent Households	154	24.9%
Income status	246	39.7%
Limited-English proficiency	158	25.5%
Chronic illness	301	48.6%
Living in a vehicle, couch-surfing or temporary shelter or hotel	197	31.8%
Other (please specify)	72	11.6%

Figure 2-1. MJHMP Survey Hazards of Concern

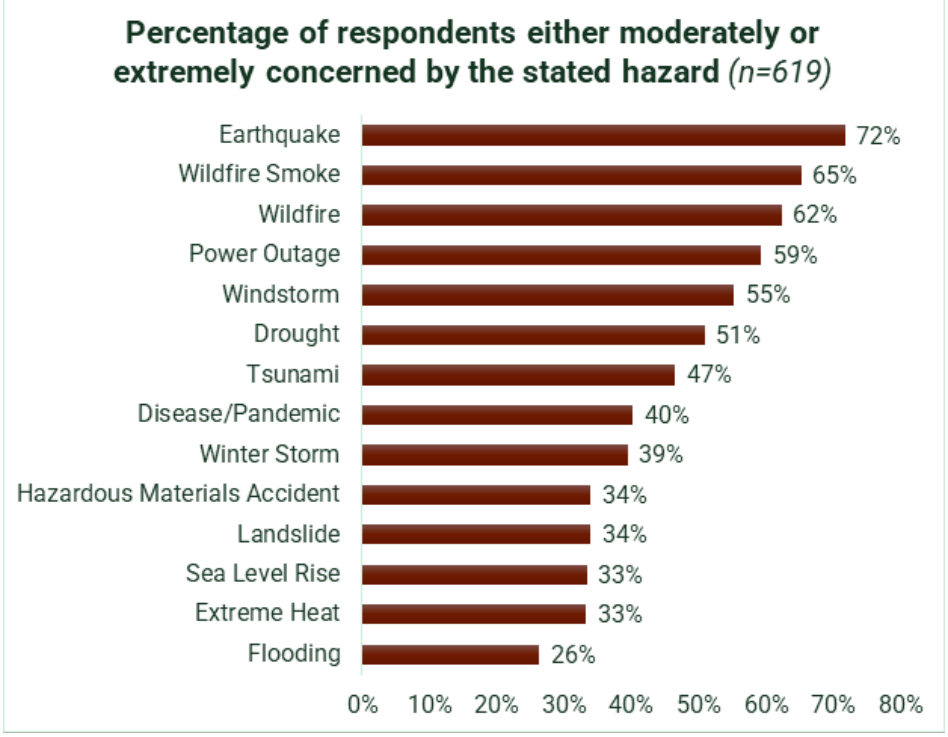
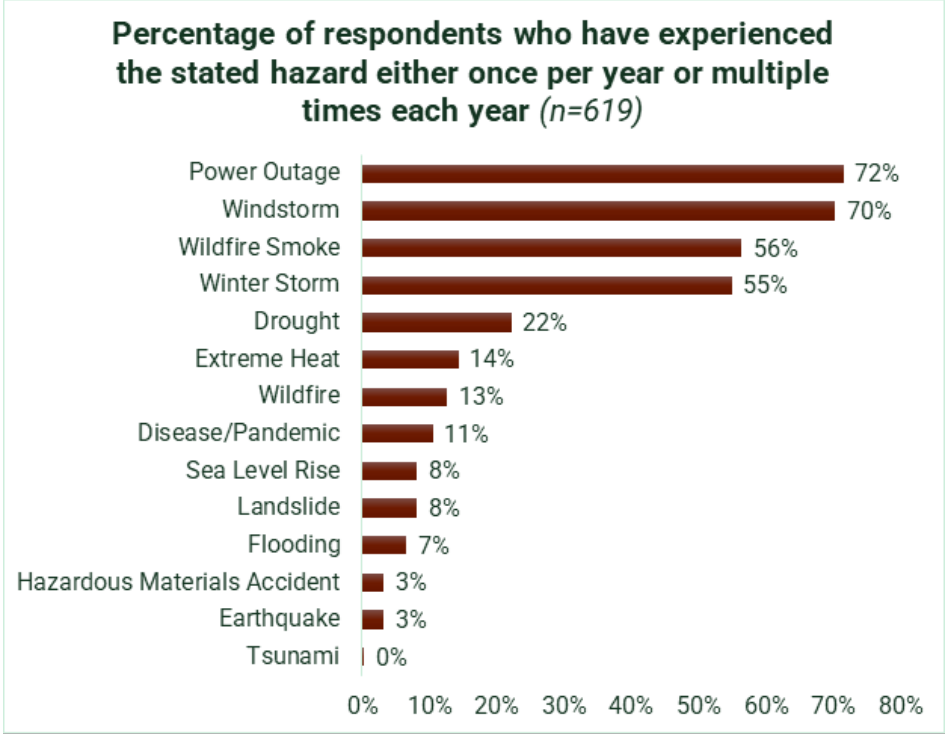


Figure 2-2. MJHMP Survey Hazards Experienced



2.1.7.3 Climate Risk & Resilience Community Survey

The Climate Risk and Resiliency Survey was the second of two community-wide surveys supporting the MJHMP and Climate Element. The first survey focused on hazards, while this survey focused on climate change and vulnerability to climate impacts. Specifically, this survey focused on how extreme weather and climate change is affecting Clallam County communities, identifying priorities for the Climate Vulnerability Assessment, and opinions on climate resiliency strategies.

The objectives of the Climate Survey included:

- Understand current climate awareness and experience for residents
- Identify priorities for enhancing resilience
- Gauge level of support for draft policy areas
- Solicit new ideas for climate policy

The survey was open from August 8, 2024 to October 4, 2024. The survey was hosted on the Clallam County ArcGIS Survey platform (same as MJHMP Survey 1), promoted through Clallam County media channels and press releases, and shared by HMCR Steering committee members and other partners. The survey received 142 responses.

2.1.7.4 Community Outreach Events

The intent of public outreach events was to use the "Whole Community" approach and reach stakeholders/community members in convenient ways to reduce barriers to participation and garner input.

Definitions:

Whole Community: engaging the full capacity of private and nonprofit sectors, including businesses, faith-based and disability organizations, and the general public, in conjunction with the participation of local, tribal, state, and Federal governmental partners (FEMA).

Social Vulnerability: characteristics of a person or group that affect their capacity to anticipate, cope with, resist, and recover from the impact of a discrete and identifiable disaster in nature or society (CDC).

KONP Home Show: A member of the MJHMP Project Management Team, Diane Harvey, promoted the MJHMP update and solicited public input at the 39th Annual KONP Home Show. The Home Show was hosted at the Port Angeles High School on March 9 and March 10, 2024. The MJHMP Project Management Team gathered input from 40 members of the public. Participants were asked to provide input on hazards they were most concerned about and potential solutions. Most respondents identified earthquake and wildfire as high hazards of concern, which matches the concerns of survey respondents.

Kiwanis Club Hazard Mitigation Presentation: A member of the MJHMP Project Management Team, Diane Harvey, presented to the Kiwanis Club of Port Angeles on April 4, 2024. The Kiwanis Club is part of a global network of clubs and members who take part in community service projects. The presentation focused on the risks and vulnerabilities of the community to natural hazards and introduced the MJHMP update. Attendees were asked to provide input on survey forms regarding hazards and potential solutions. The presentation was live streamed to the public on Facebook and posted on the Kiwanis Club Facebook page. Notice of the presentation was provided on the Facebook page.

KONP Radio Show Segment: A member of the MJHMP Project Management Team, Diane Harvey, appeared on The Todd Ortloff Show on April 15, 2024, to discuss the

MJHMP planning efforts and urged listeners to participate in the online community survey. The show was podcasted and posted on the KONP website.

HMCR and Community Tribal Workshop: An interactive, in-person HMCR Workshop was hosted at the Jamestown S'Klallam Tribal Center Red Cedar Hall on August 7, 2024, from 1:30 – 3:30 pm. Tribal members from the following Tribes were invited to attend to discuss hazard mitigation and climate adaptation strategies impacting Tribal communities: Jamestown S'Klallam, Lower Elwha Klallam, Makah, Quileute Nation, and the Hoh Tribe. The HMCR Steering Committee provided several informational boards regarding the MJHMP update process and information about key community lifelines. The workshop included a short overview presentation on the MJHMP, hazards, and expected climate impacts for the County. The Workshop also featured two main discussions, one focused on vulnerability to hazards and climate impacts and the latter on solutions and responses.

Participants were split into two discussion groups for 15 minutes. Group 1 discussed vulnerability assessment focus areas of economic development and land use, and public health and community wellbeing. Group 2 discussed focus areas of built infrastructure and natural environment, and water resources. Participants provided information on which physical assets (specific areas, critical facilities, infrastructure) are most vulnerable/at risk. Participants then held conversations focusing on the responses that Clallam County can take to build adaptive capacity to hazards and climate change. Participants discussed mitigation actions as well as policies, projects, other responses for Climate impacts.

Photos from the event are included as Figure 2-3. Results from this exercise, along with the presentation materials are documented in Appendix C: *Community Outreach Materials*.

Figure 2-3. Pictures from the MJHMP Workshop

Joyce Daze Wild Blackberry Festival: A member of the MJHMP Project Management Team, Diane Harvey, distributed information on the MJHMP update process at the 41st Annual Joyce Daze Wild Blackberry Festival on August 3, 2024. The event was hosted in the Town of Joyce, an unincorporated community in Clallam County, Washington. Diane Harvey promoted the MJHMP update at the Clallam County Sheriff booth and solicited public input via survey forms inquiring about hazards of concern and specific hazard locations for the HMCR Steering Committee to consider.

Fire Mitigation and Abbreviated Hazard Mitigation Workshop: During the month of May 2024, four presentations and question/answer sessions were given to members of the public in four different locations in Clallam County. The focus of these presentations was wildfire risk, response, and preparedness. This particular hazard was chosen as a result of the hazard mitigation public survey responses which indicated a significant concern for wildfire and smoke events. At each of the presentations, Clallam County Emergency Management Coordinator Ann Chastain discussed the MJHMP update and how the public could provide input using the comment box on the County's website. The presenters at each of the public events were from the local fire districts, the National Weather Service, the WA Department of Natural Resources, Clallam County Public Health, the US Forest Service and the American Red Cross. The public events occurred at the following venues: Forks Congregational Church (on May 4th); the Sekiu Community Center (May 11th); Clallam County Commissioners Room (May 18th) and the Guy Cole Event Center (May 25th). A flyer promoting the public events and the presentations slide have been included in Appendix C: *Community Outreach Materials*.

Clallam County Fair: A member of the MJHMP Project Management Team, Diane Harvey, promoted the MJHMP update and solicited public input at the Clallam County Fair hosted from August 15 – 18, 2024 at the Clallam County Fairgrounds in Port Angeles. The Clallam County Sheriff booth, where information on the MJHMP was available, was located alongside the booth for Project SAFER (Special Assistance For Emergency Response) which helps police, fire, and emergency responders learn ways to best help people who experience intellectual/developmental disabilities (IDD). The collaborative conversations between Clallam County Sheriff and Project SAFER and members of the Clallam County Fair garnered input from vulnerable populations about hazard mitigation the MJHMP update.

Public Safety Fair: On October 5, 2024, HMCR Steering Committee Member Justine Chorley (Clallam County Emergency Management Coordinator) and several volunteers from the Sheriff's Office, distributed information on the MJHMP update process at the Public Safety Fair at the Sequim Guy Cole Center. Hundreds of Clallam County residents attend this Fair every year which aims to give residents a hands-on look at the local services that help keep the community safe. The Radio Station advertisement and photos of the Fair are included in Appendix C: *Community Outreach Materials*.

North Olympic Development Council (NODC) Energy Futures Meeting: On October 30th, 2024, as the final HMCR Steering Committee meeting, the Climate Element and MJHMP project team invited all HMCR Steering Committee Members to attend the NODC Futures Energy and Climate Resilience Conference at 7 Cedars. The workshop goal was to gather input on proposed policy, help prioritize solutions, and brainstorm additional ideas for advancing climate resilience in Clallam County's Climate Element.

The meeting began with an overview of the Climate Element, Multi-jurisdictional Hazard Mitigation Plan, engagement, vulnerability assessment, and the policy development process. Most of the workshop was spent in two break out sessions, where facilitators broke into three small group discussions by focus areas. In the breakout discussions, attendees reviewed and provided feedback on draft policies on the 11 sectors of the Climate Element. Overall, roughly 60 participants provided feedback on draft policy. Key themes that emerged from the discussions included:

- Greater emphasis on Clallam County's specific areas, other relevant policies, places, and overall language.
- Suggestions to condense the text within policies and goals, and to refine action verbs and policy language.
- Incorporating resources and data from county, city, and tribal sources to strengthen and shape the policies.

2.1.7.5 Public Review Draft MJHMP

A draft of the MJHMP was made available on the County webpage for the public to review and comment for a 2-week period beginning on December 4, 2024, and ending on December 31, 2024. The MJHMP was posted on the Clallam County website and emails were sent to notify the public of the opportunity to review the document. The MJHMP received six public comments on the draft plan. Documentation of this process is included in Appendix C: *Community Outreach Materials*.

2.1.8 Review and Incorporate Existing Information

The HMCR Steering Committee referenced a variety of plans, studies, data and technical reports available from local, State, and federal sources to prepare the MJHMP update. Primary sources were reviewed and incorporated as part of the MJHMP

planning process, and are listed in Table 2-7. *Existing Plans, Studies, Reports, and Other Technical Data/Information*. A complete list of references is included in Section 7.0, *References*.

2.2 Assess Risks

In accordance with FEMA requirements, the HMCR Steering Committee identified and prioritized the hazards affecting the County and assessed vulnerability from those hazards. Results from this phase of the MJHMP planning process aided subsequent identification of appropriate mitigation actions to reduce risk from these hazards; refer to Section 5.0: *Mitigation Strategy*.

2.2.1 Identify/Profile Hazards

Based on a review of past hazards, as well as a review of existing plans, reports, and other technical studies, data, and information, the HMCR Steering Committee determined which specific hazards could affect the County. Content for each hazard profile is provided in Section 4.0: *Hazards Assessment*.

2.2.2 Assess Vulnerabilities

Hazard profiling exposes the unique characteristics of individual hazards and begins the process of determining which areas within the County are vulnerable to specific hazards. The vulnerability assessment included input from the HMCR Steering Committee and a GIS overlaying method for hazard risk assessments. Using these methodologies, critical facilities impacted by hazards were identified and potential loss estimates were determined, where available. Detailed information on the vulnerability assessments for each hazard is provided in Section 4.0: *Hazards Assessment*.

Table 2-7. Existing Plans, Studies, Reports, and Other Technical Data/Information

Existing Plans, Studies, Reports, and Other Technical Data/Information	Planning Process / Area of Document Inclusion
Clallam County Code Title 31: Comprehensive Plan	Multiple Plan Sections

Existing Plans, Studies, Reports, and Other Technical Data/Information	Planning Process / Area of Document Inclusion
Clallam County Code Title 32: Floodplain Management	Hazard Profiles; Mitigation Strategy
Clallam County Code Title 35: Clallam County Shoreline Master Program	Hazard Profiles; Mitigation Strategy
Clallam County Community Wildfire Protection Plan	Hazard Profiles; Mitigation Strategy
Clallam County Comprehensive Emergency Management Plan	Hazard Profiles; Vulnerability Assessment; Mitigation Strategy; Capabilities Assessment
Clallam County Graphic Information Systems (GIS) Portal	Vulnerability Assessment
Clallam County Multi-Jurisdictional Hazard Mitigation Plan (2019)	Hazard Profiles; Jurisdictional Profiles; Mitigation Strategy
FEMA Hazard Mitigation Plan x Washington Department of Commerce's Climate Element Planning Guidance	Multiple Plan Sections
FEMA Local Mitigation Plan Review Guide	Multiple Plan Sections
FEMA Local Mitigation Planning Handbook	Multiple Plan Sections
FEMA Local Mitigation Planning Policy Guide	Multiple Plan Sections
Makah Tribe Hazard Mitigation Plan (2023)	Hazard Profiles; Mitigation Strategy
National Oceanic and Atmospheric Administration Databases	Hazard Profiles
Peabody Heights Dam Emergency Action Plan	Hazard Profiles
Quillayute Airport Microgrid Feasibility Report	Mitigation Strategy
State of Washington Enhanced Hazard Mitigation Plan 2023	Hazard Profiles; Mitigation Strategy
United States Drought Monitor	Hazard Profiles

Existing Plans, Studies, Reports, and Other Technical Data/Information	Planning Process / Area of Document Inclusion
United States Geological Survey Science Data Catalog	Hazard Profiles, Vulnerability Assessment
Washington Geological Survey	Hazard Profiles; Mitigation Strategy
Washington State Climate Resilience Strategy (2024)	Mitigation Strategy

2.3 Develop Mitigation Plan

2.3.1 Identify Goals

The HMCR Steering Committee reviewed mitigation goals from the previous MJHMP and Washington State Enhanced Hazard Mitigation Plan to develop updated mitigation goals that reflect the priorities of the Clallam County. Hazard mitigation goals were discussed during HMCR Meetings #1 and #2, before finalization and incorporation into the MJHMP. The Mitigation Goals are included in Section 1.0: *Introduction*.

2.3.2 Develop Capabilities Assessment

A capabilities assessment is a comprehensive review of all the various mitigation capabilities and tools currently available to the County for the mitigation action implementation prescribed in the MJHMP. The HMCR Steering Committee identified the technical, financial, and administrative capabilities to implement mitigation actions, as detailed in Section 5.3, *Capabilities Assessment*.

2.3.3 Identify Mitigation Actions

As part of the MJHMP planning process, the HMCR Steering Committee worked to identify and develop mitigation actions, after which mitigation actions were prioritized as high, medium, or low. A detailed discussion of the identification and prioritization of mitigation actions, and the creation of the implementation strategy is provided in Section 5.0: *Mitigation Strategy*.

2.3.4 Plan Adoption and Submittal

This Plan will be submitted to Washington Emergency Management Division (EMD) and FEMA for review. Upon receiving "approvable pending adoption" notification from FEMA, this Plan will be presented to the Clallam County Board of Commissioners and all participating cities, tribes, and special districts (participating jurisdictions) for consideration and approval. If approved, a copy of the resolution will be provided in Appendix A: *Plan Adoption Resolutions*.

2.3.5 Plan Maintenance

Plan maintenance procedures, found in Section 6.0: *Plan Maintenance*, include the measures the County will take to ensure the continuous long-term implementation of the MJHMP. The procedures also include the manner in which the MJHMP will be regularly monitored, reported upon, evaluated, and updated to remain a current and meaningful planning document.

Section 3.0: Community Profile

3.1 Geography and Governance

Clallam County (the planning area) is located within the northernmost portion of the Olympic Peninsula, including 1,738 square miles of mostly forested and mountainous land.[2] The County stretches nearly 100 miles of coastline along the Strait of Juan de Fuca to the north, and more than 35 miles of coastline along the Pacific Coast to the west. The Strait of Juan de Fuca also forms the U.S.-Canada Border. Jefferson County adjoins the planning area to both the east and south. Clallam County is approximately 150 miles outside of the City of Seattle, Washington. *Exhibit 3-1* below depicts Clallam County's regional location.

The governing body of Clallam County is made up of three districts: District 1, District 2, and District 3 governed by the Board of Commissioners. The Board of Commissioners is responsible for providing the legislative and executive functions of County government. Legislative functions are accomplished at meetings of the Board by adopting ordinances, policies, or resolutions that set public policy and guide government functions. The Board is also responsible for most executive functions of County government.

Clallam County is the lead jurisdiction in the MJHMP. This Plan also includes the following participating jurisdictions:

- City of Forks
- City of Port Angeles
- City of Sequim
- Jamestown S'Klallam Tribe
- Lower Elwha Klallam Tribe
- Clallam County Public Utilities District (PUD) #1
- Port of Port Angeles

[2] Employment Security Department, *Clallam County Profile*, https://esd.wa.gov/labormarketinfo/county-profiles/Clallam, accessed May 22, 2024.

- Peninsula College

Jurisdictional profiles for each participating jurisdiction are provided in their respective jurisdictional annexes. *Exhibit 3-2* below depicts the location of these participating jurisdictions.

The Clallam County interior consists of both the Olympic National Park and Olympic National Forest, including over a million acres of wilderness. The Olympic Mountains reach elevations of nearly 8,000 feet and are deeply incised by rivers. Incorporated cities include the City of Port Angeles (County seat) and City of Sequim in the northeastern coastal portions of the planning area and the City of Forks in the western county. Due to the expansive nature of the Olympic Mountain Range, transportation routes are restricted to narrow portions of the coastal shelf. U.S. Interstate 101 (a single two-lane highway) transects the County from east to west, with State Routes 110, 112, 113, and 117 providing additional two-lane connections within the northwest portion of the County. Various county roads and city streets make up the remainder of the planning area transportation system.

3.1.1 Climate

The planning area is impacted by winter storms that move inland from the ocean, resulting in heavy precipitation and winds of gale force. Pacific mid-latitude cyclones are common. The temperate 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 in the lower mountainous elevations. Higher elevations can receive between 250 to 500 inches of precipitation. According to the National Oceanic and Atmospheric Administration (NOAA), Clallam County experienced an average rainfall of 77.49 inches between February 2023 and January 2024.[3]

The eastern section of the County experiences annual precipitation ranges from approximately 18 inches in Olympic Mountain rain shadow near Sequim. in the vicinity

[3] NOAA.gov, *County Time Series*, https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/county/time-series/WA-009/pcp/12/1/1895-2024, accessed August 29, 2024.

of Port Angeles.[4] Measurable precipitation is recorded on three to five days each month in summer and on 17 to 22 days in winter. Regarding snowfall, the Olympic Mountains snow level is between 1,500 and 3,000 feet above sea level in midwinter.[5] Snowstorms impacting the lowlands are common several times each winter. Clallam County experienced its greatest recorded daily snowfall in 1996, when 20 inches of snow fell in the County a single day.[6]

From February 2023 to January 2024, Clallam County experienced an average annual temperature of 48.5°F.[7] The County experienced its highest and lowest average temperatures in 2016 and 1956 respectively, at a record high of 49.6°F in 2016 and record low of 43.9°F in 1956.[8] As the impacts of climate change continue to be studied and evolve over the coming years, more severe fluctuations in average temperature, precipitation, and snowfall may be observed within Clallam County and throughout the Olympic Peninsula.

[4] WRCC, *Climate of Washington*, https://wrcc.dri.edu/Climate/narrative_wa.php, accessed August 29, 2024.

[5] Clallam County Emergency Management, *Multi-Jurisdictional Hazard Mitigation Plan 2019 Update*, approved January 28, 200.

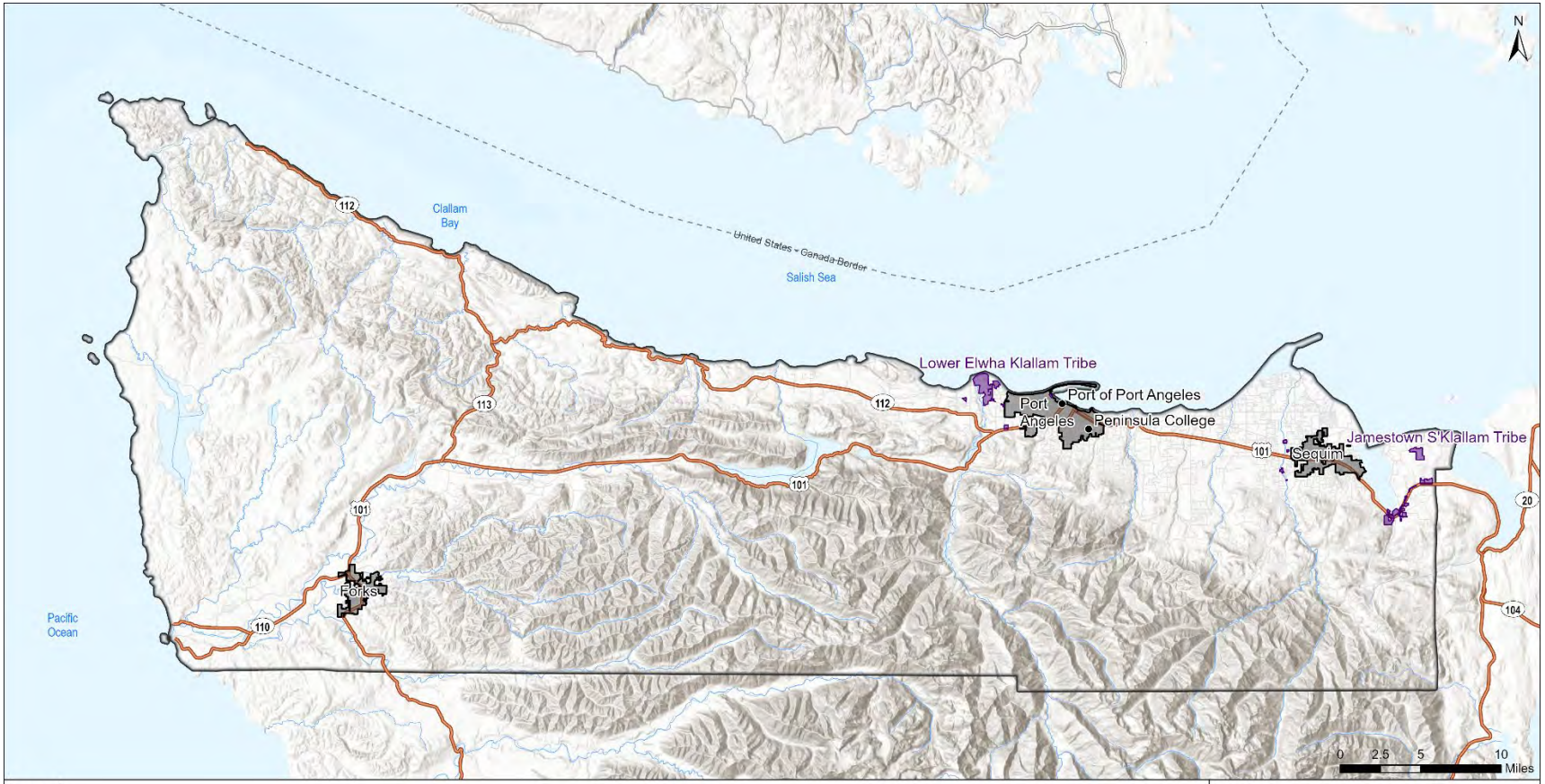
[6] NOAA.gov, *Snowfall Extremes*, https://www.ncei.noaa.gov/access/monitoring/snowfall-extremes/WA, accessed August 29, 2024.

[7] NOAA.gov, *County Time Series*, https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/county/time-series/WA-009/tavg/12/1/1895-2024, accessed August 29, 2024.

[8] Ibid. *("Ibid" used throughout when citing the same source multiple times in a row.)*

Exhibit 3-1. Regional Location

Exhibit 3-2. Clallam County and Participating Jurisdictional Annexes



Legend

- County Boundary
- Highway
- Local Road
- Stream
- City Limit
- Tribal Reservation

Clallam County, WA

August 21, 2024

Coordinate System: Washington State Plane North

Data Source: WA Dept. of Ecology 2024

3.1.2 Watersheds

Clallam County includes watersheds associated with the numerous rivers throughout the County. The four Water Resource Inventory Areas (WRIA) within Clallam County are summarized below.

WRIA 18 Elwha Dungeness: The Elwha River and Dungeness River are located in the north and northeastern areas of Clallam County. The WRIA 18 is distinguished between West WRIA 18 and East WRIA 18. West WRIA 18 (Elwha Morse) features the Elwha River and its tributaries to the west, Morse Creek to the east, and several smaller urban streams in between, such as Dry, Tumwater, Valley, Peabody, White, Ennis, and Lees creeks. The Elwha River and Morse Creek begin in the Olympic Mountains, while the smaller streams originate in the foothills north of the main Olympic range and along the northern boundary of Olympic National Park. All these streams flow into the Strait of Juan de Fuca. East WRIA 18 (Dungeness) is located in eastern Clallam and Jefferson Counties on the Olympic Peninsula, about 55-80 miles east of the Pacific Ocean. This area is bordered by the Strait of Juan de Fuca to the north, the Morse Creek watershed (West WRIA 18) to the west, the Dosewallips River watershed (part of WRIA 16) to the south, and the Big and Little Quilcene River watersheds and the Miller Peninsula (part of WRIA 17) to the east.[9]

WRIA 17 Quilcene-Snow: The Quilcene-Snow Watershed encompasses the drainage areas of the Big Quilcene River, Little Quilcene River, and Snow Creek, along with several smaller creeks on the Quimper and Toandos peninsulas and in the Chimacum Valley. This watershed is situated in northwest Washington on the Olympic Peninsula, at the mouth of Puget Sound, within the rain shadow of the Olympic Mountains. The WRIA 17 planning area includes Sequim Bay and Miller Peninsula portions of Clallam County which have been incorporated into the planning area for Dungeness River Management Team in WRIA 18. Annual precipitation in the Quilcene-Snow watershed ranges from 15 to 30 inches, mostly occurring in winter when water demand is low. Only a small portion of this precipitation becomes usable groundwater. The watershed receives minimal

[9] Clallam County, *Elwha-Dungeness Watershed Plan*, https://www.clallamcountywa.gov/812/Elwha-Dungeness-Watershed-Plan, accessed August 28, 2024.

benefit from snowpack, so during the dry summer months, stream flows rely heavily on groundwater inflow.[10]

WRIA 19 Lyre-Hoko: The Lyre-Hoko Watershed encompasses the drainage areas of the Lyre, Hoko, Pysht, West Twin, and East Twin rivers, all of which flow into the Strait of Juan de Fuca. This watershed includes numerous other creeks and streams and is situated in Clallam County, at the northern tip of the Olympic Peninsula. Most rainfall in the watershed occurs from fall to spring. During summer, rainfall is minimal, causing stream flows to rely heavily on groundwater inflow.[11]

WRIA 20 Sol Duc-Hoh: The Sol Duc-Hoh Watershed encompasses the drainage areas of the Sol Duc, Hoh, Bogachiel, and Calaweh rivers, along with smaller tributaries that flow into the Pacific Ocean. This watershed is situated in northwest Washington on the Olympic Peninsula, covering the southwestern part of Clallam County and the northwestern part of Jefferson County. Annual precipitation in the Sol Duc-Hoh Watershed varies from 100 inches in the coastal lowlands to 180 inches in the Olympic Mountains, with most rainfall occurring in winter when water demand is low. In summer, the absence of snowpack and minimal rainfall cause stream flows to rely on groundwater inflow.[12]

3.1.3 Geology

The Olympic Peninsula's geology is characterized by non-volcanic mountains formed from ancient underwater sediments and volcanic basalt outcroppings uplifted by subduction along the North American plate margin. Coastal bluffs have eroded into sea stacks, and snowmelt has created rivers and lakes.[13] The coast features diverse rock types, including pebbles, cobbles, and fine sediments from the last ice age. Clallam County is underlain by up to 2,000 feet of unconsolidated Quaternary deposits, primarily of glacial origin, with three aquifers, two confining beds, and a lower unit of

[10] Washington Department of Ecology, *WRIA 17 Quilcene-Snow Watershed Water Availability*, published October 2023.

[11] Washington Department of Ecology, *WRIA 19 Lyre-Hoko Watershed Water Availability*, published October 2023.

[12] Washington Department of Ecology, *WRIA 20 Soleduc-Hoh Watershed Water Availability*, published July 2024.

[13] National Park Service, *Geology of Olympic*, https://www.nps.gov/olym/learn/nature/geology.htm, accessed August 28, 2024.

undifferentiated deposits, underlain by a bedrock unit at the base of the groundwater system.[14]

3.2 History

Clallam County is composed of the traditional lands of Klallam, Makah, and Quileute peoples who continue to play a significant role in the County.[15] The Klallam or S'Klallam ("the strong people") occupied the largest portion of Clallam County, and it is from these native people that the County derived its name. The Klallam people's territory stretched along the Strait of Juan de Fuca from the Hoko River to the east beyond Discovery Bay. There are two S'Klallam bands living in the county: the Jamestown S'Klallam Tribe, and the Lower Elwha Klallam.[16]

Around 1851, the first white settlers staked claims in the area that would soon be known as Clallam County, after being distinguished from Jefferson County in 1854. In 1855, S'Klallam leaders signed the Treaty of Point No Point with the U.S. Federal Government, trading vast amounts of land and resources in exchange for the right to continue to hunt, fish, and gather in their "usual and accustomed ground".[17] In 1890, the City of Port Angeles was incorporated into Clallam County and was named the County seat. The City of Sequim was later incorporated in 1913, followed by the City of Forks in 1945. These three cities remain the only incorporated jurisdictions within Clallam County.

Initially, logging was the primary industry in the County and benefitted greatly when railroads allowed for further reach into the great conifer stands. Hydroelectric power from the Elwha River dam spurred the first large sawmill in the County. The "Big Mill" was the largest employer in the County for 25 years. World War I fueled the need for

[14] USGS, *Hydrogeologic assessment of the Sequim-Dungeness area*, Clallam County, Washington, https://pubs.usgs.gov/publication/wri994048, accessed August 28, 2024.

[15] History Link, *Clallam County – Thumbnail History*, https://www.historylink.org/File/, posted December 27, 2005, accessed May 6, 2024.

[16] Ibid.

[17] Jamestown Tribe, *The Strong People*, https://jamestowntribe.org/, updated 2024, accessed May 6, 2024.

spruce, which was vital in the construction of the first airplanes. In the 1920s, the City of Port Angeles produced pulp to address the growing need for newsprint and cellulose.[18]

After World War II, timber and agriculture continued to grow and commercial and sport fishing activities became increasingly important. Clallam County tribes reclaimed traditions and reasserted tribal fishing rights. The Jamestown S'Klallam tribe won federal recognition in 1981, and received trust land at Blyn on Sequim Bay, which now houses the tribal center and casino.[19]

In more recent history, the service and tourism sector in Clallam County has experienced growth in the last decade. In 2021, the service sector accounted for 88.7 percent of all non-agricultural employment.[20] In addition to accommodating Olympic National Park and National Forest tourism, several major events and festivals are hosted in Clallam County including: the Sequim Lavender Festival, the Clallam County Fair, the Joyce Daze Blackberry Festival, and Forks Forever Twilight Festival. During the summer months, the Clallam County population can grow by the thousands due to peak tourism travel.

Other new industries have moved into the County in the past decade, increasing overall employment. In 2021, goods-producing industries advanced 6.8 percent over 2020, including both the construction (up 8.6 percent) and manufacturing (up 5.1 percent) industries. Over the past 20 years, Clallam County's economy has experienced slow but steady growth.

3.3 Demographics and Socioeconomic Factors

Population, education, employment, and housing data for Clallam County is described in the following sections.

[18] Washington State Employment Security Department, *Clallam County Profile,* https://esd.wa.gov/labormarketinfo/county-profiles/Clallam, updated 2021, accessed May 8, 2024.

[19] Ibid.

[20] Ibid.

3.3.1 Clallam County Population

Table 3-1. Clallam County and Washington State Population and Housing Data (2022), provides and overview of County and state demographics.

Table 3-1. Clallam County and Washington State Population and Housing Data (2022)

Category Description	Clallam County	Washington State
Total population	77,333	7,688,549
Percent of Residents that are children (under 18 years)	16.6%	21.6%
Percent of Residents that are senior citizens (65 and over)	30.7%	16.0%
Median Age (years)	51.2	38
Median Household Income	$66,108	$90,325
Median House Value (Owner-occupied housing units)	$353,600	$473,400
Occupied Housing Units	34,128	2,979,272
Percent of Renter-Occupied Housing Units	27.1%	63.8%
Percent of Owner-Occupied Housing Units	72.9%	36.2%
Average Household Size	2.53	2.75

Source: US Census Bureau, 2022: American Community Survey 5-Year Estimates, *DP05 Demographic and Housing Estimates*.
US Census Bureau, 2022: American Community Survey 5-Year Estimates, *DP04 Selected Housing Characteristics*.
US Census Bureau, 2022: American Community Survey 5-Year Estimates, *S0101 Age and Sex*.
US Census Bureau, 2022: American Community Survey 5-Year Estimates, *S1101 Households and Families*.
US Census Bureau, 2022: American Community Survey 5-Year Estimates, *S2503 Financial Characteristics*.

Clallam County has an estimated population of 77,333 according to 2022 American Community Survey (ACS) 5-year estimates. Clallam County residents 65 and older make up 30.7 percent of the County's population, while residents under the age of 18 account for only 16.6 percent of the population. The remaining 52.7 percent of the population is

between the ages of 18 and 65. The median age of County residents is 51.2 years of age. Comparatively, Washington State age demographics are composed of 16 percent of residents 65 and over, with 21.6 percent of residents under the age of 18. Approximately 62.4 percent of the population is between the ages 18 and 65, with a median age of 38 years. Overall, these metrics show that Clallam County has an older population when compared to Washington State.

The County has a lower median household income and median house value compared to Washington State. The median household income in Clallam County is $66,108, which is approximately 30 percent lower than that of the Washington State at $90,325. Similarly, the median home value in the County is roughly 20 percent lower than that of the state. The County has an average household size of 2.53 persons per household, and the average household size across Washington State is 2.75 persons per household. The percentages of owner-occupied and renter-occupied housing units between the County and the state are relatively inverse with the State's percent of renter-occupied housing units at 63.8 percent and owner-occupied housing units at 36.2 percent compared to Clallam County's renter -occupied housing units at 27.1 percent and owner-occupied housing units at 72.9 percent.

Table 3-2. Clallam County and Washington State Racial and Ethnic Composition (2022), provides an overview of the County and state's racial and ethnic demographics.

Table 3-2. Clallam County and Washington State Racial and Ethnic Composition (2022)

Race or Ethnicity	Clallam County		Washington State	
	Population	Percentage	Population	Percentage
Hispanic or Latino (of any race)	5,553	7.2%	1,037,153	13.5%
White	62,462	80.8%	5,038,521	65.5%
Black or African American	627	0.8%	290,907	3.8%
Native American and Alaska Native	2,861	3.7%	67,829	0.9%
Asian	1,292	1.7%	702,336	9.1%

Race or Ethnicity	Clallam County		Washington State	
	Population	Percentage	Population	Percentage
Native Hawaiian and other Pacific Islander	14	0.0%	51,303	0.7%
Some Other Race alone	107	0.1%	35,220	0.5%
Total Population	**77,333**	**100%**	**7,688,549**	**100%**
Source: US Census Bureau, 2022: American Community Survey 5-Year Estimates, *DP05 Demographic and Housing Estimates*.				

The largest ethnic group in Clallam County is the White population, accounting for 80.8 percent of the County's total population. The County's remaining ethnic makeup consists of Hispanic or Latino at 7.2 percent, Native American and Alaska Native at 3.7 percent, Asian at 1.7 percent, Black or African American at 0.8 percent, and Native Hawaiian and other Pacific Islander at 0.0 percent with a total estimate of 14 individuals. Persons identifying as some other race account for 0.1 percent of the population, while those identifying as two or more races make up 5.7 percent of the population.

The racial/ethnic makeup of Washington State consist of White at 65.5 percent, Hispanic or Latino at 13.5 percent, Asian at 9.1 percent, Black or African American at 3.8 percent, Native American and Alaska Native at 0.9 percent, and Native Hawaiian and other Pacific Islander at 0.7 percent. Persons identifying as some other race alone account for 0.5 percent of the population, while those identifying with two or more races making up 6.1 percent of the population.

The population of Clallam County has significantly less racial/ethnic diversity compared to that of Washington State. The County has a racially and ethnically concentrated population, with racial ethnic groups outside of the White population composing very little of the County's population.

3.3.2 Clallam County Educational Attainment

Educational attainment is analyzed based on the population of individuals aged 25 and over. Refer to *Table 3-3. Clallam County and Washington State Educational Attainment (2022)*.

Table 3-3. Clallam County and Washington State Educational Attainment (2022)

Education Attainment (Age 25 and Over)	Clallam County		Washington State	
	Population	Percentage	Population	Percentage
Less than 9th Grade	1,254	2.1%	183,332	3.4%
9th to 12th Grade, no diploma	2,965	5.0%	240,317	4.5%
High School Graduate	14,509	24.2%	1,165,130	21.8%
Some College, No Degree	15,733	26.3%	1,188,000	22.2%
Associate degree	6,952	11.6%	541,092	10.1%
Bachelor's Degree	10,921	18.2%	1,244,437	23.3%
Graduate or Professional Degree	7,531	12.6%	785,006	14.7%
Total	**59,865**	**100%**	**5,347,314**	**100%**

Source: US Census Bureau, 2022: American Community Survey 5-Year Estimates, *S1501 Educational Attainment*.

Of Clallam County's population aged 25 years and older, 12.6 percent attained a graduate or professional degree, 18.2 percent attained a bachelor's degree, and 11.6 percent attained an associate degree. About 42.4 percent of the County's population has completed a higher education degree. In comparison, Washington State's higher education degree attainment is as follows: 14.7 percent attained a graduate or professional degree, 23.3 percent attained a bachelor's degree, and 10.1 percent attained an associate degree for a total of 48.1 percent. Therefore, Washington State has a slightly higher average level of educational attainment than that of Clallam County. Approximately 5.0 percent of adults in Clallam County have not completed high school, compared to approximately 4.5 percent of adults in the State.

3.3.3 Economic and Employment Trends

According to 2022 ACS 5-year estimates, there are 66,079 residents over 16 years of age in Clallam County and 32,442 residents in the labor force.[21] Out of the 34,442 people in the labor force, 30,216 were employed (45.7 percent) and 1,740 were unemployed (2.6 percent). The educational services and healthcare/social services industry employed the largest number of County residents (24.1 percent); followed by retail trade (12.6 percent); arts, entertainment, and recreation and accommodation and food services (11.3 percent); professional, scientific, and management, and administrative management services (8.7 percent); construction (7.9 percent); public administration (7.7 percent); other services except for public administration (6.9 percent); finance and insurance, and real estate/rental/leasing (5.4 percent); manufacturing (5.4 percent); transportation, warehousing and utilities (4.4 percent); agriculture, forestry, fishing and hunting, and mining (3.4 percent); wholesale trade (1.5 percent); and information (0.7 percent).

The median household income in the County was $66,108. While 11.4 percent of employees work from home, a majority of residents commute for work with 71.3 percent of residents driving alone. The average travel time to work for residents is 20 minutes.[22]

3.3.4 Housing

According to 2022 ACS 5-year estimates, there are 37,994 housing units in Clallam County.[23] There are a total of 34,128 households in the County, with an average household size of 2.23 persons per household.[24] The most common household size is the 2-person household representing 14,669 housing units (43.0 percent), followed by 1-

[21] United States Census Bureau, American Community Survey 5-Year Estimates, *DP03 Selected Economic Characteristics, 2022,* https://data.census.gov/table/ACSDP5Y2022.DP03?, updated 2023, accessed May 8, 2024.

[22] Ibid.

[23] US Census Bureau, American Community Survey 5-Year Estimates Data Profiles, *Table DP04 Selected Housing Characteristics*, *2022*, https://data.census.gov/table/ACSDP5Y2022.DP04?g=050XX00US53009, published 2022, accessed May 8, 2024.

[24] US Census Bureau, American Community Survey 5-Year Estimates Data Profiles, *Table S1101, Household and Families*, *2022,* https://data.census.gov/table/ACSST5Y2022.S1101?q=HOUSEHOLD&g=050XX00US53009, published 2023, accessed May 8, 2024.

person households at 10,841 units (31.8 percent), 4-or-more households at 4,813 units (14.1 percent), and 3-person households at 3,805 units (11.1 percent).[25] Single family households make up the majority of housing units, accounting for 61.7 percent of the housing stock in Clallam County. 76.9 percent of family households are classified as "married couple families", and 38.3 percent of the County's total housing units are nonfamily households.[26]

Of the total housing units located within the planning area, approximately 90 percent are occupied and 10 percent are unoccupied. 2022 ACS data reports the housing vacancy rate in Clallam County is approximately 6.6 percent in 2022.[27] The high level of unoccupied and vacant housing units in Clallam County is largely attributed to the presence of second homes and vacation rentals, primarily utilized during the summer months. Housing growth within Clallam County is discussed in Section 3.5, *Development Trends and Future Development*, below.

3.4 Land Uses and Existing Development

The 2019 Clallam County Comprehensive Plan is the principal policy document regulating land use in the County. The City of Port Angeles, City of Sequim, and the City of Forks also each have their own comprehensive plan that designates land use and makeup up of each respective city. *Table 3-4. Clallam County Comprehensive Plan Land Use Designations*, identifies the type and distribution of land uses in the County.

Table 3-4 contains the Clallam County land use designations as defined in the Comprehensive Plan.[28] The majority (58 percent) of lands are designated natural resource lands, which include commercial forest and agricultural lands. The designated

[25] US Census Bureau, American Community Survey 5-Year Estimates Date Profiles, *Table S2501, Occupancy Characteristics, 2022*, https://data.census.gov/table/ACSST5Y2022.S2501?g=040XX00US53_050XX00US53009, updated 2023, accessed May 13, 2024.

[26] Ibid

[27] US Census Bureau, American Community Survey 5-Year Estimates Data Profiles, *Table DP04 Selected Housing Characteristics, 2022,* https://data.census.gov/table/ACSDP5Y2022.DP04?g=050XX00US53009, published 2022, accessed May 8, 2024.

[28] Clallam County, *Long Range Planning*, https://www.clallamcountywa.gov/191/Long-Range-Planning, accessed May 23, 2024.

Urban Growth Areas (UGAs) account for only 2 percent of the total County and include both incorporated and unincorporated areas of Port Angeles, Forks, and Sequim.

Table 3-4. Clallam County 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.

General Land Use Designation	Acres	% of County
[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.		
Source: US Census Bureau, American Community Survey 5-Year Estimates Data Profiles, *Table DP04 Selected Housing Characteristics,* https://data.census.gov/table/ACSDP5Y2022.DP04?q=2022%20acs%20DP04&g=050XX00US06037_160XX00US0673080, updated 2023, accessed May 8, 2024.		

3.5 Development Trends and Future Development

The Washington State Department of Commerce provides growth management services to assist and guide local governments, state agencies, and other entities to manage growth and development consistent with the Growth Management Act.[29]

Each incorporated city has their plan to regulate land use in their jurisdiction. The Clallam County Department of Community Development is responsible for comprehensive planning, zoning, and processing of development and building permits in the unicoporated county.

Since the previous iteration of the 2019 MJHMP, population patterns, development and land use have not substantially changed in the planning area. Therefore, overall vulnerability has not substantially changed as associated with the identified hazards. Overall, the County population increased nominally, from 75,474 individuals identified in the 2019 MJHMP to 77,333 individuals identified in this MJHMP – representing a net growth of 1,859 individuals or 2.46 percent increase of the County population. Similarly, the County housing stock also increased to correlate with population growth. The 2019 MJHMP reported 36,912 residential housing units within the County to 37,994 units identified in this MJHMP – representing a net growth of 1,082 units or 2.93 percent increase. While population and housing growth is occurring in Clallam County, the rate

[29] Washington State Department of Commerce, *Growth Management*, https://www.commerce.wa.gov/serving-communities/growth-management/, published 2023, accessed May 8, 2024.

and scale is much slower compared to other jurisdictions across the state.[30] It is noted that the COVID-19 pandemic effected mitigation patterns in Washington State; generally, households moved from populated urban centers such as King County to less urbanized and rural communities such as Clallam County. A dataset from the United States Postal Services lists Clallam County as the second County with top household migration since March 2020. City of Sequim is listed as the eighth top net migration City in Washington State.[31]

Most growth was concentrated within the urbanized areas of Clallam County including Cities of Port Angeles and Sequim. Because no major changes in land use, population patterns and development occurred while the previous 2019 MJHMP was active, risk and vulnerability associated with most of the hazards listed in the MJHMP update remains similar. Any differences or changes in vulnerability are discussed within the hazard profiles, found in Section 4.0: *Hazards Assessment*.

Clallam County does not anticipate substantial changes in population patterns, land use or development over the five-year active period of this current MJHMP. Land use and development is largely constrained by existing infrastructure, topography, and other protected forest, national park and wilderness lands throughout the County. Washington State Office of Financial Management has identified six Urban Growth Areas (UGAs) within Clallam County, listed below:

- Carlsborg
- Clallam Bay
- Forks
- Joyce
- Port Angeles
- Sequim

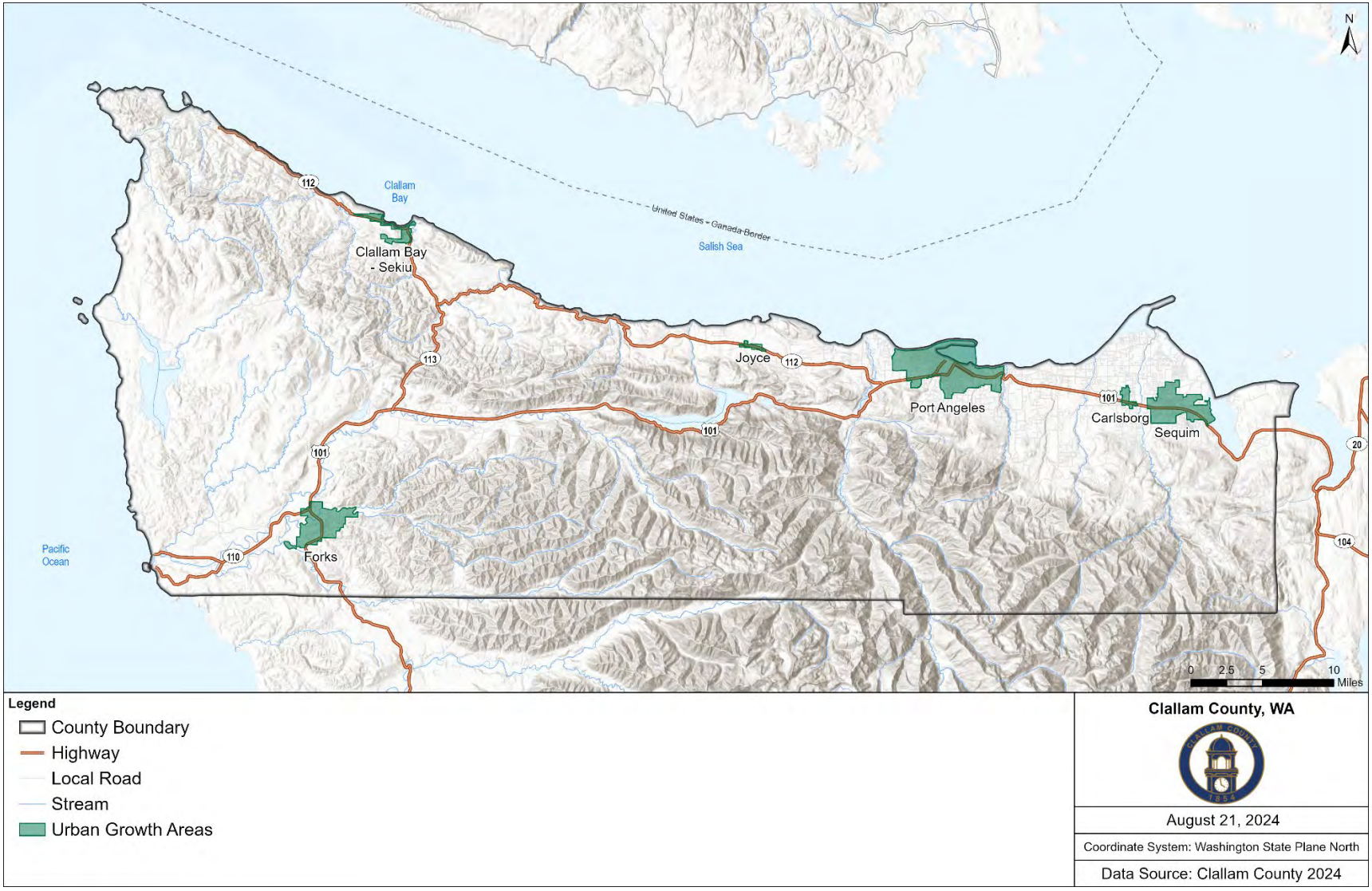
Refer to *Exhibit 3-3. Clallam County Urban Growth Areas*, for UGA distribution across the planning area. Carlsborg, Clallam Bay and Joyce are located within unincorporated

[30] Washington Office of Financial Management, *Press Release – Washington state tops 8 million residents in 2024*, https://ofm.wa.gov/sites/default/files/public/dataresearch/pop/april1/ofm_april1_press_release.pdf, published June, 28, 2024, accessed August 20, 2024.

[31] ArcGIS, *US Net Migration Since Onset of COVID-19 (Domestic)*, https://www.arcgis.com/apps/dashboards/951428e32723456c879d0966af4baa8a, accessed August 20, 2024.

Clallam County; Forks, Port Angeles and Sequim are incorporated cities, and UGAs include sphere of influence and other unincorporated portions of Clallam County. The majority population growth, increased development, and changes in land use within the next five years would occur within the identifies UGAs. Several UGAs intersect with known hazard vulnerability zones; this is further discussed within each hazard profile in Section 4.0: *Hazards Assessment*.

Exhibit 3-3. Clallam County Urban Growth Areas



3.6 Infrastructure Systems

Infrastructure systems within the County such as roadways, water and wastewater facilities, electricity, and natural gas provide vital community and individual functions. The ability for infrastructure systems to remain operational during hazard events and emergencies will contribute to the County's ability to withstand and quickly recover from hazard events.

3.6.1 Transportation

Transportation routes are restricted to the coastal plain due to the location 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 vehicles or Clallam Transit. ParaTransit, also referred to as "Clallam Connect", provides services to disabled individuals by appointment.

Airports with hard surface runways are located in the City of Port Angeles, the City of Sequim, the City of 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., passes through Clallam County.

3.6.2 Water and Wastewater

Water supply in Clallam County is managed by Clallam PUD, the Crescent Water Association, the Diamond Point Private Water System, the City of Port Angeles Water System, the City of Sequim Water System, and the Sunland Water System. Wastewater and seawater systems in Clallam County are managed by Clallam PUD, City of Port Angeles, Clallam Bay Correction Center, the Sunland Water System, the City of Sequim

Water System, and City of Forks. Clallam County operates the Clallam Bay/Sekiu water and waste system.

The Public Utility District No. 1 of Clallam County is a municipal corporation of the State of Washington authorized under the provisions of Chapter 54 of the Revised Code of Washington to own and operate public water and wastewater systems within Clallam County. Clallam County PUD No. 1 owns and operates the following five water districts listed below, along with their respective water sources:

- Port Angeles Composite Water System (DOH ID No. 43296)
- Island View Water System (DOH ID No. 362609)
- Carlsborg Water System (DOH ID No. 003070)
- Evergreen Water System (DOH ID No. 241811)
- Panoramic Heights Water System (DOH ID No. 02890F)

Ground water supplies are utilized for permanent production in all District water systems except for Island View. The Port Angeles Composite, Old Olympic Well, Bobcat Hollow Well, and Bluffs Well are used as production supplies with Township Line Wells being used as a backup source. The Hoko Well Field, which consists of four wells near the Hoko River, is the only source of water for the Clallam Bay/Sekiu Water System. The Carlsborg Water System utilizes the Carlsborg Well as its source. Morse Creek and Olsen Creek are used for primary production in Port Angeles Composite and Island View, respectively. The PUD does not operate any other surface water sources and uses a direct filtration plant to treat Morse Creek and an in-line filtration plant to treat Olsen Creek.

3.6.3 Sanitation Infrastructure/Solid Waste

According to the Washington Administrative Code (WAC 173-350-100), "Solid Waste" or "Solid Wastes" are all putrescible and non-putrescible solid and semi-solids including, but not limited to garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles and parts thereof, contaminated soils and contaminated dredged material, and recycling materials.[32] The Clallam County Environmental Health Services oversees solid waste activities at solid

[32] Clallam County Washington, *Solid Waste Disposal*, https://www.clallamcountywa.gov/537/Solid-Waste-Disposal, updated 2024, accessed May 8, 2024.

waste sites by permitting, inspecting, and reviewing environmental monitoring data, enforcing solid waste regulations, investigating solid waste complaints, and ensuring that local waste codes are adequate and up-to-date.

The City of Port Angeles Solid Waste Utility manages waste within the city limits of Port Angeles. The Port Angeles Solid Waste Utility also manages collection and disposal at the Blue Mountain and Regional Transfer Stations. Solid waste is shipped to Roosevelt Landfill in eastern Washington.

Clallam County, the City of Port Angeles, the City of Sequim, and the City of Forks use the Clallam County Solid Waste Management Plan for guidance on the solid waste system in Clallam County. The Plan is updated every five years with the most recent update in 2021.

3.6.4 Electricity

Several providers provide electricity to jurisdictions within Clallam County. The Clallam County Public Utilities Department (PUD) provides energy to most of Clallam County. Clallam County PUD provides power to approximately 30,000 electric meters throughout a 2,000 square mile service territory consisting of Clallam County and small portions of Jefferson County. Clallam County PUD also operates a transmission and distribution system consisting of nearly 2,000 miles of transmission lines and 25 distribution substations.[33] Over 83 percent of local electricity is sourced by Clallam County PUD from the Northwest hydropower system. The City of Port Angeles Public Works Light Operations Division serves approximately 10,750 customers within the 13.5 square mile city limits of Port Angeles and operates and maintains a system of 8.8 miles of sub transmission lines, 127 miles of overhead distribution lines, 42 miles of underground distribution lines, and 7 substations.[34] U.S. Bonneville Power Administration is the only power source to the planning area. The City of Port Angeles Power Management is

[33] Clallam County PUD, *Electric*, https://clallampud.net/electric/, accessed May 4, 2024.

[34] Port Angeles Washington, *Light Operations (electric utility),* https://www.cityofpa.us/429/Light-Operations-electric-utility, accessed April 17, 2024.

responsible for providing administrative support for Port Angeles's electric, water, wastewater, and solid utilities.[35]

3.7 Critical Facilities

This MJHMP identified 468 critical facilities in Clallam County for incorporation into the vulnerability assessment and associated hazard analysis; refer to Appendix D-2: *Vulnerability Summary* for a complete list of critical facilities. These facilities provide essential services to the community such as basic government functions, water and power service, and other essential needs and operations. Some of these facilities can also serve additional roles during an emergency, including as a shelter for displaced residents, a staging area for emergency response and recovery activities, or a location for important administration functions. Damage to these facilities can impair response and recovery operations and may lead to a disruption of vital services for Clallam County residents.

The MJHMP Planning Team utilized the previous 2019 MJHMP critical facilities list for evaluation, making recommendations for critical facility additions based on experience and expertise in the County. The MJHMP Planning Team identified each facility's potential loss value (where feasible), comprised of replacement and contents for each facility. If a facility is completely destroyed in a hazard event, the replacement and contents value indicate the cost to replace the facility. Typically, the cost to repair a damaged facility will be less than the replacement value. While replacement and content values are used throughout this MJHMP to estimate potential losses, it is noted that the actual cost to recover from a hazard event will depend on the type and magnitude of the specific occurrence. Appendix D-2: *Vulnerability Summary* includes details for all critical facilities, including address/location, asset type, community lifeline type, and replacement value (where available). Many critical facilities are identified by both the County and one or more jurisdictional annex.

Due to the number of critical facilities considered critical by the MJHMP Planning Team, the comprehensive summary of critical facility vulnerability is also included in Appendix

[35] Port Angeles, Washington U.S., *Power Management*, https://www.cityofpa.us/244/Power-Management, accessed May 8, 2024.

D-2: *Vulnerability Summary*. Each vulnerability subsection within the Section 4.0 hazard profiles includes an infographic that summarizes vulnerability to people, development, and critical facilities on a hazard-by-hazard basis. This infographic categorizes critical facilities by community lifeline categories and reports out vulnerability accordingly.

FEMA created the Community Lifelines concept to reframe incident information, understand and communicate incident impacts using plain language, and promote unity of effort across the whole community to prioritize efforts to stabilize lifelines during incident response. While the Community Lifelines concept was developed to support response planning and operation, the concept was applied here during the hazard mitigation planning process to benefit the entirety of the preparedness cycle. Efforts to protect and mitigate impacts to community lifelines forms the basis of this MJHMP mitigation action strategy. *Exhibit 3-4* illustrates the community lifeline concept. *Table 3-5. Community Lifeline and Critical Facility Summary* is provided below to summarize critical facilities and the essential services they provide to the planning area.

Exhibit 3-4. FEMA Community Lifeline Concept

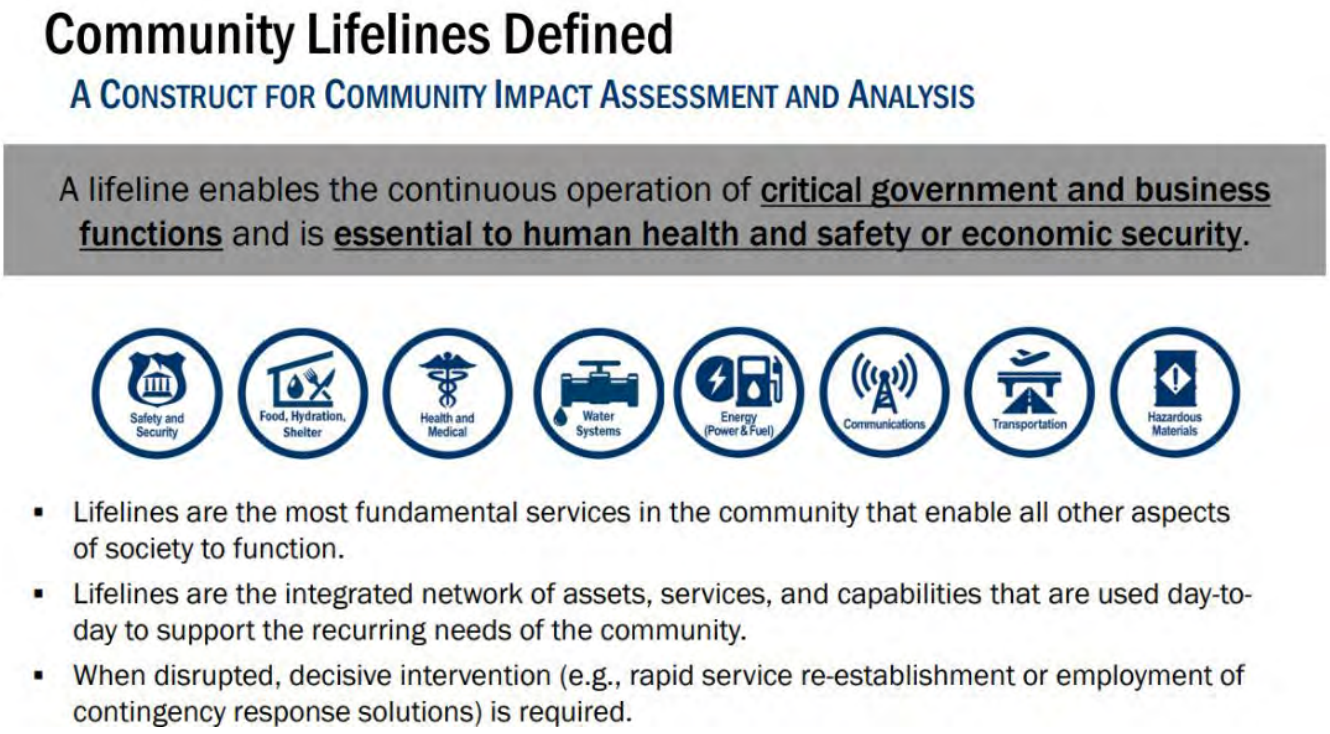


Table 3-5. Community Lifeline and Critical Facility Summary

Community Lifeline	Lifeline Description	Number of Identified Lifelines
Safety and Security	Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety	85
Food, Hydration, Shelter	Food, Hydration, Shelter, Agriculture	156
Health and Medical	Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management	21
Energy	Power Grid, Fuel	52

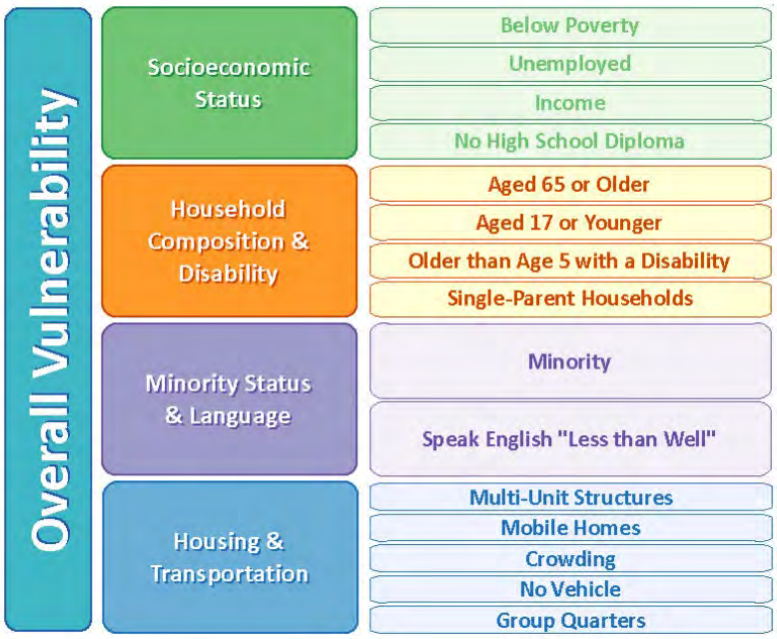
Community Lifeline	Lifeline Description	Number of Identified Lifelines
Communications	Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch	33
Transportation	Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime	29
Hazardous Materials	Facilities, HAZMAT, Pollutants, Contaminants	24
Water Systems	Potable Water Infrastructure, Wastewater Management	96
Note: Some community lifelines serve multiple uses and purposes in Clallam County, and therefore some lifelines are identified in more than one category listed above. Further detail on critical facilities can be found in Appendix D-2: *Vulnerability Summary*.		

3.8 Socially Vulnerable Populations and Determination

3.8.1 SVP Research and Methodology

Identification and integration of Socially Vulnerable Populations (SVP) into the hazard mitigation planning process is a new addition to this MJHMP, as required by the recent Local Mitigation Planning Policy Update effective April 2023. The purpose of this new MJHMP section is to identify vulnerable populations within the planning area, along with identifying characteristics that can make individuals more vulnerable to natural and human-caused hazards. Social vulnerability is defined by the Center for Disease Control and Prevention (CDC) as characteristics of a person or group that affect their capacity to anticipate, cope with, resist, and recover from the impact of a discrete and identifiable disaster in nature or society. Per the CDC, several socioeconomic factors and additional characteristics influence social vulnerability, as illustrated in *Exhibit 3-5* below.

Exhibit 3-5. Social Vulnerability Index Themes and Social Factors



Source: CDC and Prevention – National Center for Environmental Health, Planning for an Emergency: Strategies for Identifying and Engaging At-Risk Groups, published 2015.

In addition to the CDC SVI, the Washington State Department of Health maintains the Washington Environmental Health Disparities Map as an interactive mapping tool comparing Washington communities for environmental health disparities. The Social Vulnerability Index of the Washington Environmental Health Disparities Map considers many of the same data markers to as the CDC SVI tool, including: household composition and disability; housing type and transportation; race, ethnicity, and language; and socioeconomic determinants. Census tracts are ranked from a scale of one to ten; a rank of ten indicates high social vulnerability and a rank of one indicates low social vulnerability.

The MJHMP Planning Team evaluated Washington-based definitions, national environmental justice definitions, and data indices as a method for locating and identifying socially vulnerable populations within the County of Clallam. The MJHMP Planning Team decided to rely primarily on CDC SVI data source (as a recommended resource by the 2024 Climate Adaptation Planning – Guidance for Emergency

Managers), and supplement with Washington Department of Health data at the census tract level to locate and identify socially vulnerable populations within the planning area.

Clallam County is current composed of 24 census tracts, as of the 2020 census. While reviewing the Washington Environmental Health Disparities Map and Data, it was determined that this data set relies on the 2010 census tract organization data. As such, there is some variability in how census tracts are defined between the CDC and Washington Department of Health datasets. For example, Census Tract 17 is divided into Census Tracts 17.01 and 17.02 in the CDC dataset where the Washington Department of Health identifies those areas as Census Tract 17. Census tract division also occurred between 2010 and 2020 with the following census tracts: Census Tract 19 (now Census Tract 19.01 and 19.02), Census Tract 20 (now Census Tract 20.01 and 20.02) and Census Tract 23 (now Census Tract 23.01 and 23.02). There is one instance of merging a census tract between 2010 and 2020; in 2010, Census Tracts 2 and 4 were mapped in the western portion of Clallam County, and in 2020 these tracts were merged into Census Tract 24.

Therefore, the CDC SVI data provides additional depth and specificity of data, when compared to the Washington Department of Health dataset. The Social Vulnerability Index scores from the CDC and Washington Department of Health are provided in *Table 3-6. Clallam County Overall Social Vulnerability Index Scores*.

Census tracts throughout Clallam County range from low to high levels of social vulnerability according to the CDC Social Vulnerability Index. Similarly, the Washington Department of Health SVI scores range from two to ten. Areas with high levels of social vulnerability include census tracts in western Clallam County and census tracts that make up the cities of Port Angeles, Forks and Sequim. Census tracts with the highest social vulnerability scores according to the CDC SVI include Census Tracts 3, 7, 21, 24 and 9400. These high scoring CDC SVI census tracts generally align with the Washington Department of Health SVI rankings, as the same data markers are tracked by both indices. Refer to *Exhibit 3-6. CDC Social Vulnerability Index*, and *Exhibit 3-7. Washington Environmental Health Disparities Map – Social Vulnerability Index*.

Table 3-6. Clallam County Overall Social Vulnerability Index Scores

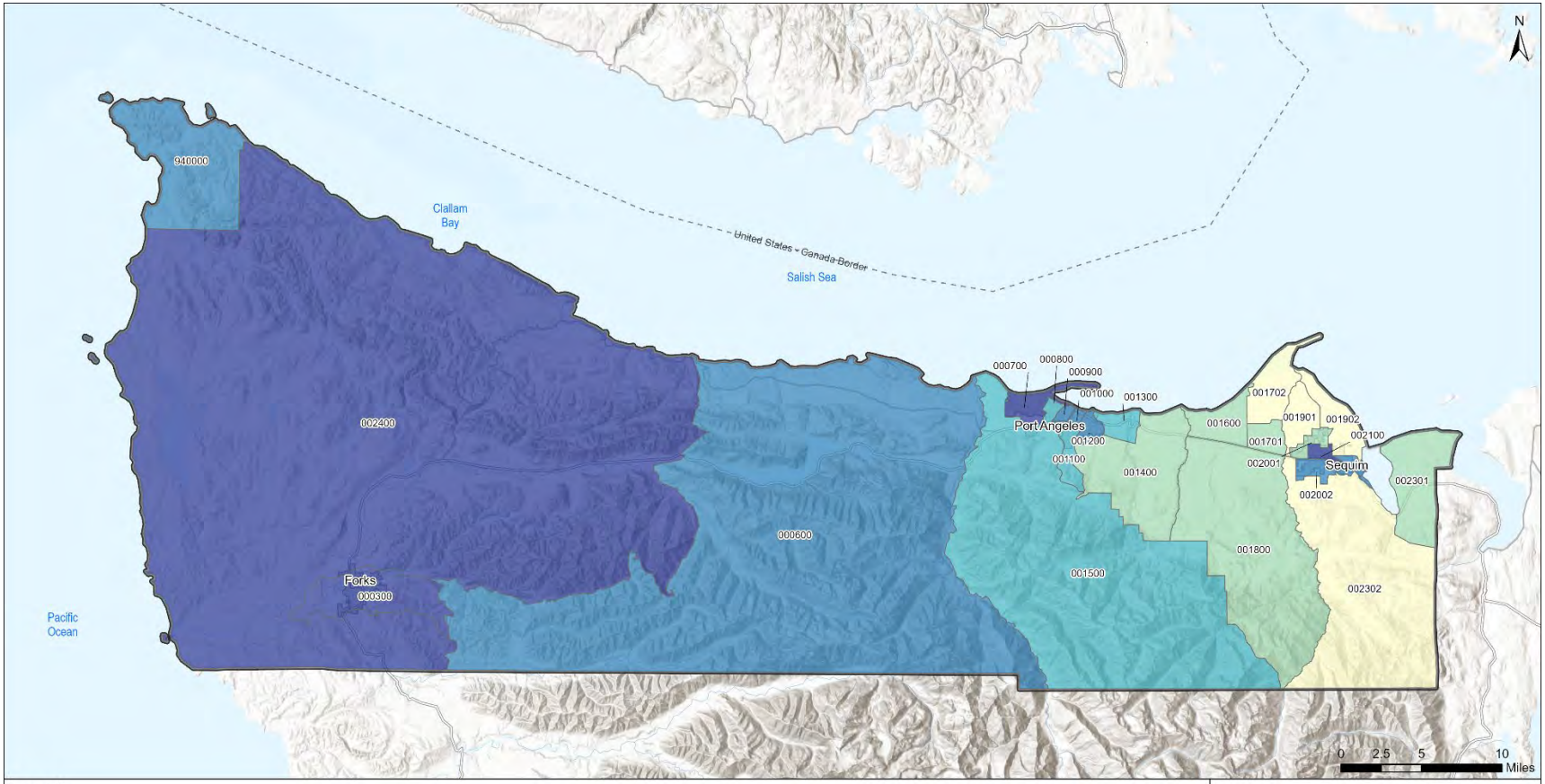
Census Tract	Social Vulnerability Index Scores		
	CDC SVI Category	CDC SVI Percentile Score	Washington Dept of Health SVI Score
Census Tract 3	High	0.9791	10
Census Tract 6	Medium - High	0.6736	6
Census Tract 7	High	0.8428	8
Census Tract 8	Medium - High	0.5899	9
Census Tract 9	Medium - High	0.6408	7
Census Tract 10	Medium - High	0.694	8
Census Tract 11	Medium - High	0.5831	7
Census Tract 12	Medium - High	0.6804	7
Census Tract 13	Low - Medium	0.4253	4
Census Tract 14	Low - Medium	0.3122	4
Census Tract 15	Medium - High	0.5979	5
Census Tract 16	Low - Medium	0.3812	4
Census Tract 17.01	Low - Medium	0.3015	3
Census Tract 17.02	Low	0.1612	3
Census Tract 18	Low - Medium	0.3727	2
Census Tract 19.01	Low	0.1488	3
Census Tract 19.02	Low	0.1312	3
Census Tract 20.01	Low - Medium	0.3524	5
Census Tract 20.02	Medium - High	0.6442	5
Census Tract 21	High	0.9378	9
Census Tract 23.01	Low	0.2251	4
Census Tract 23.02	Low	0.1482	4
Census Tract 24	High	0.8456	7/8*
Census Tract 9400	High	0.6408	10

***Census Tract 24 was split into two census tracts for reporting in 2010, Census Tract 2 and 4.**

Sources: Centers for Disease Control and Prevention and Agency for Toxic Substances and Disease Registry Social Vulnerability Index, *CDC/ASTDR Social Vulnerability Index (SVI)*, https://www.atsdr.cdc.gov/placeandhealth/svi/interactive_map.html, accessed August 27, 2024.

Washington State Department of Health, *Washington Environmental Health Disparities Map*, https://doh.wa.gov/data-and-statistical-reports/washington-tracking-network-wtn/washington-environmental-health-disparities-map, accessed August 27, 2024.

Exhibit 3-6. CDC Social Vulnerability Index



Legend

- County Boundary
- City Limit

Social Vulnerability Overall Score

- 0.13 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 0.98

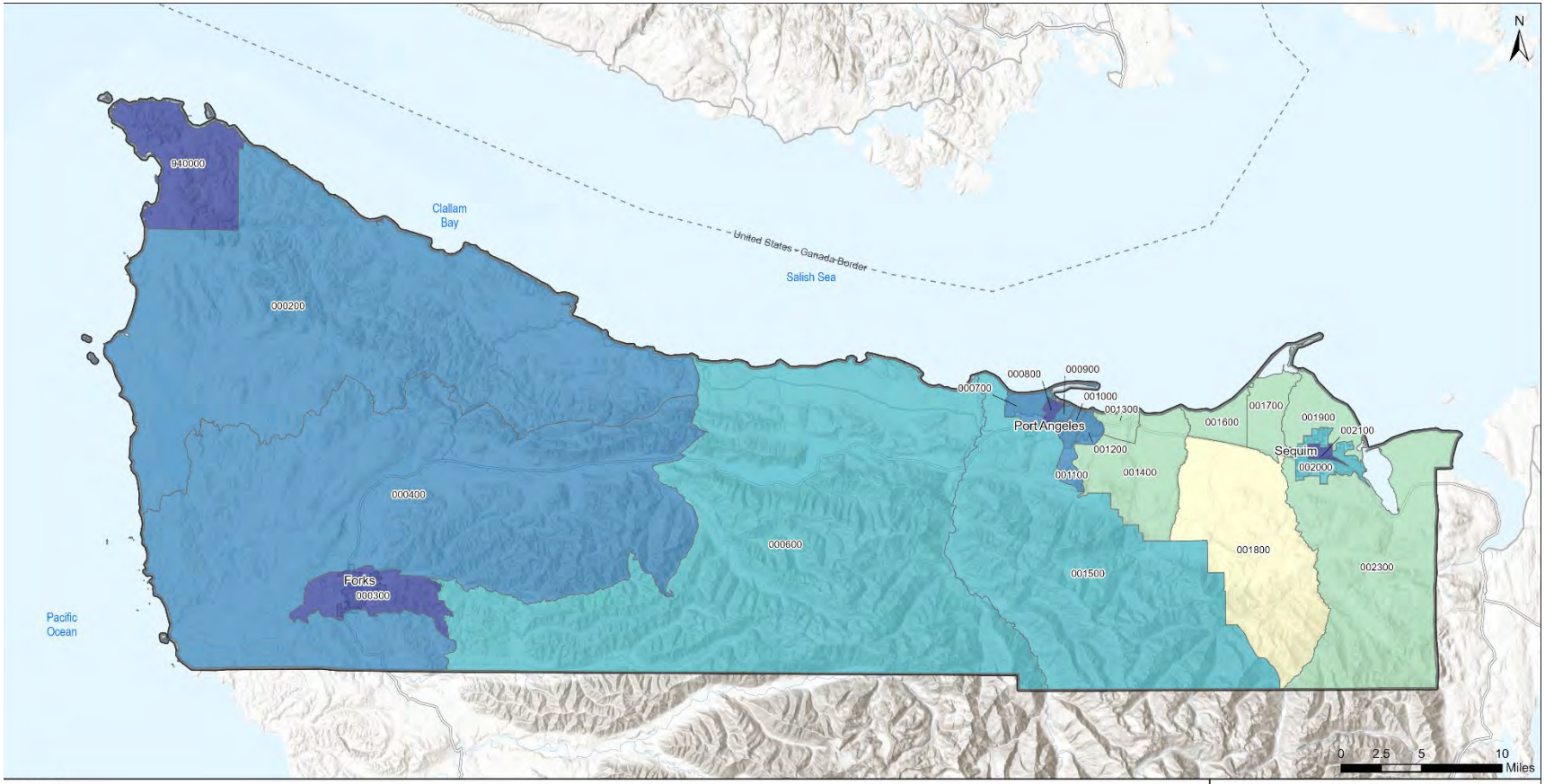
Clallam County, WA

August 21, 2024

Coordinate System: Washington State Plane North

Data Source: CDC ATSDR SVI 2022

Exhibit 3-7. Washington Environmental Health Disparities Map – Social Vulnerability Index



Several factors are reported to contribute toward the high vulnerability determinations for census tracts within the County. Census tracts within the County indicate social vulnerability based on 16 indicators identified in the SVI including socioeconomic status, household characteristics, racial/ethnic minority status and housing type/transportation. The SVI flags census tracts in the top ten percent (i.e., the 90th percentile) for these demographic, socioeconomic and housing indicators to indicate a high level of vulnerability. All but two census tracts have one or more indicator scores that are within the 90th percentile indicating a high level of vulnerability. Additionally, certain indicator scores are within the 90th percentile for multiple census tracts within the County indicating a common vulnerability characteristic in Clallam County.

Multiple census tracts within Clallam County included concentrations for the following indicators of social vulnerability:

- Persons with income below 150 percent of the poverty rate.
- Persons aged 65 and older.
- Civilian noninstitutionalized population with a disability.
- Persons reporting minority status.
- Persons living in mobile homes.

A summary of these characteristics by Census Tract identified with high social vulnerability is included as *Table 3-7* and *Table 3-8*, below.

Table 3-7. SVI – Socioeconomic Status and Household Characteristics Indicators by Census Tracts with High Vulnerability

Census Tract	Total Population	Below 150% Poverty		Age 65 or Older		Civilian with a Disability	
		% of Population	Percentile	% of Population	Percentile	% of Population	Percentile
3	4,373	41.4	0.8873	15.6	0.4568	22.9	0.9204
7	3,834	24.8	0.6504	17.9	0.5846	20.3	0.8643
21	3,834	33	0.7947	26.9	0.8992	24.1	0.9386
24	2,739	18.9	0.5061	27.9	0.914	22.6	0.9146
9400	1,550	24.9	0.6527	12.7	0.3	11.8	0.4395

Table 3-8. SVI – Racial/Ethnic Minority Status and Housing Type Indicators by Census Tracts with High Vulnerability

Census Tract	Total Population	Minority Status		Mobile Homes	
		% of Population	Percentile	% of Population	Percentile
3	4,373	39.5	0.5684	30.5	0.9514
7	3,834	18.6	0.3088	4.5	0.6932
21	3,834	26.9	0.4281	10.9	0.8043
24	2,739	39	0.5636	32.8	0.9595
9400	1,550	87.5	0.8912	19.3	0.8893

While it is acknowledged that persons with one or more of the characteristics listed above may be distributed throughout Clallam County, the indicators above were flagged due to the CDC identification of a High vulnerability census tract. These characteristics are known to make emergency response and hazard mitigation difficult for specific populations for a variety of reasons. Persons aged 65 or older often face several challenges during an emergency, such as mobility challenges, health concerns, social isolation, barriers to transportation and limited access to information or technology. In addition, there is often overlap between persons aged 65 or older and persons with a disability, as older adults experience increased prevalence of disabilities. This could include cognitive impairment, difficulties with independent living or hearing and vision problems.

Mobile homes are particularly vulnerable to hazards as they are often structurally weaker than traditional homes and aging mobile homes face additional risks due to structural integrity and deterioration. Census Tracts 3 (Forks) and 24 (West End) are within the 90th percentile for mobile home prevalence, with Census Tracts 9400 (Neah Bay – Not in planning area) and 7 (PA L&M) in the 80th percentile. As mobile homes are produced to be portable, there is higher risk during high winds, floods, and extreme weather conditions. Therefore, mobile home residents experience increased vulnerability during hazard events. By virtue of affordability, mobile homes often serve lower income households and often intersect with persons experiencing higher levels of poverty. This correlation is noted with Census Tract 3 (Forks) reporting the 80th

percentile for persons below the 150-percent poverty rate and 95th percentile for mobile home prevalence.

In addition, low-income households or persons below the 150-percent poverty rate are known to have limited financial resources to prepare for disasters, particularly purchasing emergency supplies or securing their homes. Lower income individuals may lack insurance to cover losses, making recovery more difficult and prolonged. Poverty rates may also intersect with age and disability status, where persons over the age of 65 or disabled persons may rely on a fixed income through social services. This correlation is illustrated in Census Tracts 21 (Sequim) and 24 (West End), with 90th percentile scores for both populations aged 65 or older and persons with a disability.

The last characteristic that experiences higher vulnerability during natural disasters includes minority populations. Census Tract 9400 reports 87.5 percent of the population as minority status; the majority of this census tract is located within the Makah Tribal Reservation. Overall, the planning area has a higher percentage of Native American persons, representing 3.7 percent of the County population compared to 0.9 percent of the State of Washington population.

Several Native American tribes in the county planning area are threatened by unique hazards. The Quileute Tribe Reservation is in La Push in the southwestern portion of the County; the Lower Elwha Klallam Tribe Reservation is located along the northern coast of the County just west of the City of Port Angeles; and the Jamestown S'Klallam Tribes facilities is located at the base of Sequim Bay in the northeastern portion of the County. The Makah Tribe Reservation is outside of the planning area but is within the County, located near Neah Bay in the northwestern portion of the County. All these Tribes face tsunami and earthquake threats. The Quileute, Makah and Lower Elwha Klallam Reservations include housing and residential land uses. Members of these tribes may also live off reservation. Because Jamestown S'Klallam Tribe never had a traditional reservation, the tribe currently owns assets and enterprises distributed throughout Clallam County, including residential rentals in both the community of Blyn and City of Sequim. Assets in Blyn are currently a mix of reservation, trust and fee status, and the intention is to move property to reservation and trust status in the future. At the time of this writing, Jamestown S'Klallam Tribal citizens reside throughout Clallam County.

Each of these tribes may face unique challenges during hazard events and are considered socially vulnerable due to their close dependence on and connection with the natural environment for their culture, health, and livelihoods.[36] Most tribes have reservations and treaty rights that are connected to specific places and resources, challenging tribes' mobility, and flexibility to go elsewhere in response to disasters or other changing conditions. Additionally, many tribal communities face social and economic conditions that are likely to be exacerbated by climate change.

As climate change alters land, ecosystems, and species distributions, tribes with resource-based livelihoods may lose access to natural resources within traditional homelands, Usual and Accustomed areas, and ceded or ancestral territories.[37] Climate change also negatively impacts tribal community health and well-being—which involves the interconnection of social, cultural, spiritual, environmental, and psychological health—through reductions in the quality and quantity of or access to culturally important species, subsistence foods, and traditional nutrition sources.[38] Considerations for tribes have been incorporated into the mitigation strategy to reduce risks for these populations in Section 5.0.

The MJHMP Planning Team also expressed concerns regarding tourism and seasonal population changes related to hazard mitigation and emergency response. Clallam County often experiences significant levels of tourism and seasonal population change during the summer months. Key drivers of tourism include the Olympic National Park and Olympic National Forest, along with a variety of forest lands managed by Washington Department of Natural Resources and recreational opportunities at County/City parks. In addition, a variety of special events in Clallam County increase the population of otherwise rural areas such as the Sequim Lavender Festival, the Clallam County Fair, the Joyce Daze Blackberry Festival, and Forks Forever Twilight Festival. The sudden influx of thousands of visitors can significantly increase vulnerabilities during hazard events.

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[36] University of Washington College of the Environment, *Why Does Climate Change Matter to Tribes?*, https://cig.uw.edu/resources/tribal-vulnerability-assessment-resources/why-does-climate-change-matter-to-tribes/, accessed August 29, 2024.

[37] Tribal Climate Adaptation Guidebook, *About*, https://tribalclimateadaptationguidebook.org/about/, accessed August 29, 2024.

[38] Ibid

Tourists lack permanent housing within the planning area, making them more susceptible to displacement and loss of shelter during emergencies. Evacuation can be challenging due to limited escape routes, unfamiliarity with local routes and emergency procedures, leading to delays and inefficiency. Additionally, these populations are often ill-prepared for emergencies, lacking essential supplies and knowledge about local hazards. The sudden influx of large numbers of people can strain local resources and emergency management systems, overwhelming healthcare facilities, emergency responders, and shelters. This can hinder the effectiveness of response efforts and exacerbate the impact of the disaster on both residents and visitors. Emergency management and hazard mitigation strategies can enhance preparedness for seasonal populations changes through data collection and analysis, public education and outreach, resource allocation, collaboration with local businesses and agencies and training or drills. These considerations have been incorporated into the mitigation strategy to reduce risks brought on by tourism.

As shown in *Table 3-9*, results from the 2024 Clallam County Hazard Mitigation Plan community survey found that most respondents considered age and disability status to be important factors that increase social vulnerability (76 percent and 71 percent respectively). This community feedback was found to be in alignment with the MJHMP Planning Team's social vulnerability planning assumptions utilized during the planning process.

Table 3-9. MJHMP Community Survey Social Vulnerability Findings

Vulnerability Factors	Responses	Percentage
Age (children under the age of 18 or seniors over the age of 65)	471	76.1%
Disability Status (e.g., mobility, sensory, or developmental)	441	71.2%
Lack of Vehicle or Reliable Transportation	282	45.6%
Single-Parent Households	154	24.9%
Income status	246	39.7%
Limited-English proficiency	158	25.5%

Vulnerability Factors	Responses	Percentage
Chronic illness	301	48.6%
Living in a vehicle, couch-surfing or temporary shelter or hotel	197	31.8%
Refer to Appendix C for the survey results summary.		

3.8.2 SVP Determination

Based on the SVI data and other socially vulnerable populations discussed above, the MJHMP Planning Team determined that for the purposes of this MJHMP, the following groups would be formally established as an SVP:

- Census tracts identified as "High" by the CDC SVI (Census Tracts 3, 7, 21, 24 and 9400).
- Individuals below the 150-percent poverty rate; aged 65 or older; disabled persons; persons reporting minority status; persons living within a mobile home; including populations within the above-mentioned census tracts and those populations distributed throughout Clallam County.
- Populations of the Quileute Tribe, Makah Tribe, Lower Elwha Klallam and the Jamestown S'Klallam Tribe.
- Tourists, seasonal visitors, and transient populations visiting for special events.

After understanding data behind the high vulnerability determination for all census tracts, the MJHMP Project Management team worked to incorporate stakeholders into the MJHMP Planning Team that represent or serve socially vulnerable groups, including:

- North Olympic Library System (persons aged 65 or older and persons with a disability)
- Peninsula Housing Authority (mobile home residents, transient populations)
- 7 Cedars Resort (tourists, seasonal visitors, Native American tribes)
- Quileute Tribe, Makah Tribe, Lower Elwha Klallam Tribe, Jamestown S'Klallam Tribe, Hoh Tribe (Native American tribes)

- North Olympic Development Council (persons below the 150-percent poverty rate through workforce development)
- Clallam Transit (persons below the 150-percent poverty rate, persons aged 65 or older, persons with a disability)
- Olympic Medical Center (persons below the 150-percent poverty rate, persons aged 65 or older, persons with a disability)

Feedback from these stakeholders and the rest of the MJHMP Planning team regarding socially vulnerable populations was included in each hazard profile (Section 4.0) and the mitigation strategy (Section 5.0). Specific connections between the risk assessment and relevant mitigation actions are discussed on a hazard-by-hazard basis within Section 4.0: *Hazards Assessment*.

Section 4.0: Hazards Assessment

4.1 Hazard Identification and Prioritization

4.1.1 Hazard Identification

The first step in developing the vulnerability and risk assessment is identifying the hazards. The HMCR Steering Committee reviewed the previously prepared 2019 Clallam Cunty Multi-Jurisdictional Hazard Mitigation Plan, 2023 Washington State Enhanced Hazard Mitigation Plan (SEHMP), and other relevant information to determine the extent of natural hazards with potential to affect the planning area; refer to *Table 2-7. Existing Plans, Studies, Reports, and Other Technical Data/Information*. A discussion of potential hazards during HMCR Steering Committee Meeting #1 resulted in the identification of the natural hazards that pose a potential risk to the Clallam County. *Table 4-1. Clallam County Hazard Identification*, summarizes the HMCR Steering Committee's discussion of each of the natural hazards and indicates those identified for inclusion in the MJHMP.

Table 4-1. Clallam County Hazard Identification

List of hazards	Identified in Previous MJHMP	Include in Updated MJHMP	Discussion Summary
Agricultural Pests	No	No	Not applicable. Agricultural pests have not been a significant issue within Clallam County.
Avalanche	No	No	Not applicable. Avalanche does not significantly impact Clallam County planning area.
Climate Change	Yes	Yes	Climate change is not profiled as a distinct hazard, but rather a phenomenon that could exacerbate hazards. Climate change will be considered as a

List of hazards	Identified in Previous MJHMP	Include in Updated MJHMP	Discussion Summary
			factor for relevant identified hazards.
Coastal Erosion/Bluff Failure	No	Yes	The coasts of Clallam County are susceptible to erosion. Coastal erosion is not profiled as a distinct hazard, but rather impacts of coastal erosion are discussed along with similar impacts in Section 4.11, *Sea Level Rise*.
Coastal Storm	No	Yes	Coastal areas of Clallam County are susceptible to storms. Coastal storm is not profiled as a distinct hazard, but rather impacts of coastal storms are discussed in Section 4.11, *Sea Level Rise*, and Section 4.13, *Severe Weather*, as applicable.
Dam Failure	No	Yes	The County is susceptible to inundation caused by dam or reservoir failure of multiple dams within the planning area.
Disease and Pest Management	Yes	Yes	Clallam County is susceptible to infectious diseases spread by vectors throughout the planning area. Disease is profiled along with pandemic in Section 4.6, *Disease and Pandemic*.
Drought	Yes	Yes	The planning area depends on surface water, groundwater and snowpack, which are susceptible

List of hazards	Identified in Previous MJHMP	Include in Updated MJHMP	Discussion Summary
			to drought. Clallam County has experienced several significant droughts, and thus included this hazard in the MJHMP.
Expansive Soils	No	No	Not applicable. There are no expansive soil issues in Clallam County.
Extreme Heat	No	Yes	Clallam County experiences extreme heat events during the summer months including extreme heat days. Extreme heat is profiled along with similar hazards in Section 4.13, *Severe Weather*.
Flood	Yes	Yes	Portions of the County are located within FEMA mapped floodplains and have experienced historic flooding.
Hailstorm	Yes	Yes	Clallam County experiences seasonal winter storms which occasionally include hail. The impacts of hail have been combined with similar hazards and profiled in Section 4.13, *Severe Weather*.
Hazardous Materials Spills	Yes	Yes	Hazardous materials are generated, used, stored, and transported within the planning area. Hazardous materials (including intentional or

List of hazards	Identified in Previous MJHMP	Include in Updated MJHMP	Discussion Summary
			accidental releases) could impact residents, infrastructure and natural resources. Hazardous materials are profiled in Section 4.9, *Human Caused Hazards*.
Human Caused Hazards	Yes	Yes	Hazardous materials, maritime disasters, active shooter/terrorism, utility failure/power outage and supply chain interruption are potential human-caused hazards within the planning area.
Hurricane	No	No	Not applicable. Hurricane does not typically occur within the Pacific Northwest or impact Clallam County.
Land Subsidence	No	No	Not applicable. There are no historical or expected occurrences of land subsidence in Clallam County.
Landslide	Yes	Yes	Landslide is a potential threat to Clallam County and have historically impacted the planning area.
Pandemic	No	Yes	Clallam County experienced significant impacts during the COVID-19 pandemic and has included this hazard for consideration in the MJHMP.

List of hazards	Identified in Previous MJHMP	Include in Updated MJHMP	Discussion Summary
Sea Level Rise	No	Yes	Coastal areas of Clallam County are susceptible to sea level rise. The impacts of sea level rise are included for consideration in the MJHMP.
Seismic Hazards	Yes	Yes	Clallam County is located within a seismically active region and is susceptible to fault rupture along the Cascadia Subduction Zone or other regional faults, ground shaking, and liquefaction. Land subsidence may also occur during the Cascadia Earthquake. For organizational purposes, these hazards are profiled together under Section 4.12, *Seismic Hazards*.
Severe Weather	Yes	Yes	Clallam County has experienced severe weather in the form of windstorm/tornado, winter storm (rain, freezing rain, ice, snow, cold temperature) and pacific mid-latitude cyclones. These hazards are profiled under Section 4.13, *Severe Weather*.
Tornado	No	Yes	Tornados are rare in Clallam County, but potential impacts of tornado have been profiled with similar hazards and identified in Section 4.13, *Severe Weather*.

List of hazards	Identified in Previous MJHMP	Include in Updated MJHMP	Discussion Summary
Tsunami	Yes	Yes	Clallam County has coastlines along the Pacific Ocean and is susceptible to tsunami. Tsunami has been included and profiled in the MJHMP.
Volcano	No	No	Not applicable. Impacts from volcanoes are unlikely to impact Clallam County.
Wildfire	Yes	Yes	Clallam County has significant areas of Wildland-Urban Interface and has experienced increased wildfire and wildfire smoke over the last decade. Clallam County is currently working on the creation of a Community Wildfire Protection Plan utilizing a $125,000 grant awarded by USDA.
Wind	Yes	Yes	Clallam County has experienced damage from wind events. The hazard will be profiled under Section 4.13, *Severe Weather*.
Windstorm	Yes	Yes	Clallam County has experienced damage from windstorm. The hazard will be profiled under Section 4.13, *Severe Weather*.

4.1.2 Hazard Prioritization

The HMCR Steering Committee prioritized the identified hazards by assigning each hazard a ranking based on probability of occurrence and potential impact. These rankings were assigned based on a group discussion, knowledge of past occurrences,

and familiarity with the vulnerabilities of Clallam County and the planning area. Four criteria were used to establish priority:

- Probability (likelihood of occurrence)
- Location (size of potentially affected area)
- Maximum Probable Extent (intensity of damage)
- Secondary impacts (severity of impacts to community)

A value from one to four was assigned for each criterion, where one is the lowest and four is the highest. The four criteria were then weighted based on the HMCR Steering Committee's opinion of each criterion's importance. The scores in *Table 4-3* represent these weighted values. To enhance collaboration and discussion regarding hazard rankings, the HMCR Steering Committee participated in a live survey through Mentimeter, allowing each HMCR Steering Committee member to individually report initial thoughts on probability, location, maximum probable extent, and secondary impacts. Rankings were assigned individually based on knowledge of past occurrences and familiarity with vulnerabilities. The survey was integrated into the HMCR Steering Committee Meeting #2 PowerPoint presentation, and attendees provided survey responses. Results were averaged to provide a group score per hazard, utilizing the weighted value (recommended by FEMA and confirmed by the HMCR Steering Committee) based on the importance of the criterion; refer to *Table 4-2. Hazard Ranking Methodology*.

The hazard rankings were multiplied by weighted factors to obtain a score for each criterion. A higher weight was given to the criterion considered more important or significant. For example, the probability of the hazard occurrence received a higher weight than the potential secondary impacts. The scores for location, maximum probable extent (anticipated damage), and secondary impacts for each hazard were added together to determine the total impact score. The total impact score was then multiplied by the overall probability score to determine the final score. The final scores were used to determine the prioritization of each hazard based on the following FEMA recommended scale:

- Low Threat: 0 to 12;
- Medium Threat: 12.1 to 42; and
- High Threat: 42.1 to 64.

Table 4-2. Hazard Ranking Methodology

Probability	**Importance 2.0**
Based on estimated likelihood of occurrence from historical data	
Probability	***Score***
Unlikely (less than 1% probability in next 100 years or has a recurrence interval of greater than every 100 years)	1
Somewhat Likely (between 1% and 10% probability in next year or has a recurrence interval of 11 to 100 years)	2
Likely (between 10% and 100% probability in next year or has a recurrence interval of 10 years or less)	3
Highly Likely (near 100% probability in next year or happens every year)	4
Affected Area	**Importance 0.8**
Based on size of geographical area of community affected by hazard	
Affected Area	***Score***
Isolated	1
Small	2

Secondary Impacts	**Importance 0.5**
Based on estimated secondary impacts to community at large	
Impact	***Score***
Negligible – no loss of function, downtime, and/or evacuations	1
Limited – minimal loss of function, downtime, and/or evacuations	2
Moderate – some loss of function, downtime, and/or evacuations	3
High – major loss of function, downtime, and/or evacuations	4
Total Score = Probability x Impact, where:	
Probability = (Probability Score x Probability Importance)	
Impact = (Affected Area + Primary Impact + Secondary Impacts), where:	
Affected Area = Affected Area Score x Importance	
Primary Impact = Primary Impact Score x Importance	

Medium	3		Secondary Impacts = Secondary Impacts Score x Importance			
Large	4					
Primary Impact Importance	**0.7**		**Hazard Planning Consideration**			
Based on percentage of damage to typical facility in community			***Total Score***	***Range***	***Distribution***	***Hazard Level***
Impact	***Score***		0.0	20.0	2	Low
Negligible – less than 10% damage	1		20.1	42.0	17	Medium
Limited – between 10% and 25% damage	2		42.1	64.0	0	High
Critical – between 25% and 50% damage	3					
Catastrophic – more than 50% damage	4					

The probability of each hazard is determined by assigning a level, from unlikely to highly likely, based on the likelihood of occurrence from historical data. The total impact value includes the affected area, primary impact, and secondary impact levels of each hazard. Each level's score is reflected in the matrix. The total score for each hazard is the probability score multiplied by its importance factor times the sum of the impact level scores multiplied by their importance factors. Based on this total score, the hazards are separated into three categories based on the hazard level they pose to the communities: High, Medium, and Low.

The results from the HMCR Steering Committee Meeting #2 survey were compiled and presented during HMCR Steering Committee Meeting #3 for further evaluation and discussion. *Table 4-3. Hazard Rankings*, identifies the final scores and the hazard planning consideration (threat level) for each hazard based on discussions with the HMCR Steering Committee and the prioritization process described above.

Table 4-3. Hazard Rankings

Hazard Type[1]	Probability Score[39]	Impact			Total Score[2]	Hazard Planning Consideration
		Affected Area Score	Primary Impact Score	Secondary Impact Score		
Wildfire (including wildfire smoke)	2.88	3.03	3.03	3.19	35.41	High
Drought	2.91	3.00	2.31	2.39	30.35	High
Severe Weather - Winter Storm (rain, ice, snow, cold temperature)	2.88	3.00	2.39	2.32	30.15	Medium
Severe Weather - Windstorm/ Tornado	2.61	2.59	2.48	2.43	26.19	Medium
Human-caused - Utility Failure/Power	2.45	2.77	2.39	2.70	25.71	Medium

[39] Scores in this table represent the weighted average of the HMCR Steering Committee's survey scoring.

Hazard Type[1]	Probability Score[39]	Impact			Total Score[2]	Hazard Planning Consideration
		Affected Area Score	Primary Impact Score	Secondary Impact Score		
Outage (secondary)						
Landslide	2.67	1.97	2.52	2.43	24.27	Medium
Seismic - Cascadia Subduction Earthquake	1.58	3.47	3.73	3.96	23.22	Medium
Severe Weather - Extreme Heat	2.45	2.79	1.97	2.04	22.74	High
Seismic - Onshore and Offshore Earthquakes (~7.0 Design Level)	1.76	2.91	3.09	3.36	21.69	Medium
Human-caused - Supply Chain Interruption (secondary)	2.09	2.66	2.39	2.63	21.38	Medium
Flood	2.32	2.09	2.38	2.48	21.27	Medium
Disease and Pandemic	1.85	2.97	2.25	2.26	18.83	Medium
Tsunami	1.50	2.27	3.38	3.58	17.91	Medium
Sea Level Rise (including	1.97	1.82	1.56	1.97	13.92	Medium

Hazard Type[1]	Probability Score[39]	Impact			Total Score[2]	Hazard Planning Consideration
		Affected Area Score	Primary Impact Score	Secondary Impact Score		
coastal erosion)						
Human-caused - Hazardous Materials Spill	1.85	1.63	2.00	1.93	13.57	Medium
Human-caused - Active Shooter	1.67	1.63	2.32	2.27	13.54	Medium
Human-caused - Maritime Disaster	1.61	1.94	2.16	1.77	12.69	Medium
Human-caused - Terrorism	1.27	1.80	2.52	2.40	11.20	Low
Dam/Reservoir Failure	1.12	1.48	2.16	2.03	8.30	Low

1. The HMCR Steering Committee did not rank climate change, due to the interconnected nature with other identified hazards. Climate change is profiled with each identified hazard in Section 4.4, below.

2. Refer to *Table 4-2* for the hazard ranking methodology. The total score is based on an equation that provides a weighted value to each category by importance.

Many hazards identified by the HMCR Steering Committee are recognized to be interconnected or interrelated. Where appropriate, the hazard profiles (presented below) may include references to other hazard profiles. As part of the hazard identification and prioritization process, the HMCR Steering Committee determined that some hazards could be combined for clarity purposes within a larger hazard category. Some hazards

were expanded or renamed to reflect conditions more accurately for Clallam County. Thus, the Severe Weather profile includes windstorm/tornado, winter storm (rain, freezing rain, ice, snow, cold temperature), and extreme heat. The Human-Caused Hazards profile includes hazardous materials spill, maritime disasters, active shooter/terrorism, and utility failure/power outage and supply chain interruption as secondary hazards. The Seismic Hazards profile includes Cascadia Subduction Zone earthquake, onshore and offshore earthquakes, ground shaking, and liquefaction.

It is noted that utility failure/power outage and supply chain interruption are not direct hazards, but a secondary impact from other natural disasters. The HMCR Steering Committee and survey participants expressed concerns about the ramifications of utility failure/power outage and supply chain interruption and the effects on County operations; thus, utility failure/power outage and supply chain interruption are included as secondary hazards under Section 4.9, *Human Caused Hazards*.

The following hazards are discussed in the MJHMP, below:

- Dam & Reservoir Failure
- Disease and Pandemic
- Drought
- Flood
- Human Caused Hazards
- Landslide
- Sea Level Rise
- Seismic Hazards (Cascadia Subduction Zone earthquake, onshore and offshore earthquake, ground shaking, and liquefaction)
- Severe Weather (windstorm/tornado, winter storm, and extreme heat)
- Tsunami
- Wildfire

4.2 Climate Change Considerations

Climate change has the potential to exacerbate many of the existing hazards that apply to Clallam County. As such, the HMCR Steering Committee decided climate change would be included under each applicable hazard profile with a discussion about how

each hazard would intersect or become more significant with impacts of climate change. Discussion and analysis related to climate change is discussed as a subsection under each hazard profile included below.

Clallam County is simultaneously developing a Climate Element as a part of the 2025 Comprehensive Plan update, which will meet new Washington House Bill 1181 requirements for cities and counties to integrate climate mitigation and/or resilience policies into their periodic comprehensive plan updates. From Spring 2024 to Fall 2025, the Climate Element team drafted and refined climate goals and policies that address the following requirements from Commerce:

- 1: Address natural hazards created or aggravated by climate change, including sea level rise, landslides, flooding, drought, heat, smoke, wildfire, and other effects of changes to temperature and precipitation patterns;
- 2: Identify, protect, and enhance natural areas to foster climate resilience, as well as areas of vital habitat for safe species migration;
- 3: Identify, protect, and enhance community resilience to climate impacts, including social, economic, and built-environment factors, which support adaptation to climate impacts consistent with environmental justice.

The Climate Element goals and policies were developed to align with climate considerations addressed in the MJHMP, supporting the County's efforts in preparing for and responding to hazards exacerbated by climate change.

4.3 Vulnerability/Risk Assessment

Vulnerability describes how exposed or susceptible to damage an asset is, and depends on an asset's construction, condition, contents, and economic value of functions. A vulnerability analysis predicts the extent of injury/damage on the built environment that may result from a hazard event of a given intensity in a specific area.

The vulnerability assessment considers risks to critical facilities listed in Section 3.0, *Community Profile*, and to residential and non-residential buildings throughout Clallam County. Critical facilities serve an important function in the operations of Clallam County, participating jurisdictions and in serving the community. Facilities listed include

essential public buildings, police and fire stations, schools, health and medical centers, transportation infrastructure, food suppliers, reservoirs, and essential public utility assets. Many facilities may also be vital to evacuations, serve as assembly points or temporary structures, or provide a supportive role in preparing for and recovering from hazard events. Critical facilities are owned and maintained by Clallam County or other participating jurisdictions including other public agencies or jurisdictions. Direct and indirect impacts were considered as part of the vulnerability assessment as impacts to some particular facilities may have indirect impacts on other facilities or populations.

The vulnerability assessment below quantifies, to the extent feasible using the best available data, assets at risk to hazards and estimates potential losses. This section focuses on the profiled hazards and risks specific to Clallam County. The hazard profiles and vulnerability assessment for each participating jurisdiction is presented in their respective jurisdictional annex.

Each hazard profile in the following section includes a Vulnerability and Risk Assessment section that presents the results of the method described below.

4.3.1 Methodology

For each hazard profiled in Sections 4.5 to 4.13, a vulnerability/risk assessment is included within the section. The vulnerability/risk assessment gives equal weight to all hazards, regardless of the identified probability. Hazard rankings and associated probability are considered as part of the mitigation prioritization, discussed in Section 5.0: *Mitigation Strategy*. This assessment considers the physical threats to critical facilities. It should be noted that actual losses will depend on the type, location, magnitude, and extent of the actual hazard event.

This assessment considers the physical threat to the critical facilities, as well as the physical threat to residential and non-residential structures. Socioeconomic impacts are generally discussed as some hazards have the potential to impact the planning area in ways beyond physical damages. To confirm at-risk community populations, a detailed parcel analysis investigated the intersection of each mapped natural hazard with development and population vulnerability. The critical facilities listed in Section 3.0, *Community Profile*, were mapped in GIS and overlaid with mapped hazard areas (those

hazards that have a specific geographic area) to determine which assets are located in each hazard area.

Using the comprehensive parcel database from Clallam County, parcels with residential and non-residential structures were identified within each mapped natural hazard zone. For residential assets, the number of units is reported per hazard zone. Single family homes are assumed to be one unit. The number of residential units then informs an estimate of residents within each hazard zone. The estimate was generated using the 2.23 persons per household identified by the American Community Survey (ACS) 2022 dataset. It is noted that the 2020 US Census reports approximately 3,800 vacant housing units in Clallam County, representing a 10 percent vacancy rate. The methodology outlined above assumes each residential unit is occupied by the average number of persons per household within the planning Therefore, it is noted this vulnerability assessment assumes a higher population number than likely present in each hazard zone. For non-residential assets, the total structure square footage was calculated.

Hazard areas and critical facility overlays were conducted for: flood, landslide, sea level rise, fault rupture, ground shaking, liquefaction, tsunami and wildfire. It should be noted that the parcel analysis is based on the best available data and is intended for planning purposes only. Clallam County provided parcel data via ArcGIS download in May 2024. Michael Baker International did not manipulate the data and used the data as it was provided to estimate hazard vulnerabilities. As such, the parcel analysis serves as an estimate of potential losses based on this data snapshot in time and may not reflect actual or current conditions within the planning area at the time of this document approval.

Overlays were not prepared for the following hazards: dam/reservoir failure, disease and pandemic, drought, human-caused hazards (hazardous materials, maritime disasters, active shooter/terrorism, utility failure/power outage [secondary impact], supply chain interruption [secondary impact]), and severe weather (windstorm/tornado, winter storm, extreme heat). The majority of these hazards listed above would affect the entirety of the County, with the exception of dam/reservoir failure where inundation maps submitted to WA Department of Ecology indicated limited impacts to critical facilities, populations and other property. For the purposes of this MJHMP and vulnerability assessment, it is assumed that disease and pandemic, drought, human-

caused hazards (hazardous materials, maritime disasters, active shooter/terrorism, utility failure/power outage [secondary impact], supply chain interruption [secondary impact]), and severe weather (windstorm/tornado, winter storm, extreme heat) could impact the entirety of the planning area, including all critical facilities.

The 2019 MJHMP did not include a HAZUS evaluation or provide replacement values for vulnerable critical facilities. This iteration of the MJHMP included two HAZUS models, one for flood (level 2) and one for earthquake. In preparing the HAZUS models, the team relied on default values assigned to critical facilities by asset type; estimations were prepared using replacement values identified in the HAZUS 6.0 Inventory Technical Manual (2022). Replacement values by critical facility are summarized in Appendix D-2: *Vulnerability Summary*, with the rest of the vulnerability assessment findings. The HMCR Steering Committee relied on these default replacement values for vulnerable critical facilities for each mapped hazard including those that did not utilize a HAZUS analysis (i.e., landslide, sea level rise, tsunami, and wildfire). Hazard specific vulnerability summaries includes the total fiscal impact per hazard by critical facility type. Further details on jurisdiction specific vulnerabilities and fiscal impacts are provided in their respective jurisdictional annexes.

4.3.2 Vulnerability Analysis Data Sources

The vulnerability analysis and risk assessment utilizes mapped hazard areas to assess which critical facilities, parcels, and populations are located in vulnerable areas. Mapped hazards were determined using the following data sources:

- **Flood:** National Flood Hazard Layer (NFHL) – a geospatial database that contains current effective flood hazard data including mapped Special Flood Hazard Areas (SFHA) including 100-year flood zones; including the latest data prepared by RiskMap (dated May 2024).
- **Landslide:** Washington Department of Natural Resources (DNR) Landslide Hazard Zones – a compilation of all known landslide hazard zones (also known as mass wasting map units) in the State of Washington. Washington Geological Survey (WGS) Washington State Landslide Inventory Database – landslide polygons indicate areas where landslides have already occurred.

- **Seismic Hazards (fault rupture, ground shaking, liquefaction):** Washington DNR Geologic Information Portal Download – data was used to map active faults, National Earthquake Hazards Reduction Program (NEHRP) Seismic Site Class, and liquefaction susceptibility based on geological conditions.
- **Sea Level Rise:** NOAA Office for Coastal Management Sea Level Rise Viewer – a web mapping tool designed to visualize the impacts of coastal flooding and sea level rise to 10 feet above average high tides.
- **Tsunami:** Washington DNR Geologic Information Portal Download – a compilation of the maximum modeled subsidence and tsunami inundation(flooding), gathered from multiple tsunami hazard publications, representing multiple earthquake scenarios.
- **Wildfire:** United State Department of Agriculture (USDA) Wildfire Hazard Potentials – mapped wildland urban interface and wildland urban intermix areas.

Certain data sources for mapped and non-mapped hazards were not adequate to model vulnerability as part of the MJHMP vulnerability and risk assessment. However, these data sets were used to generally guide hazard discussions and informed the hazard profiles below. *Table 4-4. Summary of Data Sources*, includes the data sources used throughout the hazard profiles and vulnerability assessments below.

Table 4-4. Summary of Data Sources

Hazard Profile	Data Source
Dam/Reservoir Failure	• Washington State Department of Ecology Dam Safety Office (DSO), Inventory of Dams Report • Washington State Department of Ecology Dam Safety Office (DSO), DSS-Wise Lite
Disease and Pandemic	• Centers for Disease Control and Prevention • Washington State Department of Health
Drought	• U.S. Drought Monitor • National Integrated Drought Information System

Hazard Profile	Data Source
	• Washington State Department of Ecology Preparing for a Changing Climate Washington State's Integrated Strategy
Flood	• National Flood Hazard Layer (NFHL)
Hazardous Materials	• Clallam County Washington, Spills and Toxic Cleanup • United States Department of Transportation: Pipeline and Hazardous Materials Safety Administration, Incident Statistics
Landslide	• Washington Department of Natural Resources (DNR) Landslide Hazard Zones • Washington Geological Survey (WGS) Washington State Landslide Inventory Database
Sea Level Rise	• NOAA Office for Coastal Management Sea Level Rise Viewer • USGS Coastal Vulnerability Index (CVI)
Seismic Hazards	• USGS, U.S. Quaternary Faults • Washington DNR Geologic Information Portal Download • CEST, Cascadia Rising 2022
Severe Weather	• National Weather Service, Wind Chill Chart • National Weather Service, Heat Index
Tsunami	• Washington DNR Geologic Information Portal Download - Maximum Modeled Tsunami Inundation
Wildfire	• Washington Department of Natural Resources (DNR) Wildland-Urban Interface • USDA Wildfire Hazard Potential
Note: Full citations of data sources are provided in each hazard profile and exhibit, as well as provided in Section 7.0: *References*.	

4.4 Hazard Profiles

The following sections, Section 4.4 through Section 4.15, contains profiles for the hazards identified in *Table 4-1. Clallam County Hazard Identification*, above. The profiles include a vulnerability analysis and risk assessment using the methods described in Section 4.3, *Vulnerability/Risk Assessment*. Each hazard profile is organized by the following subsections:

- **Description:** A brief introduction to the mechanisms behind the hazard.
- **Location/Extent:** An indication of geographic areas that are most likely to experience the hazard and a description of the potential magnitude and impacts of the hazard.
- **Previous Occurrences:** A highlight of recent and historical occurrences of the hazard accompanied by the impacts or damage to the planning area, if available.
- **Probability of Future Occurrences:** Discussion of the likelihood of the hazard occurring (or a timeframe of recurrence, if available).
- **Climate Change:** A discussion of how climate change may impact the location, magnitude, recurrence, or extent of the hazard into the future.
- **Vulnerability and Risk Assessment:** 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. This section also discusses the changes in vulnerability due to expected growth and development within the planning area.
- **Socially Vulnerable Populations:** A discussion of how the hazard may impact identified socially vulnerable populations within the planning area and considerations that have been incorporated into the mitigation strategy of this MJHMP.

4.5 Dam/Reservoir Failure[40]

4.5.1 Description

A dam is an artificial barrier preventing the flow of water or a barrier built across a watercourse for impounding water. Dam failure is the uncontrolled release of impounded water from behind a dam. Flooding, earthquakes, blockages, landslides, lack of maintenance, improper operation, poor construction, vandalism, and terrorism can all cause dam infrastructure to fail. Dam failure results in sudden, fast-moving floods that can damage or destroy property, cause injury or loss of life, and displace large numbers of people in the flood's path. A dam failure event can also damage county infrastructure such as transportation and energy networks, causing impacts outside of the immediate inundation zone.

Dam failures are most likely to happen for the following reasons:[41]

- Overtopping, caused by water spilling over the top of the dam, usually a precursor of dam failure because of inadequate spillway design, debris blockage of spillways, or settlement of the dam crest;
- Foundation defects, including settlement or slope stability;
- Cracking caused by natural settling of a dam or seismic movements;
- Inadequate maintenance and upkeep; and/or
- Piping, when seepage through a dam is not properly filtered, soil particles continue to progress and form sinkholes in the dam.

Because dam failure can have severe consequences, the Federal Emergency Management Agency (FEMA) and the Washington State Department of Ecology Dam Safety Office (DSO) require owners of dams classified as "high hazard" and "significant

[40] Section 4.5 is for informational purposes only. This Section is not intended to meet local mitigation requirements necessary to seek FEMA dam rehabilitation grant funding. Clallam County neither owns nor operates any dam or reservoir. Certain Annexed Jurisdictions may determine in the future to amend their Annexed Plan to comply with the local mitigation requirements to seek FEMA dam rehabilitation funding.

[41] Association of State Dam Safety Officials, *Dam Failures and Incidents,* https://damsafety.org/dam-failures, accessed April 16, 2024.

hazard" to have an emergency action plan (EAP) in place for warning, evacuation, and post-flood actions. In the event of a major dam failure, mutual aid from all levels of government would be required for an extended period. Recovery efforts would include the removal of debris, clearing roadways, demolishing unsafe structures, assistance in reestablishing public services, and providing continued care for the affected population.

There are an estimated 1,245 regulated dams in the State of Washington, and roughly 1,100 of them are regulated by the DSO. The DSO regulates dams with the sole purpose of reasonably securing public safety. The remaining dams are regulated by federal agencies, primarily including the Federal Energy Regulatory Commission (FERC), Bureau of Reclamation (BOR), United States Fish and Wildlife Services (USFWS), United States Army Corps of Engineers (USACE) and United States Forest Service (USFS).[42]

The DSO is responsible for assigning each Washington dam a hazard classification. State-regulated dams are classified as either low, significant, or high downstream hazard based on the National Dam Safety Program hazard classifications. Hazard classification is primarily determined based on the population at risk in the event of a dam failure. Other factors such as dam deficiencies, age of the dam, adequacy of warning systems, and potential economic and environmental losses are considered when assigning a hazard classification.[43] Downstream hazard classifications of 3, 2 and 1C, 1B, 1A correspond to low, significant, and high downstream hazard classes respectively.[44] The DSO definitions for downstream hazards are outlined in *Table 4-5. Downstream Hazard Classification.*

Table 4-5. Downstream Hazard Classification

Hazard Potential	Hazard Classification	Population at Risk	Economic Loss Generic Description	Environmental Damages
Low	3	0	Minimal.	No deleterious materials

[42] Washington State Department of Ecology, *Dam Safety Guidelines – Part 1: General Information and Owner Responsibilities*, April, 2021.

[43] Washington Emergency Management Division, *Washington State Enhanced Hazard Mitigation Plan*, dated October 1, 2023.

[44] Ibid.

Hazard Potential	Hazard Classification	Population at Risk	Economic Loss Generic Description	Environmental Damages
			No inhabited structures. Limited agricultural development.	in reservoir contents.
Significant	2*	1 to 6	Appreciable. 1 or 2 inhabited structures. Notable agriculture or work sites. Secondary highway and/or rail lines.	Limited water quality degradation from reservoir contents and only short-term consequences.
High	1C	7 to 30	Major. 3 to 10 inhabited structures. Low density suburban area with some industry and work sites. Primary highways and rail lines.	Severe water quality degradation potential from reservoir contents and long-term effects on aquatic and human life.
High	1B	31 – 300	Extreme. 11 to 100 inhabited structures. Medium density suburban or urban area with associated industry, property and transportation features.	
High	1A	More than 300	Extreme. More than 100 inhabited structures. Highly developed, densely populated suburban or	

Hazard Potential	Hazard Classification	Population at Risk	Economic Loss Generic Description	Environmental Damages
			urban area with associated industry, property, transportation and community lifeline features	

***DSO subdivides Significant Hazard dams into either 2D or 2E. 2D indicates there are people at risk, while 2E indicates that impacts are limited to economic or environmental risks.**

Source: Washington State Department of Ecology, Dam Safety Guidelines – Part 1: General Information and Owner Responsibilities, published April 2021, accessed September 10, 2024.

4.5.2 Location/Extent

The geographic extent of dam or reservoir failure is dependent on the type of infrastructure and amount of water stored at the time of the hazard incident. The DSO identified 18 regulated dams within Clallam County in the Inventory of Dams Report dated December 5, 2023. Dams and reservoirs within the County, along with hazard classification, are listed in *Table 4-6. Clallam County Dams and Reservoirs*.

Table 4-6. Clallam County Dams and Reservoirs

Dam Name	Dam Owner	State ID / National ID	Latitude, Longitude	Storage Qty / Max Storage	Hazard Category
Clallam Bay Sewage Lagoon No 1	WA DNR State Land Divisions	CL19-1539 / WA01539	48.2449710°, 124.29322°	12 acre-ft / 15 acre-ft	3
Clallam Bay Sewage Lagoon No 2	WA DNR State Land Divisions	CL19-1540 / WA01540	48.2454220°, 124.294217°	12 acre-ft / 15 acre-ft	3
Dawn Lake Dam	Lake Dawn Homeowners C/O John Wegman	CL18-1064 / WA01064	48.0409560°, 123.42946°	42 acre-ft / 72 acre-ft	1B
Educket Creek Dam (Not in planning area)	Makah Tribal Council	CL20-473 / WA00473	48.3547890°, 124.616348°	80 acre-ft / 132 acre-ft	3
Elwick Dam	Short, Douglas & Brower, Vanessa	CL17-1063 / WA01063	47.9876020°, 123.056565°	22 acre-ft / 34 acre-ft	2D
Forks Dam	WA DFW	CL20-1067 / WA01067	47.9349280°, 124.439734°	20 acre-ft / 26 acre-ft	3
Haller Dam	Gary Smith	CL18-1504 / WA01504	48.0380320°, 123.153205°	12 acre-ft / 20 acre-ft	3
Interfor Pacific Stormwater Pond	Interfor Pacific Inc.	CL18-2003 / WA02003	48.1054080°, 123.517991°	27 acre-ft / 32 acre-ft	1C

Dam Name	Dam Owner	State ID / National ID	Latitude, Longitude	Storage Qty / Max Storage	Hazard Category
Lohrer Dam	Baldwin, Jeff & Becky	CL18-2017 / WA02017	48.0967860°, 123.502375°	19 acre-ft / 58 acre-ft	2D
Peabody Heights Reservoir	Port Angeles City Public Works & Utilities	CL18-1210 / WA01210	48.0980090°, 123.431808°	22 acre-ft / 25 acre-ft	1B
Rex Aldrich Dam No 1	Rex Aldrich	CL18-1352 / WA01352	48.1200640°, 123.129625°	16 acre-ft / 23 acre-ft	3
Rex Aldrich Dam No 2	Rex Aldrich	CL18-1353 / WA01353	48.1202190°, 123.130844°	16 acre-ft / 23 acre-ft	3
Smith Lake Dam Clallam Co	Clallam County Parks	CL19-1577 / WA01577	48.1443990°, 123.644116°	10 acre-ft / 20 acre-ft	3
Solmar Lake Dam	Solmar HOA	CL18-410 / WA00410	48.0944220°, 123.225717°	34 acre-ft / 38 acre-ft	1B
Wellcome Dam	Christopher & Chelsea Beery	CL18-1066 / WA01066	48.0549630°, 123.273369°	15 acre-ft / 17 acre-ft	3
Westerman Dam No 1	Jamestown S'Klallam Tribe	CL17-1502 / WA01502	48.0506000°, 122.957687°	25 acre-ft / 40 acre-ft	3
Westerman Dam No 2	Jameston S'Klallam Tribe	CL17-1503 / WA01503	48.0523120°, 122.956671°	6 acre-ft / 10 acre-ft	3

Dam Name	Dam Owner	State ID / National ID	Latitude, Longitude	Storage Qty / Max Storage	Hazard Category
Winters Pond Dam	James Winters	CL18-1040 / WA01040	48.0874070°, 123.337578°	30 acre-ft / 30 acre-ft	3
Source: Washington State Department of Ecology, Inventory of Dams Report, December 5, 2023.					

The DSO Inventory Report identifies twelve of the eighteen dams in the county as Hazard Classification 3 meaning there is minimal threat to inhabited structures, agriculture or deleterious materials in reservoir contents.

The DSO Inventory of Dams Report identifies six dams within Clallam County with a high hazard classification:

- Dawn Lake Dam HC 1B, population risk – 39.
- Elwick Dam HC 2D, population risk 0.
- Interfor Pacific Stormwater Pond HC 1C , population risk – 30.
- Lohrer Dam HC 2D, population risk 0.
- Peabody Heights Reservoir HC 1B, population risk – 210.
- Solmar Lake Dam HC 1B, population risk - 93

Lake Dawn Dam is located south of Port Angeles at the source of Ennis Creek. A breach is unlikely to threaten property in the deeply incised valley but could pose a problem for the culverts under Hurricane Ridge Road and under Highway 101 in Port Angeles.

Peabody Heights Reservoir is located in southern Port Angeles. A breach could flood the neighborhoods between Peabody Creek and Lincoln Street.

Interfor Pacific Stormwater Pond is located southwest of the City of Port Angeles and southeast of Lower Elwha Reservation Its flow is limited to the bed of Dry Creek.

Solmar Lake Dam is located north of Highway 101 between the City of Port Angeles and the City of Sequim and drains into Matriotti Creek. Potential dam inundation zones are concentrated in the northern and northeastern coastal plains. This presents a potential risk to more developed and populated areas of the County along the northern coastline,

including the Cities of Port Angeles, Sequim, and both Elwha Klallam and Jamestown S'Klallam Tribes. The inundation zones for these dams are limited to the location of the dam and impacts to surrounding populated areas, infrastructure and facilities would be unlikely. The total population at risk of high hazard dams within Clallam County according to the DSO is 372 people.[45]

The locations, limited number, small size of dams in the planning area make dam failure threats minimal. The most likely failure scenarios would limit damage to the dam itself and flooding in the surrounding areas. However, under a worst-case scenario, failure of the Peabody Reservoir Dam could flood a portion of central Port Angeles until the reservoir drained.

4.5.3 Previous Occurrences

Dam failures have occasionally occurred throughout the State of Washington, but incidents are rare in Clallam County. No major dam failure, reservoir failure, or associated incidents have occurred within the planning area. The most notable dam incident in Clallam County occurred at Dawn Lake Dam, near the City of Port Angeles in February 1950. Heavy rains caused the earthen dam to over top, resulting in the inundation of one home and $4,000 in property damage. No fatalities were reported.[46]

No declared State of Emergency by Washington State relating to dam or reservoir failure or federally declared disasters related to dam or reservoir failure have impacted the planning area within the last five years; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years*.

4.5.4 Probability of Future Occurrences

Considering the lack of dam incidents in the past, the HMCR Steering Committee determined that the probability of future dam or reservoir failures is unlikely. An unlikely probability means less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.

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[45] Washington State Department of Ecology, *Inventory of Dams Report*, December 5, 2023.

[46] Washington State, *Notable Dam Failures and Incidents*, January, 2019. https://appswr.ecology.wa.gov/docs/WaterRights/wrwebpdf/damfailure-ws.pdf, accessed April 16, 2024.

The Washington State Enhanced Hazard Mitigation Plan (SEHMP) notes that the age of a dam may indicate stability and probability of future dam failures. No problems are anticipated with 14 dams in the county. It is the responsibility of the dam owners to monitor and remediate problems with the 4 higher hazard dams. Older dams may have a higher risk of failure due to deteriorating or outdated materials, design, and construction techniques. The SEHMP notes that the average life expectancy of a dam is about 50 years and many of the dams in Washington are 50 years or older.[47] However, measures are taken to inspect and remediate dams as problems arise. Significant- and high-hazard potential dams are periodically inspected by the DSO; however, dam failures are difficult to predict based on dam condition alone and reporting dam deficiencies is largely the responsibility of the dam owner.

Dam failures may increase in occurrence and severity when coupled with other natural disasters. Earthquakes or heavy rains can threaten the structural integrity of dam/reservoir infrastructure. The county is fortunate to have limited risk of dam failure in the planning area.

4.5.5 Climate Change

The locations, limited number, small size of dams in the planning area make dam failure threats minimal even if increased storm events and flooding incidents could increase strain on dam and reservoir infrastructure. Climate change could indirectly increase the likelihood of dam or reservoir infrastructure failure. Increased severe storm events and flooding incidents could increase strain on dam and reservoir infrastructure, including dams throughout Clallam County. More frequent or intense storms, heavy rains and flooding could increase “wear and tear” and require additional maintenance and infrastructure improvements to protect dam integrity and function. Severe storm events and increased temperatures resulting in rapid snowmelt also threaten to overwhelm dams/reservoirs. Additionally, severe storm events could oversaturate soils and compromise dam infrastructure.

[47] Washington Emergency Management Division, *Washington State Enhanced Hazard Mitigation Plan*, dated October 1, 2023.

4.5.6 Vulnerability and Risk Assessment

As mentioned above, the DSO Inventory of Dams Report identifies four high hazard class dams in the planning area with a total population at risk of 372 people.

The HMCR Steering Committee relied on the Department of Ecology DSO DSS-Wise Lite to assess dam failure risk and vulnerability. DSS-Wise Lite is a web-based, dam-break flood modeling and mapping system used to find downstream hazards and produce inundation maps for Washington State's high and significant hazard dams. As such, low hazard dams within Clallam County were not included in the dataset. The analysis found that dam inundation zones for dams in Clallam County are primarily localized and would not have significant impacts to populations beyond those identified above, or critical facilities throughout the planning area.

Effectively, the primary facilities vulnerable to impacts from dam failure are the dams. The structural integrity of the dam would be compromised, leading to potential breaches or collapses. This could result in the loss of stored water, which might affect water supply and water management systems. The DSO Inventory Report identifies twelve of the eighteen dams in the county as Hazard Classification 3 meaning there is minimal threat to inhabited structures, agriculture or deleterious materials in reservoir contents. The small volume of water impounded by each dam combined with the length of the streams that could be flooded indicate minimal environmental effects to the watersheds.

Additionally, the failure could cause erosion and sediment displacement, further weakening the dam's foundation and surrounding areas. A dam failure may also have significant impacts to the surrounding natural resources and rivers. The sudden release of water can lead to severe flooding, which can erode riverbanks, destroy habitats, and displace wildlife. Sediment and debris can alter the river's flow, affecting water quality and aquatic ecosystems. Fish populations may be particularly vulnerable, as their spawning grounds could be disrupted or destroyed. Additionally, the loss of the dam's reservoir can reduce water availability for downstream ecosystems that rely on consistent water levels. Overall, the environmental and economic impacts of a dam failure may occur despite low risk to populations and critical facilities throughout the planning area.

4.5.6.1 Changes in Vulnerability

As discussed in Section 3.5, County population and development to accommodate this population has increased in the last five years, but County vulnerability to dam failure has not increased as inundation zones for dams in Clallam County are generally limited to the location of the dam itself and the immediate surrounding area.

At the time of this MJHMP preparation, the County anticipates the majority of population growth, land use changes and development to occur within the designated Urban Growth Areas (UGAs). Dam and reservoir inundation areas are not known to intersect with mapped UGAs within the County at this time, indicating that Clallam County's overall risk to dam and reservoir failure remains low.

It is acknowledged the Washington Office of Financial Management develops population projections at the County level, and local jurisdiction zoning is required to accommodate this projected growth. However, the exact type, location and timing of projected growth and development is unknown at the time of this writing. After consideration of the vulnerability factors listed in this section, it is reasonable to assume that population growth and development to accommodate that growth could result in increased vulnerability to dam and reservoir failure over the next five years in the City of Port Angeles and possibly near the Solmar Lake Dam between the cities of Port Angeles and Sequim.

4.5.6.2 Socially Vulnerable Populations

With the exception of the Peabody Heights reservoir, dam inundation zones are limited to the location of the dams themselves and would have minimal impacts on the SVPs within Census Tracts 3, 7, 21 and 24. It is possible that a Peabody Reservoir Dam failure may impact socially vulnerable populations in central Port Angeles, specifically, individuals below the 150-percent poverty rate, aged 65 or older, disabled persons, and persons reporting minority status. The primary concern for SVPs and other high-risk individuals in the city would be temporary evacuation and displacement of individuals and access to emergency services and supplies.

Low-income populations, minorities, tribal populations, and individuals living in mobile homes are particularly vulnerable to the impacts of a nearby dam failure. These communities often reside in areas more prone to flooding and may lack the financial

resources to relocate or make necessary home improvements to withstand such disasters. Mobile homes are especially susceptible to flood damage. Additionally, these populations might have limited access to emergency alerts, evacuation plans, and recovery assistance. Social and economic disparities can further hinder their ability to recover, leaving them at greater risk of long-term displacement and financial hardship following a dam failure. Elderly populations and individuals with disabilities may face mobility challenges which can hinder their ability to evacuate quickly, putting them in immediate danger from rising waters. They may also rely on medical equipment that could be damaged by flooding. Additionally, pre-existing health conditions can be exacerbated by the stress and physical strain of a dam failure and inundation event. Limited access to emergency information and services, coupled with potential social isolation, further complicates their ability to respond and recover effectively. Tourists, seasonal visitors, and transient populations are particularly vulnerable during a nearby dam failure due to their unfamiliarity with the area and lack of established support systems. They may not be aware of evacuation routes or local emergency procedures, making it difficult for them to respond quickly. Additionally, they might not have access to timely information about the dam failure or the resources needed to cope with the aftermath. These factors make SVPs throughout Clallam County especially vulnerable to the impacts of a dam failure.

Considerations for SVPs throughout the planning area were incorporated into the mitigation strategy in Section 5.0. Specifically, the HMCR Steering Committee tailored Mitigation Actions CC20, CC27, PUD11, and PUD14, to mitigate dam failure impacts on SVPs including issues related to preparedness, evacuations, and access to emergency services.

4.6 Disease and Pandemic

4.6.1 Description

4.6.1.1 Disease (Infectious/Vector-Borne)

Infectious diseases are caused by undesirable organisms (insects, bacteria, viruses, etc.), resulting in health impacts, symptoms and/or serious harm to plants, animals, or humans. These organisms threaten human health by infecting people with disease,

some of which are potentially fatal. Vector-borne diseases are a type of infectious disease which the World Health Organization (WHO) defines as human illnesses caused by parasites, viruses, and bacteria that are only transmitted by vectors. In this context, vectors are "living organisms that can transmit infectious pathogens between humans, or from animals to humans".[48]

Communicable disease is an umbrella term for infectious diseases that are spread from one person to another through contaminated surfaces, bodily fluids, and through the air. In any case, infectious diseases transmitted from vector-to-person or person-to-person may have significant health impacts and symptoms that affect the structure or function of the immune, neurological, or other physiological system of the human body. In many cases, infectious diseases have severe health impacts up to and including death.

Specific vectors of concern in Clallam County include mosquitos, ticks, rodents, and other animals. These vectors are known carriers of hantavirus, rabies, West Nile Virus (WNV), and tick-borne diseases such as Lyme disease.

The Zoonotic and Vector-borne Disease program operated by the Washington State Department of Health lowers disease risk and responds to public health events involving vector-borne diseases or environmental pathogens. Under this program, state and local agencies partner to monitor and report vector-borne diseases, prevent disease through public health efforts and education, and prepare for and respond to outbreaks. Additionally, the Clallam County Department of Health & Human Services administers public health awareness programs.

4.6.1.2 Pandemic

The Centers for Disease Control and Prevention (CDC) defines an epidemic as an increase, often sudden, in the number of cases of a disease above what is normally expected in a population. The CDC makes the distinction that a pandemic refers to an epidemic that has spread over several countries or continents, usually affecting signification proportions of the population.[49] This definition of pandemic refers

[48] World Health Organization, *Vector-Borne Diseases*, https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases, accessed April 16, 2024.

[49] CDC, *Lesson 1: Introduction to Epidemiology,* Section 11, https://archive.cdc.gov/#/details?url=https://www.cdc.gov/csels/dsepd/ss1978/lesson1/section11.html, accessed April 16, 2024.

specifically to infectious diseases that have spread over or impacted large geographic areas. Non-infectious diseases, such as asthma or diabetes, may exist in "pandemic proportions" but do not readily spread throughout a population and thus do not constitute a pandemic. Pandemics also exclude vector-borne diseases, categorized by transmission through a vector (rats, mosquitos, etc.).

Pandemics require two components: 1) an agent (disease or virus) and 2) a susceptible host population. The host population, usually humans, is the primary mode by which agents are spread under this definition of pandemic. Pandemic agents are spread from person to person through direct or indirect contact, so humans are understood to be the causal element of pandemics. 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 therefore have the potential to reach pandemic levels.

Viruses of special concern in pandemics are novel viruses, which are new viral strains not previously identified in humans. Novel viruses present public health challenges as limited information about transmission, prevention, and treatment is available. Further, the human body does not have natural immune defenses prepared to fight novel viruses.[50] In recent history, novel viruses originated as zoonotic diseases; the virus beginning in animals evolves to transfer from human to human. Examples of zoonotic diseases becoming human pandemics include COVID-19 (theorized to originate in bats), H1N1 influenza (originated in pigs), and H5N1 influenza (originated in birds).[51]

[50] GoodRX Health, *The Novel Coronavirus: What are Novel Viruses, and How do they Impact Public Health?,* https://www.goodrx.com/conditions/covid-19/what-does-novel-coronavirus-mean-science-medical-definition, published April 30, 2020, accessed April 16, 2024.

[51] CDC, *Lesson 1: Introduction to Epidemiology,* Section 11, https://archive.cdc.gov/#/details?url=https://www.cdc.gov/csels/dsepd/ss1978/lesson1/section11.html, accessed April 16, 2024.

Image 1. Clallam County COVID-19 Pandemic Shelters[52]

4.6.2 Location/Extent

4.6.2.1 Disease (Infectious/Vector-Borne)

A public health crisis involving vector-borne diseases can originate within the County or neighboring communities before spreading into and throughout the planning area. Vector-borne diseases and pests could potentially impact any areas throughout Clallam County. Outdoor spaces are most likely to be areas of vector congregation, but specific vectors prefer different environments. Vectors such as rats may thrive in unmaintained structures or other areas with trash and food sources. Mosquitos require standing water to reproduce, prefer warmer environments, and may be found throughout the County. Ticks and rodents may interact with humans anywhere throughout the planning area, although outdoor and wildland areas may pose a higher risk of contact.

[52] Peninsula Daily News, Shelters being set up on Peninsula during COVID-19 pandemic, www.peninsuladailynews.com/news/shelters-being-set-up-on-peninsula-during-covid-19-pandemic/, April 10th, 2020.

The connection to the global economy and the ease of national and international travel can increase the potential for new disease to be introduced to Clallam County. Additionally, natural disasters could result in displaced populations and mass sheltering, which increase the potential for communicable disease outbreaks.

The magnitude and severity of vector-borne diseases rely on many factors such as the range and distribution of the vector population. A crisis can occur if dense populations of vectors carrying disease come in contact with large groups of people. Vector-borne disease could spread quickly among residents in urban areas, including vulnerable populations such as elderly persons, low-income populations, and people living in overcrowded housing conditions. The severity of impacts from vector-borne diseases are highly variable; some diseases may have relatively minor health impacts while others could be deadly. A worst-case scenario would be a vast vector population that transmits a disease with an extremely high mortality rate. In this scenario, impacts would be severe and could extend throughout populations within Clallam County.

4.6.2.2 Pandemic

By definition, a pandemic is understood to have a significant geographic range with impacts on a global scale. Effects of a pandemic would impact the entirety of the planning area, depending on the disease and susceptible population. 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; many public activities are centered out of the Port Angeles and Sequim area. making these areas more likely to experience the spread of pandemic disease. Areas with relatively low population densities throughout the County are less likely to experience a widespread outbreak. While the entirety of Clallam County would be at risk, specific subsets of the population may be more susceptible than others, including vulnerable populations such as the very young (those under 1 year), elderly, and immuno-compromised individuals, depending on the disease.[53, 54]

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[53] Mayo Clinic, *Covid-19 in babies and children*, https://www.mayoclinic.org/diseases-conditions/coronavirus/in-depth/coronavirus-in-babies-and-children/art-20484405, published October 21, 2022, accessed April 17, 2024.

[54] University of Michigan, *Which Populations are Most Vulnerable to the Coronavirus Pandemic?*, https://sph.umich.edu/news/2020posts/which-populations-are-most-vulnerable-to-coronavirus.html, published April 6, 2020, accessed April 17, 2024.

The extent to which a pandemic could impact Clallam County depends on the disease type and symptoms. Some diseases may be highly transmissible and affect a significant portion of the population but may carry minor symptoms. On the other hand, a disease might be very deadly but not be easily transmitted. The worst-case pandemic scenario is a disease that is both highly transmissible and carries a high mortality rate. The severity and extent of a pandemic may also depend on the ability to respond by developing and administering vaccinations, or other public health measures for mitigating the spread of the disease.

4.6.3 Previous Occurrences

4.6.3.1 Disease (Infectious/Vector-Borne)

Incidents of vector-borne and infectious disease are rare in Clallam County. Tick-borne diseases, such as Lyme disease, and mosquito-borne diseases such as West Nile Virus (WNV) have presented a threat to the planning area in the past. WNV is the leading cause of mosquito-borne disease in the continental United States.[55] However, WNV is very rare in Clallam County. From 2002 to 2023, only one case of WNV in humans occurred Clallam County in 2022; no cases were found in other mammals, birds, or mosquito samples.[56]

Tick-borne disease cases, such as Lyme disease and Rocky Mountain Spotted Fever, are rare in Washington with relatively few cases reported each year in comparison to other areas of the United States.[57]

Cases of hantavirus, transmitted by rodents, are more common; cases have been identified in Washington residents almost every year from 1994 to 2017. This is an average of two cases each year and a total of 51 reported cases in 2017.[58] Other

[55] Centers for Disease Control and Prevention, *West Nile Virus*, https://www.cdc.gov/westnile/index.html, accessed April 17, 2024.

[56] Washington State Department of Health, *Historical West Nile Virus Activity*, https://doh.wa.gov/data-and-statistical-reports/diseases-and-chronic-conditions/west-nile-virus/historical-west-nile-virus-activity, accessed April 17, 2024.

[57] Washington State Department of Health, *Tick-borne Diseases*, https://doh.wa.gov/you-and-your-family/illness-and-disease-z/tick-borne-diseases, accessed April 17, 2024.

[58] Washington State Department of Health, *epiTRENDS: Hantavirus in Washington*, May 2017, https://doh.wa.gov/sites/default/files/legacy/Documents/5100//420-002-epitrends2017-05.pdf, accessed April 17, 2024.

diseases transmitted by rodents such as rabies have effectively been eradicated due to pet vaccinations and other preventative measures.

Washington State experienced an outbreak of measles in 2015. Measles is a highly contagious viral infection that can cause a rash, fever, and cough. Statewide, there were 11 people diagnosed with measles, five of which were from Clallam County. During this outbreak, a woman from Clallam County died from pneumonia due to measles. This was the first death due to measles since 2003.[59] Measles is a highly contagious disease but did not continue to spread to reach epidemic levels.

No declared State of Emergency by Washington State relating to vector-borne diseases or pests or federally declared disasters related to vector-borne diseases or pests have impacted the planning area within the last five years; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years*.

4.6.3.2 Pandemic

The CDC has identified two recent pandemics and two major historical pandemics in roughly the past 100 years:[60]

- 2019 Covid-19 Pandemic (SARS-CoV-2 virus)
- 2009 H1N1/"Swine Flu" Pandemic (H1N1pdm09 virus)
- 1968 Pandemic (H3N2 virus)
- 1918 Pandemic (H1N1 virus)

Clallam County experienced significant impacts from the Covid-19 Pandemic. A novel coronavirus disease, namely SARS-CoV-2 or Covid-19, was identified in Wuhan, China in December 2019. By March 2020, Governor Jan Inslee issued the first statewide stay home – stay healthy order, prohibiting all people in Washington State from leaving their homes or participating in social, spiritual, and recreational gatherings of any kind regardless of the number of participants, and limiting the operations of non-essential businesses.

[59] Sequim Gazette, *Measles Led to Death of Clallam County Woman*, https://www.sequimgazette.com/news/measles-led-to-death-of-clallam-county-woman/, accessed April 17, 2024.

[60] CDC, *Past Pandemics*, https://www.cdc.gov/flu/pandemic-resources/basics/past-pandemics.html, accessed April 17, 2024.

At the time this document was prepared, there have been over 16,000 total reported cases and 200 total deaths in Clallam County.[61] Covid-19 has affected the entirety of the County. As part of the response to slow the spread of the virus, non-essential businesses and schools were closed or transitioned to remote environments, if feasible. A significant milestone and improvement against the pandemic came in December of 2020 with the release of the Covid-19 vaccine. Clallam County made various resources available based on guidance from the WHO, CDC, and Washington State DOH. Mask mandates were issued for indoor spaces, and proof of vaccination requirements were established for certain activities through 2022 to help stop transmission. Generally, the pandemic resulted in significant economic and public health impacts that are still reverberating throughout the County. At the time of this writing, Covid-19 is a seasonally recurring issue as vaccines, masks, and social distancing has made disease transmission and treatment much more manageable.

Before Covid-19, the most recent pandemic occurred in 2009: the (H1N1) pdm09, "swine flu" pandemic.[62] H1N1pdm09 primarily affected children and young/middle-aged adults, atypical from most influenza pandemics. Between April 2009 and April 2010, the CDC estimates over 60 million cases, nearly 275,000 hospitalizations, and over 12,000 deaths affected the United States population. The World Health Organization declared an end to the global pandemic in August 2010; however, the virus continues to circulate as a seasonal influenza virus.[63]

Both the 1968 and 1918 pandemics were caused by avian flu outbreaks. The 1968 pandemic was caused by an influenza H3N2 virus, with an estimated death toll of 116,000 in the United States and an estimated worldwide toll of 1.1 million.[64] Medical advances in the 1960s including antiviral medications and expanded influenza vaccine options significantly helped to combat this pandemic. The 1918 pandemic was an outbreak of influenza caused by an H1N1 virus. The virus spread worldwide from 1918-

[61] USAFACTS, *Clallam County, Washington coronavirus cases and deaths*, https://usafacts.org/visualizations/coronavirus-covid-19-spread-map/state/washington/county/clallam-county/, accessed April 17, 2024.

[62] CDC, *Origin of 2009 H1N1 Flu (Swine Flu): Questions and Answers,* https://www.cdc.gov/h1n1flu/information_h1n1_virus_qa.htm, published November 25, 2009, accessed April 17, 2024.

[63] CDC, *Past Pandemics*, https://www.cdc.gov/flu/pandemic-resources/basics/past-pandemics.html, accessed April 17, 2024.

[64] Ibid.

1919. It is estimated that one third of the worldwide population at the time, about 500 million people, became infected with the virus. The pandemic resulted in an estimated 675,000 deaths in the United States alone and over 50 million deaths worldwide.[65]

The Covid-19 pandemic resulted in two federally declared disasters within the planning area since the adoption of the previous MJHMP. A list of federally declared disasters is included below; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years* for further details regarding specific impacts to Clallam County.

- DR 3427, Biological, Washington Covid-19 – March 13, 2020
- DR4481, Biological, Washington Covid-19 – March 22, 2020

The Covid-19 pandemic resulted in State of Emergency Proclamations by Washington State affecting the entire state and affecting to varying degrees the planning area depending on the nature of the proclamation:

- Proclamation 20-05 (2/29/2020 in English and Spanish) (original Emergency Proclamation activating National Guard and directing the WA State Comprehensive Emergency Management Plan be implemented);
- Proclamation 20-05 (10/28/2022 in English and Spanish) (Rescind original Emergency Proclamation activating National Guard and directing the WA State Comprehensive Emergency Management Plan be implemented);
- Proclamation 20-06 (3/10/2020 in English and Spanish) (placing restrictions on nursing home activities and waiving certain statutory provisions);
- Proclamation 20-07 (8/26/2020 in English) (placing restrictions on nursing home activities and waiving certain statutory provisions);
- Proclamation 20-09 (3/13/2020 in English) (State-wide K-12 school closures);
- Proclamation 20-09.1 (4/6/20 in English and Spanish) (school closure extension);
- Proclamation 20-09.3 (12/16/20 in English and Spanish) (school closure extension);
- Proclamation 20-09.4 (7/30/21 in English and Spanish) (school closure extension);
- Proclamation 20-10 (3/13/20 in English) (addressing long-term care workers);

[65] Ibid.

- Proclamation 20-11 (3/13/20 in English and Spanish) (placing restrictions on gatherings state-wide);
- Proclamation 20-12 (3/13/20 in English and Spanish) (college closures);
- Proclamation 20-12.1 (6/24/20 in English and Spanish) (higher education-fall 2020);
- Proclamation 20-12.2 (10/20/20 in English and Spanish) (higher education-fall 2020);
- Proclamation 20-12.3 (6/30/21 in English and Spanish) (higher education-fall 2020);
- Proclamation 20-12.4 (7/12/21 in English and Spanish) (higher education-fall 2020);
- Proclamation 20-12.5 (8/27/21 in English and Spanish) (higher education-fall 2020);
- Proclamation 20-13 (3/16/20 in English and Spanish) (State-wide limits on food and beverage services and areas of congregation);
- Proclamation 20-14 (3/16/20 in English and Spanish) (reduction of statewide limits on gatherings);
- Proclamation 20-15 (3/16/20 in English and Spanish) (Department of Licensing waivers of certain statutory provisions);
- Proclamation 20-15.02 (5/5/20 in English) (Department of Licensing extension of waivers of certain statutory provisions);
- Proclamation 20-15.03 (5/29/20 in English) (Department of Licensing extension of waivers of certain statutory provisions);
- Proclamation 20-15.05 (7/2/20 in English) (Department of Licensing extension of waivers of certain statutory provisions);
- Proclamation 20-15.06 (7/31/20 in English) (Department of Licensing extension of waivers of certain statutory provisions);
- Proclamation 20-15.07 (9/2/20 in English) (Department of Licensing extension of waivers of certain statutory provisions);
- Proclamation 20-15.08 (10/2/20 in English) (Department of Licensing extension of waivers of certain statutory provisions);
- Proclamation 20-15.09 (11/10/20 in English) (Department of Licensing extension of waivers of certain statutory provisions);

- Proclamation 20-15.10 (12/08/20 in English) (Department of Licensing extension of waivers of certain statutory provisions);
- Proclamation 20-15.11 (1/19/21 in English) (Department of Licensing extension of waivers of certain statutory provisions);
- Proclamation 20-15.12 (4/29/22 in English) (Department of Licensing extension of waivers of certain statutory provisions);
- Proclamation 20-16 (3/16/20 in English) (statewide limits on Long Term Care facilities – no visitors);
- Proclamation 20-17 (3/17/20 in English) (prohibiting visitors at Long Term Care facilities);
- Proclamation 20-18 (3/18/20 in English) (expanding eligibility for Family Emergency Assistance Program);
- Proclamation 20-19 (3/18/20 in English and Spanish) (moratorium on evictions);
- Proclamation 20-19.1 (4/16/20 in English and Spanish) (moratorium on eviction extension);
- Proclamation 20-19.2 (4/16/20 in English) (evictions and related housing practices);
- Proclamation 20-19.3 (7/24/20 in English) (evictions and related housing practices);
- Proclamation 20-19.4 (10/14/20 in English) (evictions and related housing practices);
- Proclamation 20-19.5 (12/31/20 in English) (evictions and related housing practices);
- Proclamation 20-19.6 (3/18/21 in English) (evictions and related housing practices);
- Proclamation 20-20 (3/18/20 in English and Spanish) (waivers of certain Department of Revenue tax provisions including tax penalties);
- Proclamation 20-20.01 (4/23/20 in English) (Department of Revenue – extended relief from penalties, fees, interest, due dates);
- Proclamation 20-20.03 (5/29/20 in English) (Department of Revenue – extended relief from penalties, fees, interest, due dates);
- Proclamation 20-20.05 (7/2/20 in English) (Department of Revenue – extended relief from penalties, fees, interest, due dates);

- Proclamation 20-20.06 (7/31/20 in English) (Department of Revenue – extended relief from penalties, fees, interest, due dates);
- Proclamation 20-20.08 (10/2/20 in English) (Department of Revenue – extended relief from penalties, fees, interest, due dates);
- Proclamation 20-20.09 (11/10/20 in English) (Department of Revenue – extended relief from penalties, fees, interest, due dates);
- Proclamation 20-20.10 (12/08/20 in English) (Department of Revenue – extended relief from penalties, fees, interest, due dates);
- Proclamation 20-20.11 (1/19/21 in English) (Department of Revenue – extended relief from penalties, fees, interest, due dates);
- Proclamation 20-20.12 (7/27/21 in English) (Department of Revenue – extended relief from penalties, fees, interest, due dates);
- Proclamation 20-21 (3/18/20 in English and Spanish) (unemployment insurance waiver);
- Proclamation 20-21.01 (4/23/20 in English) (extension of unemployment benefit – 1 week waiting period waiver);
- Proclamation 20-21.03 (5/29/20 in English) (extension of unemployment benefit – 1 week waiting period waiver);
- Proclamation 20-21.05 (7/2/20 in English) (extension of unemployment benefit – 1 week waiting period waiver);
- Proclamation 20-21.06 (7/31/20 in English) (extension of unemployment benefit – 1 week waiting period waiver);
- Proclamation 20-21.07 (9/2/20 in English) (extension of unemployment benefit – 1 week waiting period waiver);
- Proclamation 20-21.08 (10/2/20 in English) (extension of unemployment benefit – 1 week waiting period waiver);
- Proclamation 20-21.09 (11/10/20 in English) (extension of unemployment benefit – 1 week waiting period waiver);
- Proclamation 20-21.10 (12/8/20 in English) (extension of unemployment benefit – 1 week waiting period waiver);
- Proclamation 20-21.11 (12/22/20 in English) (extension of unemployment benefit – 1 week waiting period waiver);
- Proclamation 20-22 (3/18/20 in English and Spanish) (truck driver hours);

- Proclamation 20-22.01 (4/17/20 in English and Spanish) (extending truck driver hours relief);
- Proclamation 20-22.02 (5/15/20 in English) (extending truck driver hours relief);
- Proclamation 20-22.03 (6/15/20 in English) (extending truck driver hours relief);
- Proclamation 20-22.04 (7/14/20 in English) (extending truck driver hours relief);
- Proclamation 20-22.05 (8/13/20 in English) (extending truck driver hours relief);
- Proclamation 20-22.06 (9/14/20 in English) (extending truck driver hours relief);
- Proclamation 20-22.07 (12/4/20 in English) (extending truck driver hours relief);
- Proclamation 20-22.08 (1/24/21 in English) (extending truck driver hours relief);
- Proclamation 20-22.09 (5/28/21 in English) (extending truck driver hours relief);
- Proclamation 20-22.10 (9/2/21 in English) (extending truck driver hours relief);
- Proclamation 20-22.11 (12/7/21 in English) (extending truck driver hours relief);
- Proclamation 20-23 (3/18/20 in English) (waiver of certain utility statutory provisions);
- Proclamation 20.23.01 (3/24/20 in English and Spanish) (utility ratepayer assistance);
- Proclamation 20.23.02 (4/17/20 in English and Spanish) (extension of ratepayer assistance and preservation of essential services);
- Proclamation 20.23.03 (5/5/20 in English) (extension of ratepayer assistance and preservation of essential services);
- Proclamation 20.23.04 (5/29/20 in English) (extension of ratepayer assistance and preservation of essential services);
- Proclamation 20.23.06 (7/2/20 in English) (extension of ratepayer assistance and preservation of essential services);
- Proclamation 20.23.07 (7/31/20 in English) (extension of ratepayer assistance and preservation of essential services);
- Proclamation 20.23.08 (9/2/20 in English) (extension of ratepayer assistance and preservation of essential services);
- Proclamation 20.23.09 (10/2/20 in English) (extension of ratepayer assistance and preservation of essential services);
- Proclamation 20.23.10 (10/8/20 in English) (extension of ratepayer assistance and preservation of essential services);
- Proclamation 20.23.11 (10/14/20 in English) (extension of ratepayer assistance and preservation of essential services);

- Proclamation 20.23.12 (11/10/20 in English) (extension of ratepayer assistance and preservation of essential services);
- Proclamation 20.23.13 (12/8/20 in English) (extension of ratepayer assistance and preservation of essential services);
- Proclamation 20.23.14 (1/19/21 in English) (extension of ratepayer assistance and preservation of essential services);
- Proclamation 20.23.15 (3/18/21 in English) (extension of ratepayer assistance and preservation of essential services);
- Proclamation 20.23.16 (7/2/21 in English) (extension of ratepayer assistance and preservation of essential services);
- Proclamation 20.23.17 (6/1/21 in English) (ratepayer assistance and preservation of essential services rescinded);
- Proclamation 20-24 (3/19/20 in English and Spanish) (restrictions on non-urgent medical procedures);
- Proclamation 20-24.1 (5/18/20 in English) (extension of restrictions on non-urgent medical procedures);
- Proclamation 20-24.2 (11/25/20 in English) (extension of restrictions on non-urgent medical procedures);
- Proclamation 20-25 (3/23/20 in English and Spanish) (stay home, stay healthy – placing restrictions on business operations, private gatherings and multi-person activities);
- Proclamation 20-25.1 (4/2/29 in English and Spanish) (stay home, stay healthy extension);
- Proclamation 20-25.02 (4/27/20 in English and Spanish) (Stay Home, Stay Healthy Adjustment);
- Proclamation 20-25.03 (5/4/20 in English and Spanish) (Stay Home, Stay Healthy Adjustment extended to May 31, 2020);
- Proclamation 20-25.04 (5/31/20 in English and Spanish) (transition from Stay Home, Stay Healthy to “Safe Start, Stay Healthy” County by County phased reopening);
- Proclamation 20-25.05 (7/1/20 in English) (transition from Stay Home, Stay Healthy to “Safe Start, Stay Healthy” County by County phased reopening);
- Proclamation 20-25.06 (7/7/20 in English) (transition from Stay Home, Stay Healthy to “Safe Start, Stay Healthy” County by County phased reopening);

- Proclamation 20-25.07 (7/7/20 in English) (transition from Stay Home, Stay Healthy to "Safe Start, Stay Healthy" County by County phased reopening);
- Proclamation 20-25.08 (11/15/20 in English) (transition from Stay Home, Stay Healthy to "Safe Start, Stay Healthy" County by County phased reopening);
- Proclamation 20-25.09 (12/10/20 in English) (transition from Stay Home, Stay Healthy to "Safe Start, Stay Healthy" County by County phased reopening);
- Proclamation 20-25.10 (12/21/20 in English) (transition from Stay Home, Stay Healthy to "Safe Start, Stay Healthy" County by County phased reopening modifications);
- Proclamation 20-25.11 (1/11/21 in English) (transition from Stay Home, Stay Healthy to "Safe Start, Stay Healthy" Rollback of County-by-County phased reopening);
- Proclamation 20-25.12 (1/11/21 in English) (Roadmap to Recovery);
- Proclamation 20-25.13 (5/21/21 in English) (Roadmap to Recovery);
- Proclamation 20-25.14 (7/1/21 in English) (Roadmap to Recovery);
- Proclamation 20-25.15 (8/21/21 in English) (Washington Ready Mask Requirement);
- Proclamation 20-25.16 (9/3/21 in English) (Washington Ready Mask Requirement);
- Proclamation 20-25.17 (9/13/21 in English) (Washington Ready Mask Requirement);
- Proclamation 20-25.18 (2/17/22 in English) (Washington Ready Mask Requirement);
- Proclamation 20-25.19 (3/11/22 in English) (Washington Ready Mask Requirement);
- Proclamation 20-26 (3/24/20 in English) (penalty tax relief concerning liquor and cannabis businesses);
- Proclamation 20-26.1 (4/23/20 in English) (extension of penalty tax relief concerning liquor and cannabis businesses);
- Proclamation 20-26.2 (5/5/20 in English) (extension of penalty tax relief concerning liquor and cannabis businesses);
- Proclamation 20-26.3 (5/29/20 in English) (extension of penalty tax relief concerning liquor and cannabis businesses);

- Proclamation 20-26.5 (7/2/20 in English) (extension of penalty tax relief concerning liquor and cannabis businesses);
- Proclamation 20-27 (3/24/20 in English and Spanish) (electronic notary effective date);
- Proclamation 20-27.1 (4/23/20 in English) (electronic notary extension);
- Proclamation 20-27.2 (5/5/20 in English) (electronic notary extension);
- Proclamation 20-27.3 (5/29/20 in English) (electronic notary extension);
- Proclamation 20-27.5 (7/2/20 in English) (electronic notary extension);
- Proclamation 20-27.6 (7/31/20 in English) (electronic notary extension);
- Proclamation 20-27.7 (9/2/20 in English) (electronic notary extension);
- Proclamation 20-28 (2/24/20 in English and Spanish) (Open Public Meetings Act and Public Records Act – waiver or suspension of certain statutory provisions);
- Proclamation 20-28.01 (4/23/20 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-28.02 (5/5/20 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-28.03 (5/12/20 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-28.04 (5/29/20 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-28.06 (7/2/20 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-28.07 (7/8/20 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-28.08 (7/31/20 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-28.09 (9/2/20 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);

- Proclamation 20-28.10 (9/16/20 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
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- Proclamation 20-28.11 (10/2/20 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-28.12 (11/10/20 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-28.13 (11/12/20 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-28.14 (12/8/20 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-28.15 (1/19/21 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-28.16 (4/29/22 in English) (Open Public Meetings Act and Public Records Act – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-29 (3/25/20 in English and Spanish) (telemedicine services);
- Proclamation 20-29.01 (4/23/20 in English) (telemedicine services extension);
- Proclamation 20-29.02 (5/5/20 in English) (telemedicine services extension);
- Proclamation 20-29.03 (5/29/20 in English) (telemedicine services extension);
- Proclamation 20-29.05 (7/2/20 in English) (telemedicine services extension);
- Proclamation 20-29.06 (7/31/20 in English) (telemedicine services extension);
- Proclamation 20-29.07 (9/2/20 in English) (telemedicine services extension);
- Proclamation 20-29.08 (10/2/20 in English) (telemedicine services extension);
- Proclamation 20-29.09 (11/10/20 in English) (telemedicine services extension);
- Proclamation 20-29.10 (12/8/20 in English) (telemedicine services extension);
- Proclamation 20-30 (3/25/20 in English and Spanish) (unemployment compensation);

- Proclamation 20-30.01 (4/23/20 in English) (extension of unemployment compensation);
- Proclamation 20-30.02 (5/5/20 in English) (extension of unemployment compensation);
- Proclamation 20-30.03 (5/29/20 in English) (extension of unemployment compensation);
- Proclamation 20-30.05 (7/2/20 in English) (extension of unemployment compensation);
- Proclamation 20-30.06 (7/31/20 in English) (extension of unemployment compensation);
- Proclamation 20-30.07 (9/2/20 in English) (extension of unemployment compensation);
- Proclamation 20-30.08 (10/2/20 in English) (extension of unemployment compensation);
- Proclamation 20-30.09 (10/10/20 in English) (extension of unemployment compensation);
- Proclamation 20-30.10 (12/8/20 in English) (extension of unemployment compensation);
- Proclamation 20-30.11 (1/19/21 in English) (extension of unemployment compensation);
- Proclamation 20-30.12 (6/21/21 in English) (extension of unemployment compensation);
- Proclamation 20-31 (3/26/20 in English and Spanish) (childcare background checks – waiver or suspension of certain statutory provisions);
- Proclamation 20-31.01 (4/23/20 in English) (childcare background checks – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-31.03 (5/29/20 in English) (childcare background checks – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-31.05 (7/2/20 in English) (childcare background checks – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-31.06 (7/31/20 in English) (childcare background checks – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-31.07 (9/2/20 in English) (childcare background checks – extension of waiver or suspension of certain statutory provisions);

- Proclamation 20-31.08 (10/2/20 in English) (childcare background checks – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-31.09 (11/10/20 in English) (childcare background checks – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-31.10 (12/8/20 in English) (childcare background checks – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-31.11 (1/19/21 in English) (childcare background checks – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-31.12 (4/8/22 in English) (childcare background checks – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-32 (3/26/20 in English) (healthcare worker licensing - waiver or suspension of certain statutory provisions);
- Proclamation 20-32.01 (4/23/20 in English) (extension of healthcare worker licensing - waiver or suspension of certain statutory provisions);
- Proclamation 20-32.02 (5/5/20 in English) (extension of healthcare worker licensing - waiver or suspension of certain statutory provisions);
- Proclamation 20-32.03 (5/29/20 in English) (extension of healthcare worker licensing - waiver or suspension of certain statutory provisions);
- Proclamation 20-32.05 (7/2/20 in English) (extension of healthcare worker licensing - waiver or suspension of certain statutory provisions);
- Proclamation 20-32.06 (7/31/20 in English) (extension of healthcare worker licensing - waiver or suspension of certain statutory provisions);
- Proclamation 20-32.07 (9/2/20 in English) (extension of healthcare worker licensing - waiver or suspension of certain statutory provisions);
- Proclamation 20-32.08 (10/2/20 in English) (extension of healthcare worker licensing - waiver or suspension of certain statutory provisions);
- Proclamation 20-32.09 (11/10/20 in English) (extension of healthcare worker licensing - waiver or suspension of certain statutory provisions);
- Proclamation 20-32.10 (12/8/20 in English) (extension of healthcare worker licensing - waiver or suspension of certain statutory provisions);
- Proclamation 20-32.11 (1/19/21 in English) (extension of healthcare worker licensing - waiver or suspension of certain statutory provisions);
- Proclamation 20-32.12 (8/5/21 in English) (Rescind healthcare worker licensing - waiver or suspension of certain statutory provisions);

- Proclamation 20-33 (3/26/20 in English and Spanish) (visitation and remedial services in foster and group homes – waiver or suspension of certain statutory provisions);
- Proclamation 20-33.01 (4/23/20 in English) (visitation and remedial services in foster and group homes – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-33.02 (5/5/20 in English) (visitation and remedial services in foster and group homes – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-33.03 (5/12/20 in English) (visitation and remedial services in foster and group homes – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-33.04 (5/19/20 in English) (visitation and remedial services in foster and group homes – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-33.05 (5/29/20 in English) (visitation and remedial services in foster and group homes – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-33.07 (7/2/20 in English) (visitation and remedial services in foster and group homes – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-33.09 (7/31/20 in English) (visitation and remedial services in foster and group homes – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-34 (3/26/20 in English) (filing annual reports with State Auditor's Office – waiver or suspension of certain statutory provisions);
- Proclamation 20-34.01 (4/23/20 in English) (filing annual reports with State Auditor's Office – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-34.02 (5/5/20 in English) (filing annual reports with State Auditor's Office – extension of waiver or suspension of certain statutory provisions);

- Proclamation 20-34.03 (5/29/20 in English) (filing annual reports with State Auditor's Office – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-35 (3/30/20 in English and Spanish) (Department of Corrections Community Custody violations – waiver or suspension of arrest and imprisonment);
- Proclamation 20-36 (3/30/20 in English) (Department of Health facilities – suspension or waiver of certain statutory provisions; hand sanitizer requirements);
- Proclamation 20-36.01 (4/30/20 in English) (extending suspension and waiver of certain statutory provisions; hand sanitizer requirements);
- Proclamation 20-36.02 (5/11/20 in English) (extending suspension and waiver of certain statutory provisions; hand sanitizer requirements);
- Proclamation 20-36.03 (7/8/20 in English) (extending suspension and waiver of certain statutory provisions; hand sanitizer requirements);
- Proclamation 20-36.04 (7/31/20 in English) (extending suspension and waiver of certain statutory provisions; hand sanitizer requirements);
- Proclamation 20-36.05 (9/2/20 in English) (extending suspension and waiver of certain statutory provisions; hand sanitizer requirements);
- Proclamation 20-36.06 (10/2/20 in English) (extending suspension and waiver of certain statutory provisions; hand sanitizer requirements);
- Proclamation 20-36.07 (11/10/20 in English) (extending suspension and waiver of certain statutory provisions; hand sanitizer requirements);
- Proclamation 20-36.08 (12/9/20 in English) (extending suspension and waiver of certain statutory provisions; hand sanitizer requirements);
- Proclamation 20-36.09 (1/8/21 in English) (extending suspension and waiver of certain statutory provisions; hand sanitizer requirements);
- Proclamation 20-36.10 (1/19/21 in English) (extending suspension and waiver of certain statutory provisions; hand sanitizer requirements);
- Proclamation 20-36.11 (8/5/22 in English) (rescind suspension and waiver of certain statutory provisions; hand sanitizer requirements);
- Proclamation 20-37 (3/30/20 in English) (registered nursing assistants' waiver of certain training and testing requirements);

- Proclamation 20-37.1 (4/30/20 in English) (extending registered nursing assistants' waiver of certain training and testing requirements);
- Proclamation 20-37.2 (5/11/20 in English) (extending registered nursing assistants' waiver of certain training and testing requirements);
- Proclamation 20-37.3 (5/29/20 in English) (extending registered nursing assistants' waiver of certain training and testing requirements);
- Proclamation 20-37.5 (7/2/20 in English) (extending registered nursing assistants' waiver of certain training and testing requirements);
- Proclamation 20-37.6 (7/31/20 in English) (extending registered nursing assistants' waiver of certain training and testing requirements);
- Proclamation 20-38 (3/30/20 in English) (Department of Social and Health Services – waiver or suspension of certain statutory provisions regarding facility operations);
- Proclamation 20-38.1 (4/30/20 in English) (Department of Social and Health Services – extending waiver or suspension of certain statutory provisions regarding facility operations);
- Proclamation 20-38.2 (5/11/20 in English) (Department of Social and Health Services – extending waiver or suspension of certain statutory provisions regarding facility operations);
- Proclamation 20-38.3 (5/29/20 in English) (Department of Social and Health Services – extending waiver or suspension of certain statutory provisions regarding facility operations);
- Proclamation 20-38.5 (7/2/20 in English) (Department of Social and Health Services – extending waiver or suspension of certain statutory provisions regarding facility operations);
- Proclamation 20-38.6 (7/31/20 in English) (Department of Social and Health Services – extending waiver or suspension of certain statutory provisions regarding facility operations);
- Proclamation 20-39 (3/31/20 in English) (DRS post-retirement employment);
- Proclamation 20-39.1 (4/30/20 in English) (extending DRS post-retirement employment);
- Proclamation 20-39.2 (5/11/20 in English) (extending DRS post-retirement employment);

- Proclamation 20-39.3 (5/29/20 in English) (extending DRS post-retirement employment);
- Proclamation 20-40 (4/2/20 in English and Spanish) (building code implementation postponed);
- Proclamation 20-41 (4/3/20 in English and Spanish) (DOL license renewal extension);
- Proclamation 20-41.01 (5/1/20 in English) (extending date of DOL license renewal extension);
- Proclamation 20-41.02 (5/29/20 in English) (extending date of DOL license renewal extension);
- Proclamation 20-41.03 (5/11/20 in English) (extending date of DOL license renewal extension);
- Proclamation 20-41.05 (6/19/20 in English) (extending date of DOL license renewal extension);
- Proclamation 20-41.06 (7/2/20 in English) (extending date of DOL license renewal extension);
- Proclamation 20-41.07 (7/31/20 in English) (extending date of DOL license renewal extension);
- Proclamation 20-41.08 (9/2/20 in English) (extending date of DOL license renewal extension);
- Proclamation 20-41.09 (10/2/20 in English) (extending date of DOL license renewal extension);
- Proclamation 20-41.10 (11/10/20 in English) (extending date of DOL license renewal extension);
- Proclamation 20-41.11 (12/8/20 in English) (extending date of DOL license renewal extension);
- Proclamation 20-41.12 (1/19/21 in English) (extending date of DOL license renewal extension);
- Proclamation 20-41.13 (4/1/22 in English) (extending date of DOL license renewal extension);
- Proclamation 20-42 (4/3/20 in English and Spanish) (DOL driver license suspension – waiver of certain statutory provisions);
- Proclamation 20-42.1 (5/1/20 in English) (extending DOL driver license suspension – waiver of certain statutory provisions);

- Proclamation 20-42.2 (5/11/20 in English) (extending DOL driver license suspension – waiver of certain statutory provisions);
- Proclamation 20-43 (4/10/20 in English and Spanish) (OFM Annual Leave and Pay Procedures – waiver or suspension of certain statutory provisions);
- Proclamation 20-43.01 (5/11/20 in English) (OFM Annual Leave and Pay Procedures – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-43.02 (5/29/20 in English) (OFM Annual Leave and Pay Procedures – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-43.04 (7/2/20 in English) (OFM Annual Leave and Pay Procedures – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-43.05 (7/31/20 in English) (OFM Annual Leave and Pay Procedures – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-43.07 (10/2/20 in English) (OFM Annual Leave and Pay Procedures – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-43.08 (11/10/20 in English) (OFM Annual Leave and Pay Procedures – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-43.09 (12/8/20 in English) (OFM Annual Leave and Pay Procedures – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-43.10 (1/19/21 in English) (OFM Annual Leave and Pay Procedures – extension of waiver or suspension of certain statutory provisions);
- Proclamation 2-44 (4/10/20 in English) (nursing home transfer or discharge for COVID-19 cohorting purposes);
- Proclamation 2-44.01 (5/11/20 in English) (extension of nursing home transfer or discharge for COVID-19 cohorting purposes);
- Proclamation 2-44.02 (5/29/20 in English) (extension of nursing home transfer or discharge for COVID-19 cohorting purposes);
- Proclamation 2-44.03 (6/18/20 in English) (extension of nursing home transfer or discharge for COVID-19 cohorting purposes);
- Proclamation 2-44.04 (7/2/20 in English) (extension of nursing home transfer or discharge for COVID-19 cohorting purposes);
- Proclamation 2-44.05 (7/31/20 in English) (extension of nursing home transfer or discharge for COVID-19 cohorting purposes);
- Proclamation 2-44.06 (7/31/20 in English) (extension of nursing home transfer or discharge for COVID-19 cohorting purposes);

- Proclamation 2-44.07 (10/02/20 in English) (extension of nursing home transfer or discharge for COVID-19 cohorting purposes);
- Proclamation 2-44.08 (11/10/20 in English) (extension of nursing home transfer or discharge for COVID-19 cohorting purposes);
- Proclamation 2-44.09 (12/8/20 in English) (extension of nursing home transfer or discharge for COVID-19 cohorting purposes);
- Proclamation 2-44.10 (1/19/21 in English) (extension of nursing home transfer or discharge for COVID-19 cohorting purposes);
- Proclamation 2-44.11 (7/27/21 in English) (extension of nursing home transfer or discharge for COVID-19 cohorting purposes);
- Proclamation 20-45 (4/10/20 in English and Spanish) (protection orders and personal service – waiver or suspension of certain statutory provisions);
- Proclamation 20-45.02 (5/15/20 in English) (protection orders and personal service – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-45.03 (6/16/20 in English) (protection orders and personal service – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-45.04 (7/2/20 in English) (protection orders and personal service – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-45.05 (7/31/20 in English) (protection orders and personal service – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-45.06 (7/31/20 in English) (protection orders and personal service – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-45.07 (10/2/20 in English) (protection orders and personal service – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-45.08 (11/2/20 in English) (protection orders and personal service – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-45.09 (12/8/20 in English) (protection orders and personal service – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-45.10 (1/19/21 in English) (protection orders and personal service – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-45.11 (7/20/21 in English) (protection orders and personal service – extension of waiver or suspension of certain statutory provisions);
- Proclamation 20-46 (4/13/20 in English and Spanish) (high-risk employees – workers' rights);

- Proclamation 20-46.1 (6/2/20 in English and Spanish) (high-risk employees – workers' rights extended);
- Proclamation 20-46.2 (7/29/20 in English and Spanish) (high-risk employees – workers' rights extended);
- Proclamation 20-46.3 (4/8/21 in English and Spanish) (high-risk employees – workers' rights extended);
- Proclamation 20-46.4 (6/21/21 in English and Spanish) (high-risk employees – workers' rights extended);
- Proclamation 20-47 (4/14/20 in English and Spanish) (criminal justice – limitations of action);
- Proclamation 20-48 (4/14/20 in English and Spanish) (Department of Licensing – CDL heath certificates and other requirements);
- Proclamation 20-48.01 (5/15/20 in English) (Department of Licensing – CDL heath certificates and other requirements extended);
- Proclamation 20-48.02 (5/29/20 in English) (Department of Licensing – CDL heath certificates and other requirements extended);
- Proclamation 20-48.04 (7/2/20 in English) (Department of Licensing – CDL heath certificates and other requirements extended);
- Proclamation 20-48.05 (7/31/20 in English) (Department of Licensing – CDL heath certificates and other requirements extended);
- Proclamation 20-48.06 (7/31/20 in English) (Department of Licensing – CDL heath certificates and other requirements extended);
- Proclamation 20-48.07 (10/2/20 in English) (Department of Licensing – CDL heath certificates and other requirements extended);
- Proclamation 20-48.08 (11/10/20 in English) (Department of Licensing – CDL heath certificates and other requirements extended);
- Proclamation 20-48.09 (12/8/20 in English) (Department of Licensing – CDL heath certificates and other requirements extended);
- Proclamation 20-48.10 (1/19/21 in English) (Department of Licensing – CDL heath certificates and other requirements extended);
- Proclamation 20-48.11 (4/1/22 in English) (Department of Licensing – CDL heath certificates and other requirements extended);
- Proclamation 20-49 (4/14/20 in English and Spanish) (garnishments and accrual of interest);

- Proclamation 20-49.01 (5/15/20 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.02 (5/22/20 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.03 (5/26/20 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.04 (5/26/20 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.05 (6/18/20 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.06 (7/2/20 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.07 (8/4/20 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.08 (9/2/20 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.09 (10/2/20 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.10 (10/2/20 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.11 (12/8/20 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.12 (1/7/21 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.13 (1/19/21 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.14 (3/17/21 in English) (garnishments and accrual of interest extended);
- Proclamation 20-49.15 (8/4/21 in English) (garnishments and accrual of interest extended);
- Proclamation 20-50 (4/15/20 in English and Spanish) (COVID-19 – reducing prison population);
- Proclamation 20-51 (4/17/20 in English) (community association meetings and late fees);

- Proclamation 20-51.01 (5/15/20 in English) (community association meetings and late fees extended);
- Proclamation 20-51.02 (5/29/20 in English) (community association meetings and late fees extended);
- Proclamation 20-51.03 (6/18/20 in English) (community association meetings and late fees extended);
- Proclamation 20-51.04 (6/24/20 in English) (community association meetings and late fees extended);
- Proclamation 20-51.05 (7/2/20 in English) (community association meetings and late fees extended);
- Proclamation 20-51.06 (7/31/20 in English) (community association meetings and late fees extended);
- Proclamation 20-51.07 (9/2/20 in English) (community association meetings and late fees extended);
- Proclamation 20-51.08 (10/2/20 in English) (community association meetings and late fees extended);
- Proclamation 20-51.09 (11/10/20 in English) (community association meetings and late fees extended);
- Proclamation 20-51.10 (12/8/20 in English) (community association meetings and late fees extended);
- Proclamation 20-51.11 (1/19/21 in English) (community association meetings and late fees extended);
- Proclamation 20-51.12 (7/13/21 in English) (community association meetings and late fees extended);
- Proclamation 20-52 (4/23/20 in English) (Statewide orders relating to long-term care);
- Proclamation 20-52.01 (5/11/20 in English) (extending Statewide orders relating to long-term care);
- Proclamation 20-52.02 (5/29/20 in English) (extending Statewide orders relating to long-term care);
- Proclamation 20-52.03 (6/18/20 in English) (extending Statewide orders relating to long-term care);
- Proclamation 20-52.04 (7/2/20 in English) (extending Statewide orders relating to long-term care);

- Proclamation 20-52.05 (7/31/20 in English) (extending Statewide orders relating to long-term care);
- Proclamation 20-52.06 (9/2/20 in English) (extending Statewide orders relating to long-term care);
- Proclamation 20-52.07 (10/2/20 in English) (extending Statewide orders relating to long-term care);
- Proclamation 20-52.08 (11/10/20 in English) (extending Statewide orders relating to long-term care);
- Proclamation 20-52.09 (12/8/20 in English) (extending Statewide orders relating to long-term care);
- Proclamation 20-52.10 (1/19/21 in English) (extending Statewide orders relating to long-term care);
- Proclamation 20-52.11 (8/5/22 in English) (rescind Statewide orders relating to long-term care);
- Proclamation 20-53 (5/5/20 in English) (maintaining access to the ballot for all candidates);
- Proclamation 20-55 (5/7/20 in English) (collective bargaining);
- Proclamation 20-56 (5/28/20 in English) (Tribal fuel tax refund restrictions);
- Proclamation 20-56.1 (5/28/20 in English) (Tribal fuel tax refund restrictions extended);
- Proclamation 20-56.2 (7/2/20 in English) (Tribal fuel tax refund restrictions extended);
- Proclamation 20-56.3 (7/2/20 in English) (Tribal fuel tax refund restrictions extended);
- Proclamation 20-56.4 (9/2/20 in English) (Tribal fuel tax refund restrictions extended);
- Proclamation 20-56.5 (10/2/20 in English) (Tribal fuel tax refund restrictions extended);
- Proclamation 20-56.6 (11/10/20 in English) (Tribal fuel tax refund restrictions extended);
- Proclamation 20-56.7 (12/8/20 in English) (Tribal fuel tax refund restrictions extended);
- Proclamation 20-56.8 (1/19/21 in English) (Tribal fuel tax refund restrictions extended);

- Proclamation 20-56.9 (6/1/22 in English) (Tribal fuel tax refund restrictions rescinded);
- Proclamation 20-57 (5/28/20 in English and Spanish) (concerning the health of agricultural workers);
- Proclamation 20-57.1 (8/19/20 in English and Spanish) (concerning the health of agricultural workers);
- Proclamation 20-57.2 (7/1/21 in English and Spanish) (concerning the health of agricultural workers);
- Proclamation 20-58 (6/19/20 in English) (Employment Security Department-shared work requirements);
- Proclamation 20-58.2 (7/31/20 in English) (Employment Security Department-shared work requirements extendeds);
- Proclamation 20-58.3 (9/2/20 in English) (Employment Security Department-shared work requirements extended);
- Proclamation 20-58.4 (10/2/20 in English) (Employment Security Department-shared work requirements extended);
- Proclamation 20-58.5 (11/10/20 in English) (Employment Security Department-shared work requirements extended);
- Proclamation 20-58.6 (12/8/20 in English) (Employment Security Department-shared work requirements extended);
- Proclamation 20-58.7 (12/22/20 in English) (Employment Security Department-shared work requirements extended);
- Proclamation 20-58.8 (12/30/20 in English) (Employment Security Department-shared work requirements extended);
- Proclamation 20-59 (6/19/20 in English) (Department of Health – temporary practice permits);
- Proclamation 20-59.2 (7/31/20 in English) (Department of Health – temporary practice permits);
- Proclamation 20-59.3 (8/4/20 in English) (Department of Health – temporary practice permits);
- Proclamation 20-59.4 (9/2/20 in English) (Department of Health – temporary practice permits);
- Proclamation 20-59.5 (10/2/20 in English) (Department of Health – temporary practice permits);

- Proclamation 20-59.6 (11/10/20 in English) (Department of Health – temporary practice permits);
- Proclamation 20-59.7 (12/8/20 in English) (Department of Health – temporary practice permits);
- Proclamation 20-59.8 (1/19/20 in English) (Department of Health – temporary practice permits);
- Proclamation 20-59.9 (8/5/22 in English) (rescind Department of Health – temporary practice permits);
- Proclamation 20-61 (6/30/20 in English) (Department of Transportation – annual updates to Transportation Improvement Plans);
- Proclamation 20-62 (7/8/2020 in English) (Developmental Disabilities Administration – Assessments and Reviews);
- Proclamation 20-63 (7/9/2020 in English) (DSHS – Family Emergency Assistance Program);
- Proclamation 20-63.1 (7/31/2020 in English) (DSHS – Family Emergency Assistance Program);
- Proclamation 20-63.2 (10/2/2020 in English) (DSHS – Family Emergency Assistance Program);
- Proclamation 20-63.3 (10/2/2020 in English) (DSHS – Family Emergency Assistance Program);
- Proclamation 20-63.4 (11/10/2020 in English) (DSHS – Family Emergency Assistance Program);
- Proclamation 20-63.5 (12/8/2020 in English) (DSHS – Family Emergency Assistance Program);
- Proclamation 20-63.6 (12/22/2020 in English) (DSHS – Family Emergency Assistance Program);
- Proclamation 20-63.7 (12/30/2020 in English) (DSHS – Family Emergency Assistance Program);
- Proclamation 20-63.8 (4/15/2021 in English) (DSHS – Family Emergency Assistance Program);
- Proclamation 20-63.9 (6/10/2021 in English) (DSHS – Family Emergency Assistance Program);
- Proclamation 20-64 (7/30/20 in English) (Public Records Act-Contact Tracing-Personal Information);

- Proclamation 20-64.1 (9/2/20 in English) (Public Records Act-Contact Tracing-Personal Information);
- Proclamation 20-64.2 (10/2/20 in English) (Public Records Act-Contact Tracing-Personal Information);
- Proclamation 20-64.3 (11/10/20 in English) (Public Records Act-Contact Tracing-Personal Information);
- Proclamation 20-64.4 (12/8/20 in English) (Public Records Act-Contact Tracing-Personal Information);
- Proclamation 20-64.5 (1/19/21 in English) (Public Records Act-Contact Tracing-Personal Information);
- Proclamation 20-65 (8/7/20 in English) (Long Term Care – Workers, Facilities, and resources);
- Proclamation 20-65.1 (9/2/20 in English) (Long Term Care – Workers, Facilities, and resources);
- Proclamation 20-65.2 (10/2/20 in English) (Long Term Care – Workers, Facilities, and resources);
- Proclamation 20-65.3 (11/10/20 in English) (Long Term Care – Workers, Facilities, and resources);
- Proclamation 20-65.4 (12/8/20 in English) (Long Term Care – Workers, Facilities, and resources);
- Proclamation 20-65.5 (1/19/21 in English) (Long Term Care – Workers, Facilities, and resources);
- Proclamation 20-65.6 (8/5/22 in English) (rescind Long Term Care – Workers, Facilities, and resources);
- Proclamation 20-66 (8/7/20 in English) (Long Term Care – Operations and Visitations);
- Proclamation 20-66.1 (9/2/20 in English) (Long Term Care – Operations and Visitations);
- Proclamation 20-66.2 (10/2/20 in English) (Long Term Care – Workers, Facilities, and resources);
- Proclamation 20-66.3 (11/10/20 in English) (Long Term Care – Workers, Facilities, and resources);
- Proclamation 20-66.4 (12/8/20 in English) (Long Term Care – Workers, Facilities, and resources);

- Proclamation 20-66.5 (1/19/21 in English) (Long Term Care – Workers, Facilities, and resources);
- Proclamation 20-67 (8/13/20 in English) (Food Production Workers Paid Leave);
- Proclamation 20-67.1 (7/20/21 in English) (Food Production Workers Paid Leave);
- Proclamation 20-69 (8/26/20 in English) (Residency for Tuition Waivers);
- Proclamation 20-69.1 (9/25/20 in English) (Residency for Tuition Waivers);
- Proclamation 20-69.2 (11/10/20 in English) (Residency for Tuition Waivers);
- Proclamation 20-69.3 (12/8/20 in English) (Residency for Tuition Waivers);
- Proclamation 20-69.4 (1/19/21 in English) (Residency for Tuition Waivers);
- Proclamation 20-69.5 (4/15/22 in English) (Residency for Tuition Waivers);
- Proclamation 20-70 (8/26/20 in English) (transportation and Remote Learning for K-12 Student Education);
- Proclamation 20-70.1 (7/27/21 in English) (transportation and Remote Learning for K-12 Student Education);
- Proclamation 20-71 (9/4/20 in English) (Department of Natural Resources – in person meetings)
- Proclamation 20-72 (9/10/20 in English) (Wildfires – Temporary Assistance to Families);
- Proclamation 20-72.1 (10/2/20 in English) (Wildfires – Temporary Assistance to Families);
- Proclamation 20-72.2 (10/9/20 in English) (Wildfires – Temporary Assistance to Families);
- Proclamation 20-73 (9/10/20 in English) (Wildfires – Truck Driver Hours);
- Proclamation 20-73.1 (9/14/20 in English) (Wildfires – Truck Driver Hours);
- Proclamation 20-74 (10/8/20 in English) (Behavioral Health Association, Children's Long-Term Impatient Program and Residential Treatment Facilities – Operations and Visitations);
- Proclamation 20-74.1 (11/10/20 in English) (Behavioral Health Association, Children's Long-Term Impatient Program and Residential Treatment Facilities – Operations and Visitations);
- Proclamation 20-74.2 (11/10/20 in English) (Behavioral Health Association, Children's Long-Term Impatient Program and Residential Treatment Facilities – Operations and Visitations);

- Proclamation 20-74.3 (1/19/21 in English) (Behavioral Health Association, Children's Long-Term Impatient Program and Residential Treatment Facilities – Operations and Visitations);
- Proclamation 20-74.4 (8/5/22 in English) (Rescind Behavioral Health Association, Children's Long-Term Impatient Program and Residential Treatment Facilities – Operations and Visitations);
- Proclamation 20-75 (10/27/20 in English) (Stay Safe-Vote Safe);
- Proclamation 20-76 (11/19/20 in English) (food delivery fees);
- Proclamation 20-76.1 (6/21/21 in English) (food delivery fees);
- Proclamation 20-77 (12/2/20 in English) (college bound program pledge waivers);
- Proclamation 20-78 (12/14/20 in English) (safeguarding public trust and stability in local health jurisdictions);
- Proclamation 20-79 (12/17/20 in English) (Employment Security Department – Suspension of solvency Surcharge);
- Proclamation 20-79.1 (1/19/21 in English) (Employment Security Department – Suspension of solvency Surcharge);
- Proclamation 20-79.2 (7/20/21 in English) (Employment Security Department – Suspension of solvency Surcharge);
- Proclamation 20-80 (12/17/20 in English) (DOC – Prison Commitments);
- Proclamation 20-80.1 (10/19/21 in English) (DOC – Prison Commitments);
- Proclamation 20-84 (12/30/20 in English) (Delaying repeal of RCW 26.10);
- Proclamation 20-84.2 (8/4/21 in English) (Delaying repeal of RCW 26.10);
- Proclamation 20-84.1 (1/19/21 in English) (Delaying repeal of RCW 26.10);
- Proclamation 21-02 (1/19/21 in English) (Extended eligibility for foster care services);
- Proclamation 21-05 (3/15/21 in English) (Children and Youth Mental Health Crisis);
- Proclamation 21-05.1 (3/26/21 in English) (Children and Youth Mental Health Crisis);
- Proclamation 21-08 (5/21/21 in English) (Safe Workers);
- Proclamation 21-08.01 (2/17/22 in English) (Safe Workers);
- Proclamation 21-09 (6/29/21 in English) (Tenancy Preservation- a bridge to E2SSB 5160);

- Proclamation 21-09.1 (9/24/21 in English) (Tenancy Preservation- a bridge to E2SSB 5160);
- Proclamation 21-09.2 (9/30/21 in English) (Tenancy Preservation- a bridge to E2SSB 5160);
- Proclamation 21-14 (8/9/21 in English) (COVID-19 Vaccination Requirement);
- Proclamation 21-14.1 (8/21/21 in English) (COVID-19 Vaccination Requirement);
- Proclamation 21-14.2 (9/27/21 in English) (COVID-19 Vaccination Requirement);
- Proclamation 21-14.3 (11/24/21 in English) (Amendment to COVID-19 Vaccination Requirement);
- Proclamation 21-14.4 (3/23/22 in English) (Amendment to COVID-19 Vaccination Requirement);
- Proclamation 21-14.5 (5/20/22 in English) (Amendment to COVID-19 Vaccination Requirement);
- Proclamation 21-14.6 (10/28/22 in English) (Termination of Emergency Order - COVID-19 Vaccination Requirement);
- Proclamation 21-15 (9/3/21 in English) (Transfer or Discharge of Nursing Home Residents – COVID-19 Delta Variant);
- Proclamation 21-15.1 (10/1/21 in English) (Transfer or Discharge of Nursing Home Residents – COVID-19 Delta Variant);
- Proclamation 21-15.2 (11/1/21 in English) (Transfer or Discharge of Nursing Home Residents – COVID-19 Delta Variant);
- Proclamation 21-16 (10/18/21 in English) (Large Events COVID-19 Vaccine Verification);
- Proclamation 21-16.1 (11/15/21 in English) (Large Events COVID-19 Vaccine Verification);

4.6.4 Probability of Future Occurrences

4.6.4.1 Disease (Infectious/Vector-Borne)

Many vector-borne and infectious diseases have become increasingly rare throughout Clallam County. Vector-borne diseases such as rabies have been nearly eradicated, as vaccinations and other preventative measures have significantly reduced the risk of rabies in domestic pets. Aside from domesticated animals, rabies is very uncommon in rodents in Washington. Rabies is effectively only found in bats within the County, and

transmission to humans is unlikely. It is likely that mosquito- and tick-borne diseases and diseases transmitted by other animals will continue to be very rare occurrences in the County. Awareness and preventative measures can continue to mitigate the risks of vector-borne illnesses. Considering these factors, infectious and vector-borne disease is considered to have an occasional probability of occurring in the future. Occasional probability means a 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.

4.6.4.2 Pandemic

The likelihood of pandemics has increased over the last hundred years due to increased globalization, urbanization, and changes in land use. Another potential key contributor to an increased likelihood of pandemics is factory farming. The shift from small scale animal agriculture to large factory farming operations may be a driving factor in recent pandemic diseases and may cause the next pandemic. For these reasons, the probability of future occurrences is considered occasional. Occasional means a 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years. However, the exact time and location that another virus with the potential to create a global pandemic would occur is difficult to predict. Future pandemic occurrences would likely result from a mutation of a virus that results in a new virus to which the population has no immunity. With medical technology, it is possible to anticipate new viruses and develop vaccines to prepare for the next outbreak; however, entirely preventing a pandemic through preemptive measures is unlikely.

4.6.5 Climate Change

4.6.5.1 Disease (Infectious/Vector-Borne)

Climate change can have significant impacts on public health and has the potential to facilitate the spread of vector-borne diseases. Warming trends could facilitate higher rates of rare vector-borne infections and diseases in Clallam County. Environmental disasters related to changing weather patterns such as heavy rainfall and flooding can be breeding grounds for disease-causing insects, especially mosquitos leading to

disease.[66] It is generally thought that most vectors survive and thrive in warmer temperatures and impacts from climate change could potentially create advantageous environments for the spread of vectors and vector-borne diseases.

4.6.5.2 Pandemic

While pandemics can originate for reasons outside of climate change, it is possible that the impacts of climate change will make pandemics more severe. According to the National Science Foundation, climate change will likely require humans to relocate and wild animals to find new habitats, dramatically increasing the risk of viral jumps/transmissions. For example, rising temperatures are expected to have a major impact on bats – a species known for novel virus sharing, most recently with Covid-19 or the Ebola virus.[67] Furthermore, according to the Harvard T.H. Chan School of Public Health, climate change and development, such as rising temperatures and deforestation for agricultural purposes, contribute to habitat loss worldwide.[68] Consequently, the loss of habitat forces animals to migrate and potentially face additional contact with other animals and humans, increasing the risk of disease transmission. When coupled with increased urbanization and globalization, pandemics could continue to spread as quickly or more quickly than the Covid-19 pandemic. While the full effects of climate change on pandemics are not fully known, it is reasonable to assume the risk for future pandemics continues to exist.

4.6.6 Vulnerability and Risk Assessment

4.6.6.1 Disease (Infectious/Vector-Borne)

The entirety of Clallam County is vulnerable to infectious and vector-borne diseases. Vectors such as mosquitos, ticks, rodents, and other animals are located throughout Clallam County and could spread communicable disease anywhere within the planning area. Areas with heightened interaction with these vectors may pose a higher risk of

[66] University Corporation for Atmospheric Research, *Climate Change and Vector-Borne Disease*, https://scied.ucar.edu/learning-zone/climate-change-impacts/vector-borne-disease, accessed April 17, 2024.

[67] National Science Foundation, *Study finds that climate change could spark the next pandemic,* https://beta.nsf.gov/news/study-finds-climate-change-could-spark-next, accessed April 12, 2023.

[68] Harvard T.H. Chan School of Public Health, *Coronavirus and Climate Change*, https://www.hsph.harvard.edu/c-change/subtopics/coronavirus-and-climate-change, accessed April 17, 2024.

disease. These may include forested areas, lakes, and other natural areas where humans may come in contact with vectors. Additionally, developed areas are vulnerable to the vectors of concern in the County such as mosquitos, ticks, rodents, and other animals. Developed areas and higher population density increases contact rates between humans and vectors leading to more frequent outbreaks of vector-borne diseases. Developed areas and densely populated areas create favorable conditions for vectors to thrive. Considering the vast natural and forested areas throughout Clallam County and the potential for vectors to interact with humans in natural and developed areas, is it assumed that the entire population of 77,333 people in Clallam County are potentially vulnerable.

Structures are not susceptible to physical damages from disease and therefore critical facilities are generally not considered vulnerable. The health impacts associated with disease could potentially affect residents throughout the County. The impacts to residents would depend on the nature of the disease and the distribution of the vectors. The known vectors of concern in Clallam county are known carriers of hantavirus, rabies, West Nile Virus (WNV), and tick-borne diseases such as Lyme disease. Health impacts could be minimal or severe depending on the disease. Hantavirus and rabies for example can be fatal. Tick-borne diseases and WNV often cause mild symptoms but can potentially have life-threatening or long-term health problems in severe cases. Although cases of vector-borne diseases are rare in Clallam County, the entirety of the planning area is potentially vulnerable, and impacts could range from mild to severe depending on the circumstances.

4.6.6.2 Pandemic

Pandemic has no defined hazard area within the County and would potentially affect the entirety of the planning area. Certain areas including developed and more densely populated areas may be more susceptible to the spread of a pandemic. However, because pandemic diseases and the impacts of a pandemic could potentially impact any areas within Clallam County, it is reasonable to assume that the entire population of 77,333 people in Clallam County are potentially vulnerable.

Physical structures are not vulnerable to damage due to pandemics; thus, critical facilities are generally not considered vulnerable. The main concern for pandemic vulnerability is the impact on human health, and the operations of critical facilities as a

secondary impact. Health impacts may be widespread throughout the County and impact a significant percentage of the population, including widespread illness and loss of life. Although critical facilities are not at risk of physical damage, many types of critical facilities may feel the secondary impacts of a pandemic in the County. Secondary impacts may include the shutdown of County operations and the operations of jurisdictions within the County. It is likely that these shutdowns may disrupts daily activities and essential services throughout the planning area. Health and medical community lifelines may become overwhelmed, leading to shortages of medical supplies and delayed care for non-pandemic-related health issues. Additionally, pandemics may result in significant economic impacts to the County, businesses, and residents. Economic disruptions can result in job losses, increased poverty, and food insecurity. Depending on the size and scale of the disease outbreak, the entirety of Clallam County including all populations and areas are potentially vulnerable.

4.6.6.3 Changes in Vulnerability

Since the 2019 MJHMP, population patterns, development and land use have not substantially changed in the planning area. As discussed in Section 3.5, the County population increased nominally, from 75,474 individuals identified in 2019 MJHMP to 77,333 individuals identified in this MJHMP, representing a net growth of 1,859 individuals or 2.46 percent increase in the County. This is concurrent with the County's housing stock which increased by 1,082 units, representing a 2.93 percent increase. Generally, population and housing growth over the past five years is concentrated within the urbanized areas of Clallam County, primarily in the Cities of Port Angeles of Sequim. Because the population and development to accommodate this population increased in the last five years, the overall County vulnerability to the spread of infectious disease has increased as well.

At the time of this MJHMP preparation, the County anticipates the majority of population growth, land use changes, and development to occur within the designated Urban Growth Areas (UGAs) which are identified as Port Angeles, Sequim, Forks, Carlsborg, Joyce and Clallam Bay. The emergence of a new infectious disease outbreak, or a global pandemic in more severe cases, would necessitate rapid deployment of health safety measures in these areas to mitigate the spread of disease.

No proposed projects under the purview of the County are expected to substantially increase County vulnerability to the disease and pandemic hazard at this time, as the risk of infectious disease transmission is generally not known to be associated with development and land use projects within the County.

The Washington State Office of Financial Management developed population projections at the County level while local jurisdiction zoning is required to accommodate this projected growth. However, the exact type, location and timing of projected growth and development is unknown at the time of this writing. It is reasonable to assume that any population growth and development to accommodate that growth would result in increased County vulnerability to disease and pandemic hazards during the next five years. As the County population grows and new development leads to residents and visitors congregating in concentrated areas, the risk of infectious disease transmission is projected to increase.

4.6.6.4 Socially Vulnerable Populations

The impacts of infectious disease or a pandemic would apply to the entirety of the planning area, including SVPs within Census Tracts 3, 7, 21, 24 and 9400; individuals below the 150-percent poverty rate, aged 65 or older, disabled persons, persons reporting minority status, persons living within a mobile home; populations of the Quileute Tribe, Makah Tribe, Lower Elwha Klallam and the Jamestown S'Klallam Tribe; and tourists, seasonal visitors, and transient populations visiting for special events. These SVPs are located throughout the planning area and face their own unique challenges to pandemic. The primary concern for SVPs and other high-risk individuals in the County would be exposure to vectors harboring disease, mitigating the spread of a pandemic and access to health care.

Infectious vector-borne diseases and pandemics can have significant impacts on SVPs located throughout the County. Diseases and pandemics can disproportionately affect low-income populations by limiting their access to healthcare and preventive measures, leading to higher infection rates and more severe health outcomes. Additionally, financial constraints can hinder their ability to take necessary precautions and recover from illness. Elderly people may experience worse health impacts due to their generally weaker immune systems and higher likelihood of pre-existing health conditions. Limited mobility and access to healthcare can further exacerbate their vulnerability to severe

illness and complications. Disabled persons may also struggle with access to healthcare and support services; mobility challenges and pre-existing health conditions may increase their vulnerability to severe illness and complications. Persons reporting minority status, persons living in a mobile home and tribal populations may face disproportionate impacts of disease and pandemic due to potential isolation, healthcare disparities and potential socioeconomic challenges. These factors may lead to reduced access to medical care and higher rates of severe illness and complications. Tourists, seasonal visitors, and transient populations may face disproportionate impacts due to their mobility and potential lack of access to consistent healthcare services. This can lead to rapid disease spread and challenges in receiving timely medical care.

Considerations for SVPs throughout the planning area were incorporated into the mitigation strategy in Section 5.0. Specifically, the HMCR Steering Committee tailored Mitigation Actions #CC20, #CC21 and #CC22, to ensure access to healthcare and to mitigate exposure to vectors and the spread of a pandemic.

4.7 Drought

4.7.1 Description

The United States Geological Survey (USGS) defines drought as a period of drier-than-normal conditions that results in water-related problems. Although the amount of precipitation for a certain region varies from year to year, the average amount of precipitation is relatively constant over a period of years. When drier-than-normal conditions and below average precipitation persists over weeks to years that is considered drought. Droughts are a gradual phenomenon, often occurring over multiyear periods and increasing in severity with the length of dry conditions.

Water-related problems associated with drought may include a decline in the flow of streams and rivers, a fall in water levels in lakes and reservoirs, and an increase in the depth to water in wells. The National Oceanic and Atmospheric Administration (NOAA) notes that drought can be difficult to identify and differentiate it from normal variations

in precipitation. For this reason, drought may be identified by its water-related impacts. Droughts may be characterized based on the following four categories of impacts:[69]

- *Agricultural* – Agricultural drought is defined principally in terms of naturally occurring soil moisture deficiencies relative to water demands of plant life, usually arid crops.
- *Hydrological* – Hydrological drought is related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- *Meteorological* – Meteorological drought is defined solely on the degree of dryness, expressed as a departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
- *Regulatory (or socioeconomic)* – Regulatory drought can occur when the availability of water is reduced due to imposition of regulatory restrictions on the diversion and export of water out of a watershed to another area.

Factors such as changes in land use (i.e., deforestation), land degradation, and dam construction can affect the impacts of drought in a region. Because regions are geographically interconnected by natural systems, drought impacts may extend well beyond the borders of the precipitation-deficient area. Changes in land use upstream may alter hydrologic characteristics such as infiltration and runoff rates, resulting in more variable stream flow and a higher incidence of hydrologic drought downstream. Land use changes can alter water shortage frequencies, even when no change in precipitation occurred.[70]

Droughts cause public health and safety impacts, as well as economic, environmental, and social impacts. Public health and safety impacts are primarily associated with catastrophic wildfire risks and drinking water shortage risks. Examples of other impacts include costs to homeowners due to loss of residential landscaping, degradation of urban environments due to loss of landscaping, agricultural land fallowing and associated job loss, degradation of fishery habitat, and tree mortality with damage to

[69] NOAA, *Definition of Drought,* https://www.ncdc.noaa.gov/monitoring-references/dyk/drought-definition, accessed April 1, 2024.

[70] National Drought Mitigation Center, *Drought Basics*, https://drought.unl.edu/Education/DroughtBasics.aspx, accessed April 1, 2024.

forest ecosystems. Drought conditions can also result in damage to older infrastructure that is located within dry soils with potential to break or crack. Dead or dying vegetation poses a risk to falling and damaging structures and infrastructure systems.

Drought also results in drier brush and can increase the size and severity of wildfires. Dry brush becomes significantly more flammable and increases the rate of wildfire spread. Air quality also declines under increased drought conditions.[71] Extended drought conditions can also create challenges in procuring adequate amounts of water to fight wildfires. Further, water and wastewater infrastructure systems located within areas susceptible to wildfires are at a greater risk of being impacted. Damage or failure to water and wastewater infrastructure systems can significantly reduce or even interrupt service to customers. For more on wildfire hazards, refer to Section 4.15, *Wildfire*.

Image 2. Drought Warning Sign Sequim[72]

[71] European Geosciences Union, *Adverse effects of increasing drought on air quality via natural processes*, https://acp.copernicus.org/articles/17/12827/2017/acp-17-12827-2017.html, published October 27, 2017, accessed August 13, 2024.

[72] Sequim Gazette, League installs drought warning sign for residents https://www.sequimgazette.com/news/league-installs-drought-warning-sign-for-residents/, August 28th, 2024.

4.7.2 Location/Extent

Droughts are widespread regional events that affect the entirety of Clallam County. The geographic extent of drought conditions would extend to every resident and each jurisdictional partner within the planning area. Certain areas within the County may experience more severe drought impacts than others. For example, the eastern portion of the County historically has received low amounts of rainfall. Additionally, northeast Clallam County is within the rain shadow of the Olympic Mountains, which is also an area of reduced rainfall. While these areas may be most vulnerable, regional climate patterns and drought would impact the entire planning area to similar extents.

Clallam County is particularly vulnerable to the impacts of snow drought, which characterized by abnormally low snowpack. Below average precipitation or atypical rainfall in winter due to warmer temperatures result in a lack of snow accumulation. Additionally, glaciers in the Olympics (whose size are dependent on successive years of predominantly snowfall precipitation type) have experienced dramatic retreat and almost disappearance over the last century. The County relies on the snowpack to maintain the natural environment for vegetation, wildlife, and waterway protection. Snow drought can impact water availability, water management, outdoor recreation, and ecosystems.

As such, drought conditions within the planning area may result in implementation of conservation efforts. In Washington State, drought is declared when there is less than 75 percent of normal water supply and a present risk of undue hardship. Declaring a drought allows the Washington State Department of Ecology to process emergency water right permits and transfers. Several water purveyors provide potable water services within the planning area, while some rural residents and communities may rely on individual wells. A drought in the area would potentially impact any of these purveyors and overall water supplies throughout Clallam County. Impacts would depend on the duration and severity of the drought but may include restrictions on water use and increased water rates.

Drought severity and extent depends on numerous factors including duration, intensity, and geographic extent, as well as regional water supply demands by humans and vegetation. The magnitude of drought is usually measured by time and severity of the hydrologic deficit. The United States Drought Monitor provides weekly data identifying

portions of the United States that are experiencing drought. The intensity of drought is categorized as one of five classifications: abnormally dry (D0), showing areas that may be going into or are coming out of drought, and four levels of drought: moderate (D1), severe (D2), extreme (D3), and exceptional (D4); refer to *Table 4-7. Drought Severity Classification*.

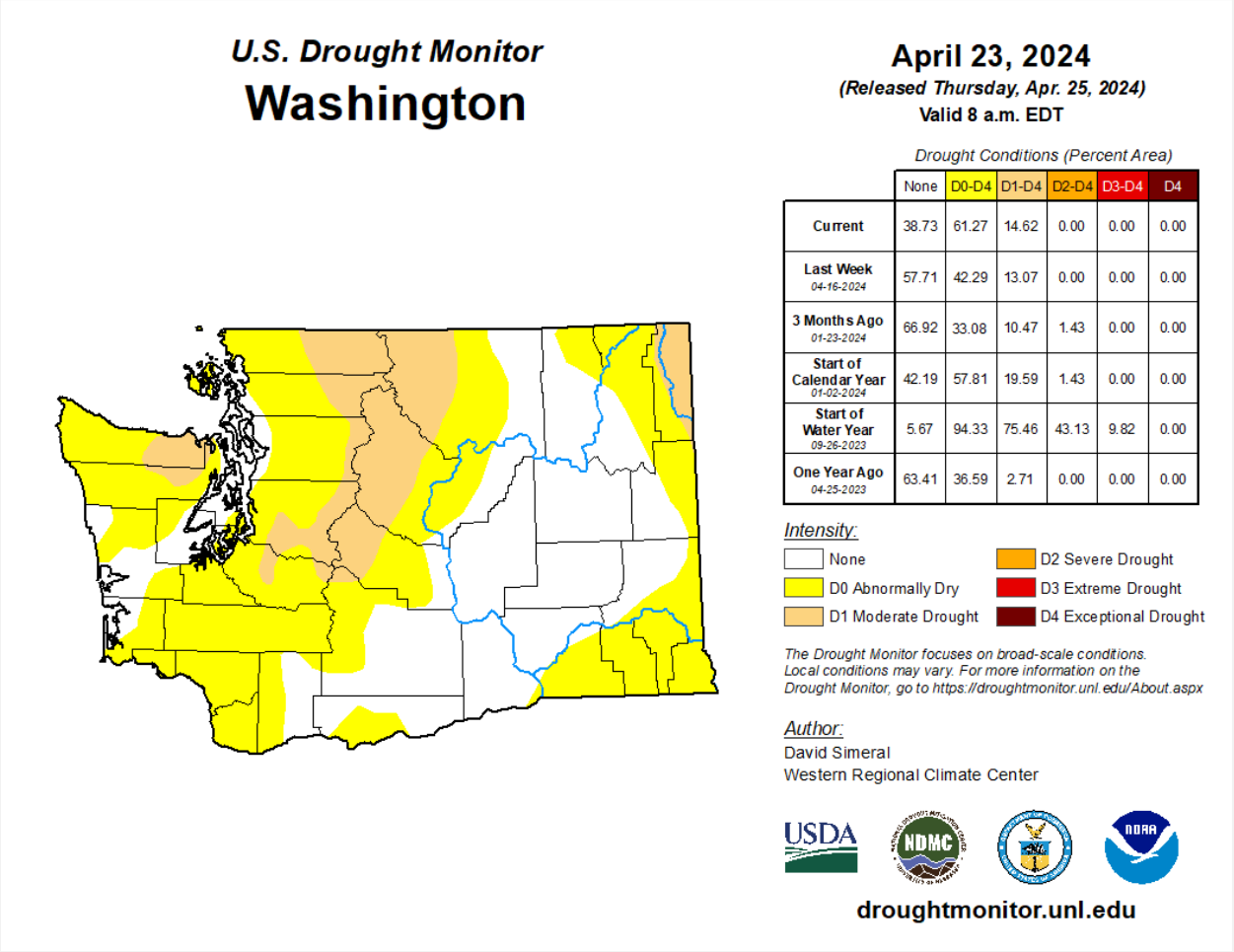
Exhibit 4-1. Drought Monitor Map, identifies areas of drought by intensity. As of April 2024, the entirety of the planning area is experiencing abnormally dry conditions and over 30 percent is experiencing moderate drought according to the United States Drought Monitor. The Drought Monitor is not a forecast but looks backward; providing a weekly assessment of drought conditions based on how much precipitation did or did not fall.

Table 4-7. Drought Severity Classification

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested.
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed.
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions.
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies.

Source: United States Drought Monitor, *Drought Classification,* https://droughtmonitor.unl.edu/About/AbouttheData/DroughtClassification.aspx, accessed April 1, 2024.

Exhibit 4-1. Drought Monitor Map



Source: U.S. Drought Monitor, Washington, https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?WA, accessed April 25, 2024.

4.7.3 Previous Occurrences

Within the past ten years, Clallam County experienced moderate (D2) to extreme (D3) drought in years 2015, 2019, 2022, and 2023 with the last year being in extreme drought.[73] In August 2015, the North Olympic Peninsula's drought status upgraded from

[73] NOAA, *Historical Conditions for Clallam County*, https://www.drought.gov/states/washington/county/clallam, published 2024, accessed April 1, 2024.

severe to extreme, including all jurisdictions within the planning area.[74] In August 2018, the Clallam County Public Utilities District (PUD) requested two water systems in the western half of the County to restrict water use before severe drought conditions were declared during the following year.[75,76]

In July 2021, the Washington Department of Ecology declared drought emergencies in 29 counties, including Clallam County.[77] The declaration came after a record-breaking heat wave affected water supplies across Washington. By summer 2023, the County experienced early snowmelt, a lack of spring rain, and low stream flows. By the next year, the Calawah River near the City of Forks, Dungeness River near the City of Sequim, and Elwha River near the City of Port Angeles reported normal streamflow conditions. The Hoko River near Sekiu, Washington, was characterized as below normal streamflow conditions.[78]

On July 24, 2023, the Washington Department of Ecology declared a drought emergency for watersheds in 12 counties, including Clallam County. A series of water alerts were issued throughout jurisdictions in Clallam County between July to September 2023. The Sequim Highland Irrigation District halted irrigation on September 10, 2023, ending the typical watering season 5 days early (April 15 to September 15). On September 11, 2023, the City of Port Angeles declared a Stage 3 alert in response to the drought affecting Elwha River. On September 12, 2023, the Clallam County Public Utility District Stage 3 water alert was issued for the Gales Addition, Mount Angeles, and Monroe

[74] Peninsula Daily News, *Peninsula drought intensifies; status boosted from severe to extreme*, https://www.peninsuladailynews.com/news/peninsula-drought-intensifies-status-boosted-from-severe-to-extreme/, published August 13, 2015, accessed April 3, 2024.

[75] State of Washington Department of Ecology, *Watching the water supply update*, https://ecology.wa.gov/blog/august-2018/watching-the-water-supply-update, published August 3, 2018, accessed April 3, 2024.

[76] Sequim Gazette, *USGS rep: Dungeness, Sequim area experiencing 'moderate' drought*, https://www.sequimgazette.com/news/usgs-rep-dungeness-sequim-area-experiencing-moderate-drought/, published July 31, 2019, accessed April 3, 2024.

[77] State of Washington Department of Ecology, *Ecology declares drought emergency*, https://ecology.wa.gov/About-us/Who-we-are/News/2021/2021-Drought-Declaration,

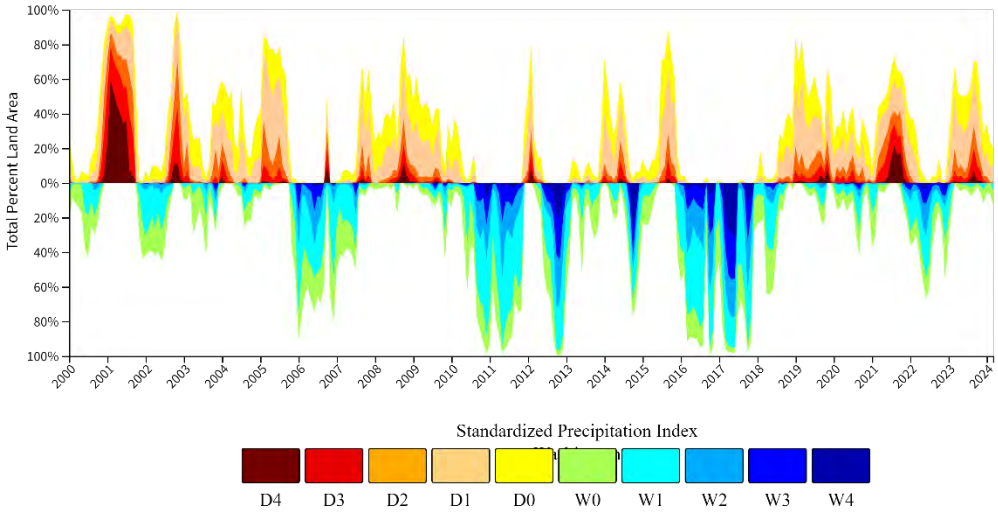
[78] NOAA, *Drought Conditions for Clallam County*, https://www.drought.gov/states/washington/county/clallam, published 2024, accessed April 1, 2024.

water systems moving the areas from the voluntary restrictions of the Stage 3 alert declared August 21 to mandatory outdoor watering restrictions.[79]

This previous drought history is indicative of historical cycles of drought and heavy rain. *Exhibit 4-2. Historical Drought and Rain Cycles in Washington*, shows the cyclical droughts and wet conditions that have occurred in Washington from 2000 to present.

[79] Peninsula Daily News, *Water use restricted in most of Clallam County*, https://www.peninsuladailynews.com/news/water-use-restricted-in-most-of-clallam-county/, published September 13, 2023, accessed April 1, 2024.

Exhibit 4-2. Historical Drought and Rain Cycles in Washington



Source: National Integrated Drought Information System, Washington, https://www.drought.gov/states/washington, accessed April 25, 2024.

No federally declared disasters relating to drought have impacted the planning area within the last five years; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years*.

Over the last five years there have been several Washington State declared emergencies relating to drought that impacted the planning area. On May 20, 2019, the State of Washington Department of Ecology declared a one-year drought emergency which included all of Clallam County and neighboring Jefferson County. On July 14,2021, the State of Washington Department of Ecology declared a one-year drought emergency which included all of Clallam County and neighboring Jefferson County; that declaration expired June 1, 2022 in the planning area. On July 24, 2023, the State of Washington Department of Ecology declared a one-year drought emergency which included all of Clallam County and neighboring Jefferson County. On April 16, 2024, the State of Washington Department of Ecology declared a one-year drought emergency which included all of Clallam County and neighboring Jefferson County; that declaration was terminated on April 8, 2025 for both Clallam and Jefferson County.

4.7.4 Probability of Future Occurrences

Based on previous occurrences and climate trends in Washington, there is a ten to 90 percent probability of drought in the next year or a recurrence interval of one to ten years. Certain areas within the planning areas may be more susceptible to drought, such as eastern portions of the County which receive less precipitation due to the rain shadow effect of the Olympic Mountains. The U.S. Seasonal Drought Outlook indicates no drought is likely to occur throughout much of the County through July 2024; however, drought is expected to persist in southeastern portions of the planning area.[80]

Impacts of future droughts can be mitigated through water conservation efforts and other waterwise management practices taken by water purveyors. Previous occurrences of drought prompted actions to examine water storage, distribution, management, conservation, and use policies more closely. Water purveyors drafted administrative drought actions and implemented mechanisms allowing for administrative consistency in water conservation and drought regulations.

4.7.5 Climate Change

Climate change will likely exacerbate drought hazards. Decreased snowpack, reduced precipitation, and higher temperatures are all expected effects of climate change. According to the Washington State Enhanced Hazard Mitigation Plan 2023, climate change will likely increase the probability of drought in extent, intensity, frequency by 24 percent.[81] The geographic distribution of drought hazards is expected to increase, with western Washington becoming more drought prone as climate change continues. The State of Washington Department of Ecology implements Washington's Integrated Climate Response Strategy 2012, which notes drought as a serious climate change impact on human health and ecosystems.[82]

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[80] NOAA, *U.S. Seasonal Drought Outlook*, https://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php, published June 30, 2023, accessed July 19, 2023.

[81] 2023 Washington State Enhanced Hazard Mitigation Plan, https://mil.wa.gov/asset/651ec296d76a9/2023_WA_SEHMP_final_20231004.pdf, published 2023, accessed April 1, 2024.

[82] State of Washington Department of Ecology, *Preparing for a Changing Climate: Washington State's Integrated Strategy,* https://apps.ecology.wa.gov/publications/documents/1201004.pdf, published April 2012, accessed April 1, 2024.

Additionally, Harto et al. (2012) analyzed the impacts of drought on electricity production in the Pacific Northwest that power production could decrease as much as 22 percent during drought.[83],[84] It is possible that capacity for hydropower will decrease as much as 11 percent during the 2020s, while demand will continue to increase.[85]

4.7.6 Vulnerability and Risk Assessment

Drought is a regional period of drier-than-normal conditions which could affect the entirety of Clallam County. Some areas may be more susceptible to drought conditions. For example, Sequim is in the rain shadow of the Olympic Mountains, making it more vulnerable to drought. Areas that rely on snowmelt may also be more vulnerable to snow drought where low levels of snowpack occur. All county critical facilities, infrastructure systems, and structures are considered vulnerable to drought.

Droughts do not typically result in physical damage to buildings and infrastructure, thus critical facilities are not at risk of destruction or structural failure. Clallam County utilizes surface water and groundwater supplies, which are vulnerable to drought. Consequently, drought could limit the availability of water resources throughout Clallam County. Drought may strain water supplies provided by public agencies such as Clallam County PUD, Crescent Water Association, Cascadia Water, City of Port Angeles Water Utility, City of Sequim Utilities, Sunland Water District as well as various private wells and water supplies throughout the County. Limited water supplies can have profound impacts on the day-to-day operations and county economy. The county's limited agricultural economy would be highly affected. Water restrictions may also affect local businesses potentially leading to job losses and economic downturns.

Natural resources, such as rivers, lakes, and forests, can also be severely affected, leading to loss of biodiversity, increased wildfire risks, and long-term ecological

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[83] U.S. Department of Energy, *Argonne National Laboratory, Analysis of drought impacts on electricity production in the Western and Texan interconnections of the United States*, https://digital.library.unt.edu/ark:/67531/metadc834538/, published February 9, 2012, accessed August 12, 2024.

[84] U.S. Department of Energy Office of Scientific and Technical Information, *Analysis of drought impacts on electricity production in the Western and Texas interconnections of the United States*, https://www.osti.gov/biblio/1035461, published February 9, 2012, accessed August 13, 2024.

[85] 2023 Washington State Enhanced Hazard Mitigation Planhttps://mil.wa.gov/asset/651ec296d76a9/2023_WA_SEHMP_final_20231004.pdf, approved October 1, 2023, accessed August 12, 2024.

damage. Various plant and animal species depend on a delicate meteorological balance to survive which would be potentially impacted by drought. Drought often coincides with the wildfire season – dry vegetation contributes to wildfire fuel further exacerbating wildfires and wildfire smoke. The effects of drought and potential economic impacts from insufficient supply of water can be mitigated through water conservation measures.

4.7.6.1 Changes in Vulnerability

As discussed in Section 3.5, the population within the planning area has increased during the last five years, representing a population increase of 2.46 percent. Concurrently, the housing stock represented an increase 1,082 units or 2.93 percent increase. Generally, population and housing growth over the past five years is concentrated with the urbanized areas of Clallam County, primarily in the Cities of Port Angeles and of Sequim. Because the population and development to accommodate this population increased in the last five years, the overall vulnerability to drought increased as well.

The County anticipates the majority of population growth, land use changes and development to occur within the designated Urban Growth Areas (UGAs) at the time of this MJHMP preparation. The UGAs identified are Sequim, Port Angeles, Forks and Carlsborg. These areas will have increased vulnerability to drought as population increases.

The Washington Office of Financial Management developed population projects at the County level, while local jurisdiction zoning is required to accommodate this projected growth. However, the exact type, location, and timing of projected growth and development is unknown at the time of this writing. It is reasonable to assume that any population growth and development to accommodate the increase of growth would result in an increase drought vulnerability during the next five years.

4.7.6.2 Socially Vulnerable Populations

The impacts of drought would apply to the entirety of the planning area, including SVPs within Census Tracts 3, 7, 21, 24 and 24; individuals below the 150-percent poverty rate, aged 65 or older, disabled persons, persons reporting minority status, persons living within a mobile home; populations of the Quileute Tribe, Makah Tribe, Lower Elwha

Klallam and the Jamestown S'Klallam Tribe; and tourists, seasonal visitors, and transient populations visiting for special events. The primary concern for SVPs and other high-risk individuals in the County would be food and water supply due to prolonged drought conditions and access to emergency resources.

Lower-income individuals may face increased food and water insecurity due to rising costs and limited resources. Elderly people and disabled persons are particularly at risk due to potential health complications from dehydration and poor nutrition, as well as mobility issues that hinder access to aid. Minority groups often experience systemic inequities that limit their access to emergency resources and support. Those living in mobile homes and tribal populations may encounter challenges related to geographic isolation or inadequate infrastructure, making it difficult to obtain necessary water supplies. Tourists, seasonal visitors, and transient populations can be affected by sudden water shortages and may lack access to consistent support services. Additionally, strained water supplies may lead to economic impacts and drought conditions may exacerbate wildfires; both of these impacts may disproportionately impact SVPs.

Considerations for SVPs throughout the planning area were incorporated into the mitigation strategy in Section 5.0. Specifically, the HMCR Steering Committee tailored Mitigation Actions #CC24 and #CC20, to mitigate the socioeconomic impacts of drought and water supply issues that may disproportionately impact SVPs in Clallam County.

4.8 Flood

4.8.1 Description

Flooding occurs when a waterway, either a natural one or an artificial drainage channel, receives more water than it is capable of conveying, causing the water level in the waterway to rise. Depending on how long these conditions last and the amount of water the waterway receives in proportion to its capacity, the rising water level may eventually overtop the waterway's banks or any other boundaries to the drainage area, resulting in flooding in the surrounding area.

Floods often occur during heavy precipitation events, when the amount of rainwater exceeds the capacity of storm drains or flood control channels. Floods can also happen when infrastructure such as levees, dams, or culverts fail, or when a section of drainage infrastructure fails, and water cannot be drained from an area fast enough. These failures can be linked to precipitation events (e.g., when water erodes away a levee, allowing water to escape and flood nearby areas), or can be a consequence of other emergency situations (e.g., a dam collapsing due to an earthquake).

The Federal Emergency Management Agency (FEMA) defines flood or flooding as a general and temporary condition of partial or complete inundation of normally dry land areas from:[86]

- The overflow of inland or tidal waters;
- The unusual and rapid accumulation or runoff of surface waters from any source; or,
- Mudslides which are proximately caused by flooding and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water and deposited along the path of the current; or
- Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.

Floods can be caused by a number of factors, including:

- Weather and climate patterns (e.g., El Niño, La Niña, Pineapple Express, Atmospheric River, etc.)
    - El Niño and La Niña are complex weather patterns resulting from variations in ocean temperatures in the equatorial Pacific. Warmer or colder than average ocean temperatures in one part of the world can influence weather around the globe. El Niño and La Niña episodes typically

[86] FEMA, *Glossary: Flood*, https://www.fema.gov/glossary/flood#:~:text=A%20general%20and%20temporary%20condition,inland%20or%20tidal%20waters%3B%20or, accessed April 8, 2024.

last nine to twelve months, but some prolonged events may last for years.[87]

  - Pineapple Express is a name given to an atmospheric river on the West Coast. It is a channel in the atmosphere that moves vast amounts of moisture and can result in massive rain showers.

- Hydrologic features such as reservoirs, ponds, lakes, rivers, etc., can have a large impact on the amount of flooding.
- The absorption capacity of the ground depends on the composition of soil and bedrock of the area. Less absorbent soil conditions in addition to lack of proper storm infrastructure can result in flooding.
- Type and density of vegetation is related to moisture absorption affecting the flow of water.
- Patterns of land use/urbanization relate to the pervious and impervious nature of the ground.
- Expected level, age, and condition of flood management infrastructure can impact flooding conditions.
- Large-scale wildfires dramatically alter the terrain and ground conditions. Vegetation absorbs rainfall, reducing runoff. However, wildfires leave the ground charred, barren, and unable to properly absorb water, creating conditions ripe for flash flooding and debris flow. Flood risk remains significantly higher until vegetation is restored – up to five years after a wildfire.[88]

The force of a flood may be sufficient to move objects or structures, causing considerable damage to buildings and infrastructure. In severe instances, floodwaters themselves can destroy structures or move them off their foundation. Floods can saturate and weaken soil, potentially making structures built on them more susceptible to damage or collapse. Flooding can also affect water quality, as large volumes of water

[87] NOAA, *What are El Nino and La Nina?,* https://oceanservice.noaa.gov/facts/ninonina.html, accessed April 8, 2024.

[88] FEMA, *Flood Risk Increases After Fires Are Out – Buy Flood Insurance Now*, https://www.fema.gov/fact-sheet/4562/flood-risk-increases-after-fires-are-out-buy-flood-insurance-now, published October 21, 2020, accessed April 8, 2024.

can transport contaminants into water bodies or overload storm/wastewater systems. Additionally, large increases in water volume can cause water body erosion and loss of aquatic habitat. Flooding can also cause economic loss to people and government due to the destruction of property and/or infrastructure.

Image 3. Flooding of SR 112 Clallam County[89]

4.8.2 Location/Extent

The topography of Clallam County is characterized by many rivers, streams, and lakes. The floodplains, or lowland areas adjacent to these rivers, streams and lakes, are the primary areas of flood hazards throughout Clallam County. The following major rivers and streams, listed from west to east, are the primary waterways with surrounding floodplains throughout Clallam County:

- Quillayute River,
- Bogachiel River,
- Calawah River,
- Sol Duc River,

[89] WSDOT Flickr, Pysht River Flooding SR 112, https://www.flickr.com/photos/wsdot/22978648992, November 13th 2015.

- East Dickey Creek,
- Sekiu River,
- Hoko River,
- Clallam River,
- Pysht River
- Twin Rivers
- Lyre River,
- Elwha River,
- Morse Creek,
- Dungeness River.

Major Lakes in Clallam County are:

- Ozette Lake,
- Dickey Lake,
- Lake Pleasant,
- Lake Crescent, and
- Lake Sutherland.

Flooding may also occur along coastlines, due to high tides or storm surges. Although Clallam County has coastlines along the Pacific Ocean and the Strait of Juan de Fuca, Federal, state and Tribal lands limit the county planning area to Strait of Juan de Fuca shorelines east of Neah Bay. These include Clallam Bay, Freshwater Bay, Port Angeles Harbor, Sequim Bay and Discovery Bay, and the Puget Sound. The Washington State Enhanced Hazard Mitigation Plan (SEHMP) identified the Puget Sound and Northwestern region of Washington as the most at risk to flooding do to frequency of flood disasters and vulnerability.[90]

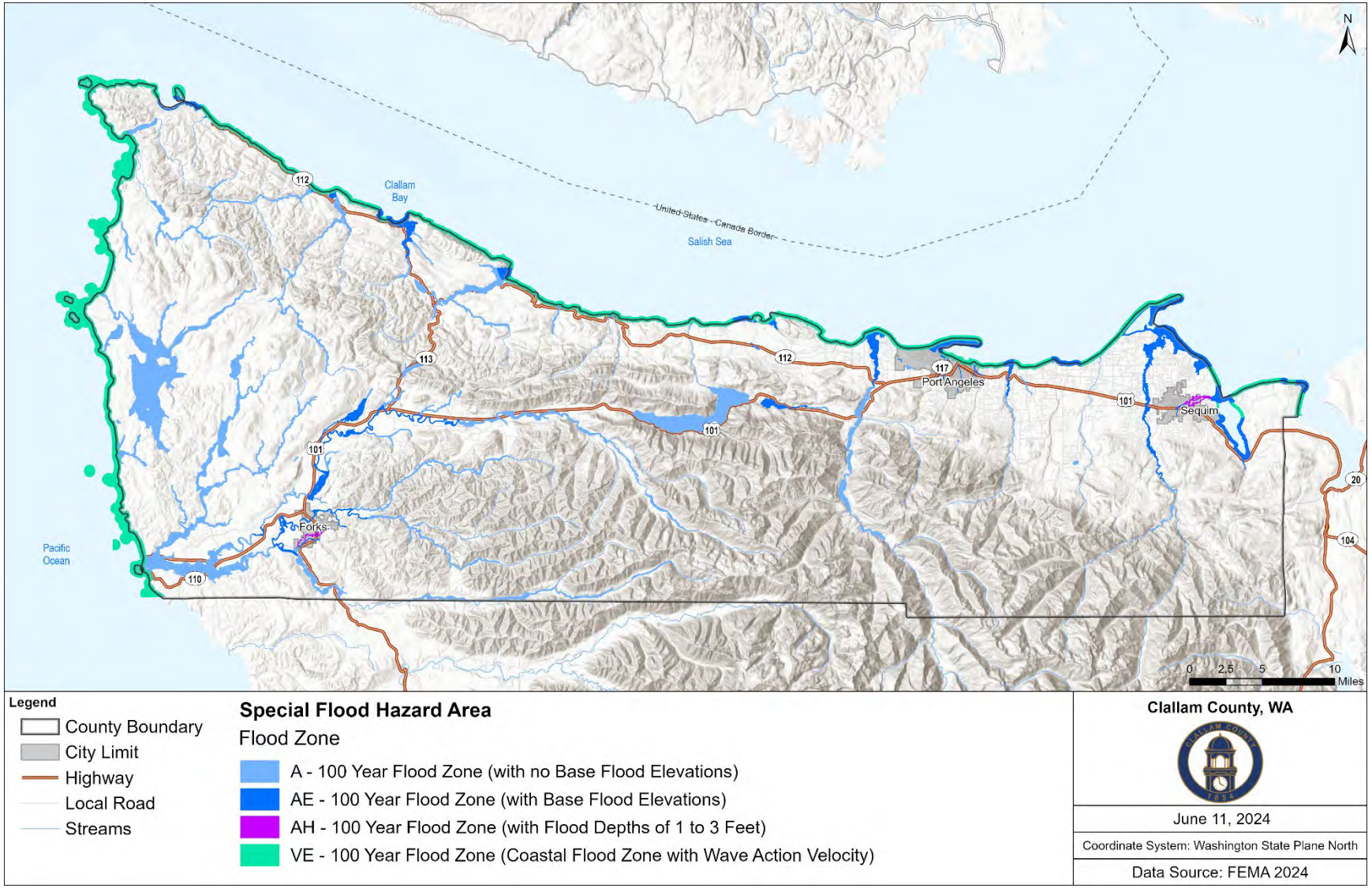
Most floodplains are mapped by FEMA for their Flood Insurance Rate Maps (FIRMs) as part of the National Flood Insurance Program (NFIP). Areas mapped within the FEMA 100-year and 500-year flood zones are included in *Exhibit 4-3. Flood Hazard Area*. This exhibit includes the draft RiskMap updates for Clallam County as of August 2024. These RiskMap updates have been developed by FEMA beginning in 2006 and

[90] Washington Emergency Management Division, *Washington State Enhanced Hazard Mitigation Plan*, dated October 1, 2023.

continuing during this MJHMP update process. FEMA expects that the maps and FIS will become effective in April 2025. Flood zone definitions are included in *Table 4-8. Flood Zones Definitions*, below. Riverine hazards exist throughout the County but are primarily located near the mouths of the rivers in the northern and northeastern areas of the County. The Quillayute River in the southwest and its tributaries, including the Sol Duc and Bogachiel Rivers, are characterized by mapped flood zones. The flood zones of the Sol Duc River and Bogachiel River affect both Highways 110 and 101 in the west end of the County. Riverine flooding of Highway 112 at the mouth of the Hoko and Pysht Rivers is common. Kinkade Island is highly vulnerable to flooding and erosion during high flows.

Coastal flooding threatens portions of Highway 112 near the Hoko and Pysht Rivers as well as Ediz Hook, and portions of Port Angeles. The Gibbon and Travis Spits in Sequim Bay may become inundated with high tides and storm surges. Much of the Hoko, Clallam, Elwha, and Dungeness River tidal areas may be impacted by high tides that aggravate river flooding.

Exhibit 4-3. Flood Hazard Area



The extent of flooding is determined by percent annual chance of flood, or the percent chance in any given year that the location will be flooded. Flood zones are classified as one in 100 (one percent) or high risk, and one in 500 (0.2 percent) or moderate risk of flooding.[91] These flood zones are also referred to as the 100-year flood and 500-year flood zones, respectively. Areas having a flood risk of less than 0.2 percent are classified as low risk areas; refer to *Table 4-8. Flood Zones Definitions*. Floods are measured by stream gages installed and operated by the United States Geological Survey (USGS) in bodies of water near populated areas, where water levels are continuously monitored.

Table 4-8. Flood Zones Definitions

Zone	Risk
Floodplain – 100-year flood zone (A, AE, AH, AO, VE)	1% annual flood risk
Floodway – 100-year flood zone (AE)	1% annual flood risk
500-year flood zone	0.2% annual flood risk
Area with reduced flood risk due to levee	Reduced flood risk

Source: FEMA, *FEMA Flood Maps and Zones Explained,* https://www.fema.gov/blog/fema-flood-maps-and-zones-explained, accessed April 9, 2024.

The magnitude and severity of flooding depends on the duration and quantity of rainfall, as well as many other factors related to the topography of the watershed and runoff conditions. Heavy rainfall events are typically correlated with high intensity, short duration runoff events. Floods usually occur during the season of highest precipitation events, which is the winter and early spring in Clallam County. Heavy rain after long dry spells may also result in more severe floods.

In addition, localized flooding can occur outside of mapped flood hazard zones and may impact low-lying areas, storm drains, culverts, and streets with inadequate stormwater capacity or damaged stormwater drainage features.

[91] FEMA, *Flood Zones,* https://www.fema.gov/glossary/flood-zones, accessed April 8, 2024.

4.8.3 Previous Occurrences

Clallam County has been most susceptible to coastal and riverine flooding during significant storms. 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.[92]

Historically, the most damage to life or property has occurred from flooding of the Bogachiel River, and the Kinkade Island and River's End segments of the Dungeness River. Jimmycomelateley Creek and the Sequim Bay have been subjected to 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 in 2022.

More recently, significant flood events occurred in Clallam County over the 2021-2022 winter season and again in late fall of 2022. Severe storms in November of 2021 resulted in flooding, landslides, downed trees, washed out roads, and power outages throughout Clallam County. Major highways were closed including the Elwha River Bridge. Crews and equipment were used to clear roadway debris, unclog drainage and culverts throughout the County. The Board of Clallam County Commissioners declared a state of emergency on November 15, 2021 and a federal disaster declaration was made on January 5, 2022.[93] Severe storms recurred from November 3 to November 8, 2022 with similar impacts as the previous year's events. The Governor of Washington declared and emergency proclamation on December 15, 2022 and a federal disaster declaration was made on January 12, 2023.[94]

The following federally declared flood disasters have been declared since adoption of the 2019 MJHP. Refer to *Table 4-21. Summary of Federally Declared Disasters Affecting*

[92] FEMA, *Disaster Declarations for States and Counties*, https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties, accessed April 15, 2024.

[93] FEMA, *Disaster Declarations for States and Counties*, https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties, accessed April 15, 2024.

[94] FEMA, *Disaster Declarations for States and Counties*, https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties, accessed April 15, 2024.

the Planning Area within Past Five Years for further details regarding specific flood impacts to Clallam County.

- DR 4418, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides, Mudslides, Tornado – March 4, 2019 (event date: December 10, 2018)
- DR 4539, Washington Severe Storms, Flooding, Landslides, and Mudslides – April 23, 2020 (event date: January 20, 2020)
- DR 4593, Washington Severe Winter Storm, Straight-line Winds, Flooding, Landslides, and Mudslides – April 8, 2021(event date: December 29, 2020)
- DR 4635, Washington Flooding and Mudslides – January 5, 2022 (event date: November 13, 2021)
- DR 4650, Washington Severe Winter Storms, Snowstorms, Straight-line Winds, Flooding – March 29, 2022 (event date: December 26, 2021)
- DR 4682, Washington Severe Winter Storm, Straight-line Winds, Flooding, Landslides, and Mudslides – January 12, 2023 (event date: November 3, 2022)
- DR 4775, Washington Severe Winter Storm, Straight-line Winds, Flooding, Landslides, and Mudslides – April 28, 2024 (event date: January 5, 2024)

The following are the Washington State emergency proclamations over the last five years concerning flooding which impacted the planning area:

- Proclamation 20-02 (2/5/2020) by the Lieutenant Governor of Washington State – severe weather storm event on January 20, 2020 resulting in flooding within counties, including Clallam County;
- Governor Proclamation 21-03 (3/1/21) for entire State– severe weather storm events beginning December 17, 2020 resulting in expected flooding;
- Governor Proclamation 21-18 (11/15/21, amended 12/1/21) – severe wind and rain event beginning November 12, 2021, resulting in flooding in several counties, including Clallam and Jefferson County;
- Governor Proclamation 22-01 (1/7/22) for entire State – severe winter storm beginning December 17, 2021, resulting in expected flooding;

- Governor Proclamation 22-06 (12/15/21) – series of severe autumn storms between November 3, 2022 and November 8, 2022 causing flooding and impacting several counties, including Clallam and Jefferson County;
- Governor Proclamation 23-01 (1/31/23) – extreme weather and flooding event between December 18, 2022 and December 28, 2022 impacting several counties, including Clallam and Jefferson County;
- Governor Proclamation 24-01 (1/24/24) – storm damage from atmospheric river event on December 3, 2024 impacting several Counties, including Clallam County; and
- Governor Proclamation 25-01 (1/7/25) – bomb cyclone weather event from November 17, 2024 and November 25, 2024, impacting several counties, including Clallam County.

4.8.4 Probability of Future Occurrences

The probability of future flood occurrences is often described by flood recurrence intervals. For example, FEMA flood zones are based on the 100- and 500-year flood events which have a probability or recurrence interval of 1-in-100 and 1-in-500 chance of occurring in any given year. The Washington State Enhanced Hazard Mitigation Plan (SEHMP) notes that these recurrence intervals can be misleading, and that 100-year flood events are happening much more frequently than every hundred years. The SEHMP also notes that Washington has had an average of one major flood event per year since 1980.[95] For this reason, the HMCR Steering Committee has determined the probability of future occurrence based on past events, climate and flood management solutions.

Clallam County is characterized by a temperate climate; however, specific areas are influenced by their geographic and climatic features. The County lies to the west of the Cascade Mountains where winters are mild, wet and cloudy; December and January are typically the wettest months. The coastal area of the Olympic Peninsula receives the full

[95] Washington Emergency Management Division, *Washington State Enhanced Hazard Mitigation Plan*, dated October 1, 2023.

force of coastal storms and heavy precipitation frequently during the winter season that contribute to coastal and riverine flooding.[96]

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 salmon habitat along the river. Despite previous floodplain management solutions, flooding will continue to impact the County.

Given the wet climate and occurrence of winter and coastal storms, coupled with the significant network of rivers and coastlines throughout the County, there is an occasional probability of significant flooding occurring throughout Clallam County. An occasional probability means a 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years. Future flood events may result in washed out roads, landslides, and power outages. damage to buildings and infrastructure may disrupt services and operations of the County or other participating jurisdictions.

4.8.5 Climate Change

The SEHMP notes that significant floods have been occurring more often in Washington, which is due in part to climate change. Climate change is likely to aggravate sea level rise and severe weather and have a direct effect on flooding.[97] Increased global temperatures impact the frequency, intensity, and duration of winter storms. This will lead to more severe heavy rain events; the SEHMP estimates that climate change-driven increases in extreme precipitation is expected to increase the frequency, extent, intensity, and geographic distribution of floods in WA by 2100.

[96] Western Regional Climate Center, *Climate of Washington*, https://wrcc.dri.edu/Climate/summaries.php, accessed April 15, 2024.

[97] Washington Emergency Management Division, *Washington State Enhanced Hazard Mitigation Plan*, dated October 1, 2023.

Additionally, climate change will increase mean sea level, compounding coastal flood hazards.[98] This will lead to an increased occurrence of riverine and coastal flooding.

It is likely that areas outside of mapped flood zones will experience flooding. It is reasonable to assume that 100-year and 500-year flood events will occur more frequently due to climate change. Mitigation of riverine flooding, coastal flooding, storm surge and localized flooding should be addressed in combination with considerations for climate change into the future.

4.8.6 Vulnerability and Risk Assessment

Approximately 5,080 residential units are located within the Special Flood Hazard Area (SFHA). Vulnerable residential units multiplied by the average 2.23 persons per household for Clallam County indicates that approximately 11,328 people reside within the SFHA. Additionally, 336 million square feet of non-residential structures are located within the SFHA.

The coastline of Clallam County is primarily classified as SFHA Flood Zone VE, which indicates a 100-year coastal flood zone with wave action velocity. Some areas of the County coastline, primarily to the north of the City of Sequim, on Ediz Hook, and on Clallam Bay, are classified as SFHA Flood Zone AE.[99] Within coastal communities and more inland areas of the County, the City of Sequim, City of Port Angeles, Lower Elwha Klallam Tribal lands, and Clallam Bay are expected to face high flood hazard vulnerability, with areas largely being classified as SFHA Flood Zone AE. Additional areas classified as Flood Zone AE are concentrated along Highway 101, specifically on Lake Sutherland, Lake Pleasant, and along the Sol Duc and Calawah Rivers. Southern areas of the City of Forks near Mill Creek and northern areas of the City of Sequim near Gierin Creek face the greatest flood vulnerability in the County, classified as SFHA Flood Zone AH.[100]

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[98] Intergovernmental Panel on Climate Change, *Climate Change Synthesis Report 2023: Summary for Policymakers*, https://www.ipcc.ch/report/ar6/syr/, accessed April 15, 2024

[99] FEMA, *Zone VE* and V1-30, https://www.fema.gov/glossary/zone-ve-and-v1-30, accessed September 4, 2024.

[100] FEMA, *Zone AH*, https://www.fema.gov/glossary/zona-ah, accessed September 4, 2024.

Depending upon the extent and magnitude of a flood event, streets may be inundated with multiple feet of flood water due to urban flooding. With the Cities of Sequim and Forks containing areas designated as SFHA Flood Zone AH, businesses may be forced to close, and city streets may no longer be accessible. Six inches of water will reach the bottom of most passenger cars causing loss of control and possible stalling, and just one foot of water will float many passenger vehicles.[101] Two feet of rushing floodwater can carry away most vehicles including heavier pickup trucks and sport utility vehicles (SUV's).[102] With flood waters in SFHA Flood Zone AH reaching up to three feet, residents and visitors face significant risk of great bodily injury or death during a severe flood event in these areas.

Flood waters may also wash out roads along Highways 112, 113, 117, and 101, cutting off access to essential evacuation routes. Socially vulnerable populations with limited mobility could face additional vulnerability during a major flood event as they are unable to escape from incoming flood waters. Flood events in Clallam County may cause additional secondary impacts including exposure to communicable diseases, electrocution due to downed power lines, and lasting mental health impacts from traumatic emergency situations.[103]

In the event of a major flood event, impacts to critical facilities in the planning area such as Van Riper's Marina and Westport Shipyard could cause a substantial release of hazardous materials into the planning area, greatly impacting the health of local residents and the environment. Reservoirs considered to be critical facilities such as the 150,000-gallon reservoir on Sportsman Club Road may be damaged or destroyed by a sudden rush of flood water, polluting local water supply and putting the population of the surrounding area at risk of severe injury or death. While drowning is the primary cause of death during a flood event, flood waters may contain sharp objects that can cause additional injury and lead to infection for those impacted by a flood emergency.[104]

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[101] NWS, *Turn Around Don't Drown*, https://www.weather.gov/tsa/hydro_tadd, accessed September 4, 2024.

[102] Ibid.

[103] FEMA, *Flood Impact*, https://community.fema.gov/ProtectiveActions/s/article/Flood-Impact, accessed September 4, 2024.

[104] Ibid

Flood Zone Vulnerability Summary

Population & Development

11,328.4
People

5,080
Residential Units

336 Million
Non-Residential Square Footage

Systems & Infrastructure

Hazardous Materials
7

Food, Hydration, Shelter
4
Food, Hydration, Shelter Facilities

Transportation
3

Safety and Security
3

Communications
2

Health and Medical
1

Refer to Appendix D-2: *Vulnerability Summary*, for a detailed assessment of community lifelines and critical facilities.

4.8.6.1 Changes in Vulnerability

Since the 2019 MJHMP, population patterns, development and land use have not substantially changed in the planning area. As discussed in Section 3.5, the County population increased nominally, from 75,474 individuals identified in 2019 MJHMP to 77,333 individuals identified in this MJHMP, representing a net growth of 1,859 individuals or 2.46 percent increase in the County. Generally, population and housing growth over the past five years is concentrated within the urbanized areas of Clallam County, primarily in the Cities of Port Angeles of Sequim. Because the population and development to accommodate this population increased in the last five years, the overall County vulnerability to the flood hazard has increased as well.

At the time of this MJHMP preparation, the County anticipates the majority of population growth, land use changes and development to occur within the designated Urban Growth Areas (UGAs). Nearly all mapped UGAs intersect with areas of high flood hazard risk within the County, which ultimately increases flood vulnerability over the next five years. Port Angeles, Sequim, Forks, and Clallam Bay show the most significant intersection with flood vulnerability with significant portions of each UGA mapped as SFHA's. To a lesser extent, the Joyce and Carlsborg show an intersection with identified flood hazard areas as well.

It is acknowledged the Washington Office of Financial Management develops population projections at the County level, and local jurisdiction zoning is required to accommodate this projected growth. However, the exact type, location and timing of projected growth and development is unknown at the time of this writing. After consideration of the vulnerability factors listed in this section, is reasonable to assume that any population growth and development to accommodate that growth would result in increased flood vulnerability during the next five years.

4.8.6.2 Socially Vulnerable Populations

Flood zones overlay SVPs within Census Tracts 3, 7, 21, and 24 and 9400, which correspond to the cities of Forks, Port Angeles, and Sequim, as well as western Clallam County and the Makah Indian Reservation. Additionally, flood zones are located throughout Clallam County and may impact SVPs and other high-risk individuals throughout the planning area. Specifically, individuals below the 150-percent poverty rate, aged 65 or older, disabled persons, persons reporting minority status, persons

living within a mobile home; populations of the Quileute Tribe, Makah Tribe, Lower Elwha Klallam, and the Jamestown S'Klallam Tribe; and tourists, seasonal visitors, and transient populations throughout the County would potentially be impacted by flood. The primary concern for SVPs and other high-risk individuals in the County would be evacuation efforts and access to emergency services and supplies.

Floods can have severe impacts on socially vulnerable populations by exacerbating existing challenges and creating new ones. Those below the 150-percent poverty rate may lack the financial resources to prepare for or recover from floods, while elderly and disabled individuals may face mobility issues that hinder evacuation and access to emergency services. Minorities and tribal populations might experience additional barriers due to language, cultural differences, or historical marginalization. Mobile home residents are particularly at risk due to the susceptibility of their homes to flood damage. Transient groups like tourists and seasonal visitors may lack local knowledge and resources, making it difficult for them to respond effectively to flood emergencies. Overall, these populations are more likely to suffer from delayed rescue operations, prolonged displacement, and increased health risks due to the compounded effects of flooding and inadequate infrastructure.

Considerations for SVPs throughout the planning area were incorporated into the mitigation strategy in Section 5.0. Specifically, the MJHMP Planning Team tailored Mitigation Actions #CC20, #CC21, #CC27, #CC31, and #CC32, to mitigate flood impacts on SVPs including issues related to preparedness, evacuations, and access to emergency services.

4.9 Human Caused Hazards

4.9.1 Description

4.9.1.1 Hazardous Materials Spill

A hazardous material is a substance that, because of its quantity, concentration, or physical or chemical composition, poses a significant present or potential hazard to human health and safety or to the environment if released. A release may occur by spilling, leaking, emitting toxic vapors, or any other process that enables the material to

escape from its container, enter the environment, and create a potential hazard.[105] Hazardous materials can be in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. Hazardous material accidents can occur during production, storage, transportation (roadway and railway), use, or disposal.[106]

Transportation of hazardous materials may pose a risk to people, property, and the environment. Vehicles, trains, boats, and aircraft may be used to transport these materials, and accidents may result in the release of hazardous materials. Additionally, an unrelated disaster such as an earthquake or flood may damage hazardous material storage or distribution infrastructure. Incidents can also occur independently of other disasters, such as from human error or malfunctioning or broken equipment.

The impacts of a hazardous materials release can vary depending on the type and amount of material released. Hazardous materials exposure can include the following effects: skin/eye irritation; difficulty breathing; headaches; nausea; behavior abnormalities; cancer; genetic mutations; physiological malfunctions (i.e., reproductive impairment, kidney failure); physical deformations; or birth defects.[107] Hazardous material spills can release significant amounts of hazardous material in which the release cannot be controlled.[108] Hazardous material spills can be detrimental to wildlife and aquatic ecosystems. Certain hazardous substances also have the potential to explode or cause fires, threatening both animals and human populations.[109]

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[105] Washington Emergency Management Division, *Hazardous Material*, https://mil.wa.gov/hazardous-material, published 2024, accessed April 17, 2024.

[106] Department of Homeland Security, *Chemicals and Hazardous Materials Incidents*, https://www.ready.gov/hazardous-materials-incidents, accessed April 17, 2024.

[107] US EPA, *Health and Ecological Hazards Caused by Hazardous Substances*, https://www.epa.gov/emergency-response/health-and-ecological-hazards-caused-hazardous-substances, updated December 13, 2023, accessed April 17, 2024.

[108] Ball State University, *Hazardous Material Spills*, https://www.bsu.edu/about/administrativeoffices/emergency-preparedness/guidelines/hazardous-material-spills#:~:text=A%20hazardous%20material%20spill%20is,the%20substance%20cannot%20be%20controlled., published 2024, accessed April 12, 2024.

[109] United States Environmental Protection Agency, *Health and Ecological Hazards Caused by Hazardous Substances*, https://www.epa.gov/emergency-response/health-and-ecological-hazards-caused-hazardous-substances, accessed April 12, 2024.

4.9.1.2 Maritime Disasters

A maritime disaster is a catastrophic or damaging event involving commercial, passenger, personal, or military ships or vessels at sea. Specific types of maritime disasters include but are not limited to shipwrecks, collisions, fires, and oil spills. Ships out at sea as well as docked ships, infrastructure, and resources along coastlines and within bays, ports, harbors and marinas are also vulnerable to maritime disasters. Maritime disasters may be caused by weather conditions, faulty design, or human error.

Maritime disasters may result in loss of life, marine pollution, environmental degradation, economic impacts, cultural impacts, supply chain disruptions, and/or destruction of onshore and offshore property. Maritime disasters may be particularly damaging to coastal communities (including the planning area), vulnerable marine ecosystems, shipping lanes, and port operations.

Image 4. Docks at Sekiu Clallam County[110]

[110] Docks at Sekiu, Clallam County, https://www.flickr.com/photos/jstephenconn/7580597530, July 16th, 2012.

4.9.1.3 Active Shooter / Terrorism

An active shooter is defined by the Federal Bureau of Investigation (FBI) as an individual actively engaged in killing or attempting to kill people in a populated area. Active shooters select victims at random, and the shooting event is unpredictable and often evolves quickly.[111] Active shooters may target public gathering and community areas, schools, places of worship, government buildings, and transportation centers. There may be one or more shooters involved in an event, and there is not one demographic profile of an active shooter. The FBI identifies the pathway to active shooting as typically involving an unresolved real or perceived grievance and an ideation of a violent resolution.[112]

Domestic terrorism is defined by the FBI as perpetuated by individuals and/or groups inspired by or associated with a primarily United States based movement that espouses extremist ideologies of a political, religious, social, racial, or environmental nature. International terrorism is perpetuated by individuals and/or groups inspired by or associated with designated foreign terrorist organizations or nations (i.e., State sponsored).[113] The United States Federal Code states that terrorism must be intended to 1) intimidate or coerce a civilian population; 2) influence the policy of a government by intimidation or coercion; or, 3) affect the conduct of a government by mass destruction, assassination, or kidnapping.[114] The most likely tactics of a terrorist event include active shooter(s), vehicle attacks, stabbing/cutting, bombings and cyberattacks. More likely targets of terrorism include human targets (particularly military, government and law enforcement personnel), government facilities, commercial facilities (including public assembly, retail, and entertainment sports venues) and transportation. According

[111] Federal Bureau of Investigation, *OPS Active Shooter Guide*, https://www.fbi.gov/file-repository/active-shooter-508.pdf/view, accessed April 19, 2024.

[112] Federal Bureau of Investigation, *Addressing the Problem of the Active Shooter*, https://leb.fbi.gov/articles/featured-articles/addressing-the-problem-of-the-active-shooter, published March 7, 2013, accessed April 19, 2024.

[113] Federal Bureau of Investigation, *Terrorism,* https://www.fbi.gov/investigate/terrorism, accessed April 19, 2024.

[114] US Federal Code Title 18, Chapter 113B, Section 2331.

to the Washington SEHMP least likely targets include amusement parks, bridges, museum, national monuments or icons, and vessels.[115]

Active shooter and terrorist incidents can both result in mass casualties, where emergency response resources are overwhelmed by the number or severity of casualties.

4.9.1.4 Utility Failure/Power Outage [Secondary Impacts]

Utility failure occurs when there is an outage or disruption of electricity, gas, water, sewer, and/or waste disposal services. Utility failures and power outages are not hazards but are often secondary impacts as a result of other natural or human-caused hazards. Potential causes of utility failures include infrastructure damage from natural disasters, planned outages to reduce stress on services or prevent hazardous situations, and malicious acts such as physical and cyber sabotage. Utility failures and power outages may be caused virtually any hazard identified in this MJHMP including dam failure, flood, human-caused hazards, landslide, seismic hazards, severe weather, tsunami, and wildfire. Hazard events may also disrupt several utilities at the same time.

Many community lifelines and services including law enforcement, fire service, health and medical services, energy, communications transportation, and water systems all rely on utilities. Disruption to these services could result in significant health and safety impacts to communities throughout the planning area. Prolonged or widespread outages or disruptions could significantly hinder County and local operations and emergency response.

4.9.1.5 Supply Chain Interruption [Secondary Impacts]

Supply chain interruption is any event that causes a disruption in the production, sale, or distribution of products. Supply chain interruption is considered a secondary impact as a result of other natural or human-caused hazards. Events that may cause a supply chain disruption include natural disasters, transportation issues, pricing fluctuations, sudden spikes in demand, regional conflicts, cyber-attacks, and pandemics. Supply

[115] Washington State Enhanced Hazard Mitigation Plan, https://mil.wa.gov/asset/651ec296d76a9/2023_WA_SEHMP_final_20231004.pdf, approved on October 1, 2023, accessed August 13, 2024.

chain interruptions may have significant economic and operational impacts. Daily operations of the County, cities, businesses and residents throughout the planning area may be impacted. Critical community lifelines and services are susceptible to supply chain interruptions. Emergency response, law enforcement, fire services, health and medical services, food supplies, and other critical needs depend on the production, sale, and distribution of products.

Impacts due to supply chain interruptions may be minor and relatively short lived or significant. Potential impacts can include scarcity of food, health and medical equipment, pharmaceutical drugs, fuel, and other key goods. Supply chain interruptions that impact these kinds of products and services can have significant health and safety impacts throughout impacted communities.

4.9.2 Location/Extent

4.9.2.1 Hazardous Materials Spill

Hazardous materials are generated, used, and stored by facilities throughout the County for a variety of purposes in service industries, businesses, schools, and households. Hazardous materials associated with certain commercial, industrial, and manufacturing uses are present throughout the County. Potential sources of hazardous material releases include superfund sites, storage facilities, residences, manufacturers, transportation carriers, hospitals/medical facilities, veterinary hospitals/clinics, and brownfield sites. These hazardous materials are generally associated with low-risk, small-scale operations consistent with day-to-day activities and would be present throughout developed areas of Clallam County and participating jurisdictions.

Certain areas throughout the County have a higher risk of hazardous materials spills. Hazardous materials transportation corridors including highways and navigable waterways are potential high-risk areas. As such, hazardous materials incidents may be caused by a traffic accident along Highway 101. The Port of Port Angeles is also a major shipping facility with an increased potential for hazardous materials incident. Furthermore, the Strait of Juan de Fuca is a major thoroughfare for oil tankers.

The Washington State Department of Ecology regulates three classes of facilities related to hazardous materials spills programs:

- 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.

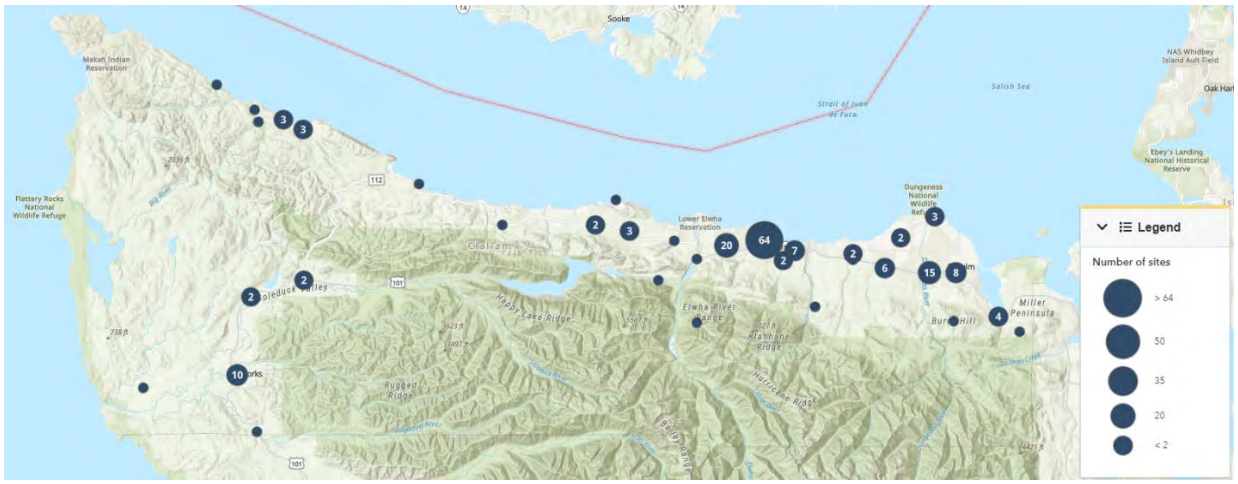
In Clallam County there are six state-regulated programs:

- 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)

Washington State Department of Ecology's Toxic Cleanup Program works to remedy accidental dangerous materials spills and contaminated land and water throughout the state.[116] Under this program, the Department of Ecology maintains a map of toxic cleanup sites throughout Washington. *Exhibit 4-4. Contamination Cleanup Sites in Clallam County*, includes the sites identified within Clallam County.

[116] Clallam County Washington, *Spills and Toxic Cleanup*, https://www.clallamcountywa.gov/383/Spills-and-Toxic-Cleanup, accessed April 12, 2024.

Exhibit 4-4. Contamination Cleanup Sites in Clallam County



Source: Clallam County Washington, Spills and Toxic Cleanup, https://www.clallamcountywa.gov/383/Spills-and-Toxic-Cleanup, accessed April 25, 2024.

Hazardous materials sites are concentrated around developed areas of Clallam County. Specifically, the cities of Forks, Sequim and Port Angeles are areas of concern. The Department of Ecology selected the Port Angeles Harbor as one of seven areas to focus cleanup resources and established two separate cleanups areas in the Rayonier Mill Cleanup area and the Western Port Angeles Harbor Cleanup area.[117] Hazardous materials transportation corridors including US-101 and WA-112 are areas of concern.

The magnitude and severity would be dependent on the type of spill, location, and the extent to which hazardous materials are released. Hazardous materials can be flammable, radioactive, infectious, corrosive, toxic/poisonous, or otherwise reactive. For example, a radioactive material spill would have a much further-reaching extent when compared to a paint spill. Climate conditions can also affect the severity of hazardous materials spills. Heavy rains or winds could spread hazardous materials over a larger geographical area or create challenging cleanup conditions. Challenging cleanup conditions could allow for the extent of contamination to grow. Additionally, natural hazards such as wildfires or earthquakes could cause hazardous materials releases as a secondary impact, requiring immediate response.

[117] Department of Ecology State of Washington, *What's in My Neighborhood: Toxics Cleanup*, https://apps.ecology.wa.gov/neighborhood/?lat=48.130855&lon=-123.356923&zoom=11&radius=false, accessed April 12, 2024.

4.9.2.2 Maritime Disasters

All coastal areas throughout Clallam County are potentially vulnerable to maritime disasters. Shipwrecks, oil spills, and fires could occur anywhere off the coast of the County and impact the nearest coastlines. However, certain areas have a higher risk of maritime disasters. Marinas, bays, ports, and areas near shipping lanes have a heightened risk of maritime disasters due to increased water transportation. Specific areas of concern include coastal areas near Quileute Marina, Neah Bay, Clallam Bay, Ediz Hook, Port Angeles Harbor, Sequim Bay, and Discovery Bay. Due to shipping traffic throughout the Strait of Juan de Fuca, any areas along the northern coast of Clallam County have a notable risk of impacts.

The magnitude and severity of impacts would depend on the type and location of a maritime disaster. Maritime disasters may result in significant environmental degradation in the case of an oil spill or collision involving large shipping vessels. Marine and coastal ecosystems could be damaged requiring substantial cleanup and remediation projects. Economic and supply chain disruptions may also be substantial impacts depending on the severity of the disaster. Maritime disasters that impact coastal infrastructure, shipping lanes, and the functionality of port operations may result in significant economic losses. Loss of life is also a potential impact in the event shipwrecks and collisions. Disasters involving passenger vessels pose the highest risk of loss of life; however, any type of maritime disaster may result in casualties.

4.9.2.3 Active Shooter / Terrorism

The specific location of active shooter incidents and terrorist attacks are difficult to predict as any populated area may be targeted. Generally, locations most vulnerable to active shooters and terrorism are places where people gather, places of political importance, infrastructure, and destinations. Examples include but are not limited to:

- Schools
- Hospitals
- Churches/religious centers
- Employment centers
- City Hall/County Seat
- Community centers
- Libraries

- Transit operations and stops
- Shopping malls/large retail centers
- Highways and other transportation infrastructure
- Power plants and utility infrastructure
- Event/entertainment centers

Active shooter incidents and acts of terrorism may occur anywhere within planning area as these types of targets exist throughout the County. Therefore, the entirety of the planning area is considered vulnerable. Certain areas may be more vulnerable to these threats, particularly within the more developed cities throughout Clallam County. Government facilities and schools may be the most likely targets for active shooter threats and terrorism. Terrorism may also be aimed at critical infrastructure throughout the County including facilities and infrastructure related to power, water, fuel or trade routes, and ports. Although terrorism and active shooter incidents often target places where people gather, it is difficult to predict specific areas or targets that may be impacted. It is reasonable to assume that all areas are potentially at risk.

The extent of impacts of an active shooter incident or terrorism are difficult to predict and would depend on the nature of the attack and target. Generally, terrorist attacks target densely populated or high-profile areas as well as high profile critical infrastructure. The impacts vary in size and severity depending on the specific event, but typically result in loss of life, psychosocial damage, and service/industry disruptions. Attacks on critical infrastructure could impact water and power availability or commerce and trade. Politically charged attacks would potentially interrupt the continuity of government. In any case, the effects of psychosocial damage, and service/industry disruptions would likely be experienced by the entire community to some degree in the event of an active shooter or terrorist attack. Long term trauma, mental health issues, and political and social divisions within the community are also potential non-physical impacts of an attack.

4.9.2.4 Utility Failure/Power Outage [Secondary Impacts]

Utilities such as communication lines, electricity, and water are transported throughout the planning area, and failures, interruptions, or power outages could impact any areas where these utilities are generated, stored, or transported. Additionally, infrastructure and transmission lines are often interconnected over large jurisdictions, meaning a

utility outage may have a significant geographic extent beyond where the location of the actual failure.

The underlying causes of utility failures, such as the various natural and human-caused hazards outlined in this document, could affect any area within the County. It is reasonable to assume that utility failures and power outages may impact any or all areas of Clallam County. Areas that may be particularly vulnerable include developed/populated centers and areas where key infrastructure overlap with known hazard zones. Specific infrastructure that may cause utility failures or outages if damaged include infrastructure used to provide power, communication, and water throughout the planning area.

During hazardous conditions (severe weather, wildfire, earthquakes, etc.), critical infrastructure throughout the planning area may be damaged or otherwise disrupted leading to outages or utility failure throughout the County. Utility companies may also intentionally discontinue services under hazardous conditions to mitigate further damages, otherwise known as a Public Safety Power Shutoff (PSPS). Given the ubiquity of utility lines and infrastructure throughout the planning area, it is understood that utility failure and power outages would potentially impact the entirety of Clallam County.

The magnitude or extent of impacts to the planning area would depend on the duration of the utility failure or outage and the size of the impacted area. Prolonged or widescale outages across the planning area could significantly disrupt County operations and emergency response. Additionally, many community lifelines rely on utilities for functionality. Law enforcement, fire service, health and medical services, energy, communications transportation, and water systems would all be impacted, potentially resulting in significant health and safety impacts.

4.9.2.5 Supply Chain Interruption [Secondary Impacts]

The production, sale, and distribution of goods is a global network. Interruption along any step of these processes could occur, resulting in impacts to the planning area. The impacts of these disruptions would potentially include food scarcity, scarcity of medical equipment, and scarcity of pharmaceutical drugs or fuel. Shortages of these products would impact the entirety of the planning area.

In addition to global supply chain interruptions, local supply chain issues would potentially impact the entirety of Clallam County. The local shipping industry and other local economic industries are potentially vulnerable. Clallam County has 200 miles of coastline, which have fostered the maritime and fishing industries. Shipping lanes throughout the Strait of Juan de Fuca and off the western coast of Washington are vulnerable to natural and human-caused hazards that may impact local supply chains. Interruptions to local shipping lanes, ports, and bays near and throughout the planning area would have potential economic impacts throughout the entirety of Clallam County.

In addition to local and global shipping lanes, supply chains rely on local transportation infrastructure. Communities within Clallam County are connected through two-lane highways such as Highway 101, 112, and 113. These highways play a vital role in the supply chain allowing for local distribution of goods. Disruptions to local transportation routes would potentially impact the local supply chain. Highways may be impacted by several hazards. Hazards that would potentially impact highways include landslides, wildfire, earthquake tsunami, flood, and severe weather or dangerous road conditions.

The Clallam County Recompete Plan Phase 2, which was approved in August 2024, states the North Olympic Peninsula Barging Network will expand options for transportation of goods to and from remote Tribes and communities in Western Clallam and Jefferson Counties.[118] The North Olympic Peninsula Recompete Coalition will use the Strategy Development Grant to enhance current supply chain infrastructure as well as scale innovative forest product manufacturing, and support workers in tribal and distressed communities through various economic development initiatives, to drive renewed economic competitiveness and job creation in the sustainable maritime and natural resources sectors.[119] Expanded supply routes and enhance infrastructure in western Clallam County would be vulnerable to supply chain issues caused by natural and human-caused hazards.

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[118] North Olympic Peninsula Recompete Coalition, *Recompete Plan: Connecting People and Resources on Land and Sea*, https://www.eda.gov/sites/default/files/2024-07/Clallam_County_Updated_Recompete_Plan_Phase_2_Submission.pdf, published 2023 - 2024, accessed September 3, 2024.

[119] U.S. Economic Development Administration, *North Olympic Peninsula Recomplete Plan*, https://www.eda.gov/funding/programs/recompete-pilot-program/2023/North-Olympic-Peninsula-Recompete-Plan, accessed September 3, 2024.

4.9.3 Previous Occurrences

4.9.3.1 Hazardous Materials Spill

The Comprehensive Environmental Response, Compensations, and Liability Act (CERCLA), Emergency Planning and Community Right-to-Know Act (EPCRA), and Washington State law require responsible parties to report hazardous materials releases if certain criteria are met. All hazardous materials releases exceeding reportable quantities must be reported to the National Response Center. As shown in *Table 4-9. Department of Transportation Hazardous Materials Spills in Clallam County*, there have been various hazardous materials incidents within the County. Most historical hazardous materials releases in Clallam County have been small in scale and impacts.

In addition, oil spills have historically occurred within the planning area resulting in substantial hazardous materials clean-up efforts. Significant oil spills within the County in recent history are listed below: [120, 121, 122]

- October 5, 2007, 2 miles west of Ediz Hook in the City of Port Angeles, oil spill at the base of the sea wall construction slope.
- May 19, 2009, Neah Bay, 200 gallons of waste oil and diesel discovered on a derelict vessel.
- November 7, 2012, Tesoro Port Angeles Terminal in Port Angeles Harbor, 840-gallon heavy fuel oil spill, where between 50 and 100 gallons reached the water.
- December 17, 2015, 38 miles off La Push, 250 gallons of diesel/marine gas oil from a fishing vessel.

[120] State of Washington Department of Ecology, *Port Angeles landfill mystery oil release*, https://ecology.wa.gov/Spills-Cleanup/Spills/Spill-preparedness-response/Responding-to-spill-incidents/Spill-incidents/P-A-Landfill-Mystery-Oil-Release, accessed April 10, 2024.

[121] State of Washington Department of Ecology, *Lady Phyl Derelict Vessel,* https://ecology.wa.gov/spills-cleanup/spills/spill-preparedness-response/responding-to-spill-incidents/spill-incidents/lady-phyl-derelict-vessel, accessed April 10, 2024.

[122] State of Washington Department of Ecology, *Harley Marine Services-Olympic Tug & Barge IFO Spill – Port Angeles*, https://ecology.wa.gov/Spills-Cleanup/Spills/Spill-preparedness-response/Responding-to-spill-incidents/Spill-incidents/Harley-Marine-Services-Olympic-Tug-Barge-IFO-Spill, accessed April 10, 2024.

- April 5, 2016, Port of Neah Bay, 500 gallons of diesel/marine gas oil from a fishing vessel.
- May 20, 2019, Strait of Juan de Fuca, 122 gallons of diesel/marine gas oil from an unknown vessel.

Hazardous materials spills along transportation corridors have also been reported throughout Clallam County. A review of the Pipeline and Hazardous Materials Safety Administration (PHMSA) incident reporting database showed the following hazardous materials incidents along transportation corridors since 1991. No fatalities resulted from these incidents.

No State or federally declared disasters relating to hazardous materials release/spills have impacted the planning area within the last five years; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years*.

Table 4-9. Department of Transportation Hazardous Materials Spills in Clallam County

Incident Route	Incident City	Date of Incident	Quantity Released (LGA)*	Commodity Long Name
707 Main St	La Push	6/25/1991	1 LGA	Isopropynol or Isopropyl Alcohol
Marine Drive Box 271	Port Angeles	4/15/1992	6 LGA	Sodium Hydroxide, Solution
N/A	Grandview	5/7/1993	2 LGA	Naphtha, Petroleum
Marine Road	Port Angeles	2/1/2001	1 LGA	Corrosive Liquids
N/A	Port Angeles	2/7/2003	100 LGA	Phosphoric Acid Solution
224 Easy St	Port Angeles	1/7/2011	1 LGA	Corrosive Liquids
MM-196	Forks	2/23/2011	4,300 LGA	Diesel Fuel
SR-101 at MP186.5	Forks	10/21/2019	1 LGA	Liquefied Petroleum Gas
990 East Washington St	Sequim	6/26/2021	15 LGA	Gasoline

***LGA = Liquid gallons**

Source: United States Department of Transportation: Pipeline and Hazardous Materials Safety Administration, Incident Statistics, https://www.phmsa.dot.gov/hazmat-program-management-data-and-statistics/data-operations/incident-statistics, accessed April 29, 2024.

4.9.3.2 Maritime Disasters

Coastal areas surrounding Clallam County have a history of shipwrecks and other maritime disasters. The Olympic Coast National Marine Sanctuary estimates over 200 historical shipwrecks have occurred in the vicinity of the western coast of the Olympic Peninsula. The majority of recorded historical shipwrecks are estimated to have occurred during the 1800s and into the mid-1900s, due to weather-related conditions

causing collisions and groundings.[123] These historical shipwrecks did not have significant recorded impacts to Clallam County.

Shipwrecks are less common in recent decades due to improved navigation and communication systems. Recent maritime disasters have typically been limited to boating accidents on a smaller scale that do not significantly impact the County or participating jurisdictions. Maritime disasters involving oil production and transport are rare but do occur on occasion in the area. Recent disasters involving oil spills are listed under hazardous materials spills section, above.

One of the most significant maritime disasters in recent history occurred on June 22, 1991. The Tenyo Maru, a 365-foot vessel weighing 6,800 tons, was struck by a 610-foot cargo ship at full speed offshore of Neah Bay. The Tenyo Maru was destroyed, and a large oil slick was released. Oil washed up on Cape Flattery to Cape Alava and as far south as Oregon. The spill resulted in a decline coastal seabird population affecting 30 different species. The Tenyo Maru had a crew of 85 people; one death was reported.[124] The event contributed to the creation of the Olympic Coast National Marine Sanctuary three years later.

No State or federally declared disasters relating to maritime disasters have impacted the planning area within the last five years; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years*.

4.9.3.3 Active Shooter / Terrorism

Clallam County and the participating jurisdictions do not have a history of active shooter incidents or terrorism within the planning area. However, there have been fraudulent threats of active shooters at schools within planning area. Additionally, criminal activity including the unlawful use of a firearm and one notable attempted terrorist attack have occurred in Clallam County.

[123] Olympic Coast National Marine Sanctuary, *Olympic Coast National Marine Sanctuary Shipwrecks*, https://olympiccoast.noaa.gov/explore/shipwrecks.html, accessed April 29, 2024.

[124] Olympic Coast National Marine Sanctuary, *Olympic Coast National Marine Sanctuary Shipwrecks*, https://olympiccoast.noaa.gov/explore/shipwrecks.html, accessed April 29, 2024.

On February 16, 2023, active shooter reports at schools in the City of Sequim and Port Angeles were noted as a part of a "swatting" scam. Swatting refers to the act of calling emergency services or a Special Weapons and Tactics (SWAT) team to a false location as a prank distraction. One pre-recorded call claimed an active shooter was at Sequim High School, while the second claimed to be a teacher at Port Angeles High School reporting a shooting on campus. Law enforcement determined that there was no threat to the schools and neither school activated its active shooter protocols. [125] On May 11, 2023, high schools in Port Angeles, Sequim, and Port Townsend were under lockdown due to a recorded threatening call. The lockdowns were lifted less than 40 minutes after, and Port Angeles High School students were sent home early with police remaining on site. The calls were determined to be a part of a swatting scam. [126]

Actual shootings did occur within the planning area in December 2023. On December 17, 2023, two drive-by shootings occurred in Port Angeles.[127] The suspect allegedly shot at two people on horseback in Agnew and a motorist in Port Angles from a blue pickup truck.[128] The suspect was arrested while armed with a handgun, and has been charged with two counts of drive-by shooting and one count of carrying a concealed weapon without a license. No deaths or injuries were reported.

The only reported attempted terrorist attack within the planning occurred in 1999. United States Customs inspectors in Port Angeles arrested a terrorist who attempted to cross the U.S. Canadian border with explosives. It was believed that the attack was intended to blow up the Space Needle in Seattle. It was later determined that the suspect was plotting to blow up a passenger terminal at Los Angeles International

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[125] Peninsula News, *Police say calls about active shooter a hoax*, https://www.peninsuladailynews.com/news/police-say-calls-about-active-shooter-a-hoax/, published February 16, 2023, accessed April 12, 2024.

[126] Peninsula Daily News, *UPDATE: Lockdowns lifted at Port Angeles, Sequim, Port Townsend high schools following threat*, https://www.peninsuladailynews.com/news/port-angeles-high-school-on-lockdown-after-threat/, accessed May 2, 2024.

[127] KIRO 7 News, *Clallam County deputies arrest man accused of shooting at horseback riders, motorist,* https://www.kiro7.com/news/local/clallam-county-deputies-arrest-man-accused-shooting-horseback-riders-motorist/XXHUJF5645CQBCXNAT5PFM7LGY/, published December 17, 2023, accessed April 12, 2024.

[128] Peninsula Daily News, *Two drive-by shootings lead to arrest in Port Angeles; nobody hurt*, https://www.msn.com/en-us/news/crime/two-drive-by-shootings-lead-to-arrest-in-port-angeles-nobody-hurt/, published December 18, 2023, accessed April 19, 2024.

Airport (LAX).[129] Although the target was intended for LAX, the threat was discovered and eliminated in Clallam County.

Active shooter scenarios and terrorist attacks are rare within the planning area. No State or federally declared disasters relating to active shooter or terrorism have impacted the planning area within the last five years; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years*.

4.9.3.4 Utility Failure/Power Outage [Secondary Impacts]

There have been various power outages and utility failures throughout Clallam County due to severe weather and other hazardous conditions. 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. Below is a list of recent power outages and utility disruptions that occurred in the planning area and participating jurisdictions.

- In 2016, Clallam County faced Super Typhoon Songda where winds were near 30 mph with 45 to 50 mph gusts.[130] The City of Sequim activated its emergency operations center while having city crews on call to respond as necessary.
- In January 2016, a heavy windstorm caused a loss of power for more than 11,800 Clallam County PUD customers in Sequim.[131] A tree in a PUD line caused all customers east of the Dungeness River to lose power.
- In December 2018, about 1,732 North Olympic Peninsula customers were without power after high winds drove trees into power lines.[132]

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[129] Peninsula Daily News, *Terrorist plot stopped in Port Angeles 20 years ago*, https://www.peninsuladailynews.com/news/terrorist-plot-stopped-in-port-angeles-20-years-ago/, published December 17, 2019, accessed April 12, 2024.

[130] Peninsula Daily News, *First of two storms expected to hit Peninsula on Thursday night*, https://www.peninsuladailynews.com/news/first-of-two-storms-expected-to-hit-peninsula-on-thursday-night/, published October 13, 2016, accessed April 19, 2024.

[131] Sequim Gazette, *Power outage affects 11K-plus PUD customers*, https://www.sequimgazette.com/news/power-outage-affects-11k-plus-pud-customers/, published January 21, 2016, accessed April 19, 2024.

[132] Peninsula Daily News, *More than 1,700 North Olympic Peninsula customers remain without power today*, https://www.peninsuladailynews.com/news/high-wind-warnings-in-place-for-olympic-peninsula/, published December 21, 2018, accessed April 19, 2024.

- In December 2021, a winter storm caused a power outage to a total of 13,442 customers throughout Clallam County.[133]
- On September 21, 2023, a delivery truck crashed into various low hanging phone lines falling into power lines that caused a power outage for more than 260 Port Angeles City Light customers.[134]
- On January 10, 2024, severe weather caused a total of 1,421 outages for the Clallam PUD. This included 186 outages in West Jefferson County, and 138 outages in East Jefferson County.[135]
- On March 11, 2024, a sport utility vehicle struck a power pole off of West Sequim Bay Road that caused a power outage for nearly 1,889 households in Sequim.[136]
- In March 2024, Clallam County PUD District No. 1 had a planned outage that affected 4,100 customers along U.S. Highway 101 west of Lake Crescent to and including the City of Forks.[137] The outage was planned to replace a damaged transmission power pole that was struck by a car.

No State or federally declared disasters relating to utility failure or power outages have impacted the planning area within the last five years; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years*.

[133] Peninsula Daily News, *Winter storm turns off heat for many, drops more than a foot of snow in some areas in Peninsula*, https://www.peninsuladailynews.com/news/electrical-outages-hit-as-snow-builds-temperatures-drop/, published December 27, 2021, accessed April 19, 2024.

[134] My Clallam County, *Delivery Truck Takes Out Power For Hundreds in Port Angeles*, https://www.myclallamcounty.com/2023/09/21/delivery-truck-takes-out-power-for-hundreds-in-port-angeles/, published September 21, 2023, accessed April 19, 2024.

[135] Peninsula Daily News, *Winter storm blows its way onto Peninsula*, https://www.peninsuladailynews.com/news/more-than-1900-without-power-on-peninsula/, published June 10, 2024, accessed April 19, 2024.

[136] Sequim Gazette, *SUV strikes power pole that causes outage for nearly 2000 Sequim households*, https://www.sequimgazette.com/news/suv-strikes-power-pole-that-causes-outage-for-nearly-2000-sequim-households/, published March 12, 2024, accessed April 19, 2024.

[137] Peninsula Daily News, *Planned Power Outage to Affect 4100 west end customers Thursday night*, https://www.peninsuladailynews.com/news/planned-power-outage-to-affect-4100-west-end-customers-thursday-night/, published March 26, 2024, accessed April 19, 2024.

4.9.3.5 Supply Chain Interruption [Secondary Hazard]

Interruptions are relatively common throughout global supply chains; however, these interruptions do not usually cause significant impacts throughout global economies. Local supply chain interruptions with notable impacts to the planning area are more uncommon but have occurred in the past. Recent supply chain issues and shortages within the planning area are listed below.

- In March 2022, supply chain issues delayed the delivery of necessary equipment to operate Blue Mountain Transfer Station between City of Port Angeles and City of Sequim.[138]
- In 2022, Clallam County PUD customers faced unprecedented multi-year nationwide supply chain issues that caused a shortage of electric distribution equipment, and most significantly, distribution transformers. Large orders for pad-mounted transformers were significantly delayed. [139]
- In 2022, supply chain issues and the avian flu caused egg prices to increase by almost 60 percent. According to the Consumer Price Index, the overall cost of food rose 11.8 percent from January 2022 to December 2022. The cost of bakery and cereal goods rose 16.1 percent and dairy products increased by 15.3 percent. Higher costs of food and fuel have significantly impacted Port Angeles, Forks, and Sequim Food Bank Association operations over the past few years.[140]
- In 2022 and 2023, supply chain issues and changes to the state energy code drove the costs of construction up and a deficit in sufficient labor workforce, creating obstacles in the construction of new housing.[141]

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[138] City of Port Angeles, *News Flash Home*, https://www.cityofpa.us/CivicAlerts.aspx?AID=1130&ARC=2084, posted on January 21, 2022, accessed April 19, 2024.

[139] Clallam PUD, *Padmount Transformer Shortage*, https://clallampud.net/padmount-transformer-shortage/, published May 16, 2022, accessed April 19, 2024.

[140] Peninsula Daily News, *Peninsula Food Banks Seeing more Clients and Rising Costs*, https://www.peninsuladailynews.com/news/peninsula-food-banks-seeing-more-clients-and-rising-costs/, accessed April 19, 2024.

[141] Sequim Gazette, *Housing shortage top priority for Clallam County*, https://www.sequimgazette.com/news/housing-shortage-top-priority-for-clallam-county/, published February 19, 2023, accessed April 19, 2024.

In addition, landslides may have caused road and highway blockages and closures impacting transportation and supply delivery. About 77 landslides have occurred in Clallam County from 2015 to 2024 which may have impacted the supply chain in some form (refer to Section 4.10, *Landslide* for further details on the impacts of past landslides.

These local supply chain issues caused varying levels of impact to the planning area, but did not significantly hinder the daily operations and supply of key goods throughout Clallam County. Significant supply chain issues resulting in major economic or social impacts have been rare in Clallam County. No State or federally declared disasters relating to supply chain interruptions have impacted the planning area within the last five years; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years*.

4.9.4 Probability of Future Occurrences

4.9.4.1 Hazardous Materials Spill

Hazardous materials will continue to be manufactured, used, stored and transported throughout Clallam County, posing a risk of hazardous materials spills. Hazardous materials used for daily commercial and household operations rarely result in significant hazardous materials releases. Additionally, various programs maintained by Clallam County and the Washington Department of Ecology aim to inform the public of responsible hazardous materials use and disposal, lessening the risk of minor releases.

Incidents caused by a traffic accident along hazardous materials transportation corridors including Highway 10, Highway 112, as well as the Strait of Juan de Fuca and other navigable waterways pose a higher risk of hazardous materials spills. Furthermore, increased development trends may lead to increased manufacturing, use, and transportation of hazardous materials and a potentially higher incidence of traffic accidents involving hazardous materials. The use, production, and transportation of fuels and fuel products throughout the County also create the potential risk of hazardous materials spills. Gas stations, marinas, propane storage sites, and port facilities will continue to use, store, and transport hazardous materials in the future. Given the prevalence of hazardous materials throughout Clallam County, there is an occasional probability of hazardous materials incidents occurring in the future. An

occasional probability means a 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.

4.9.4.2 Maritime Disasters

Maritime disasters are difficult to predict, but modern navigation, communication, and weather monitoring technologies make shipwrecks and collisions much less common. However, as long as there are ships in the water and vulnerable coastal infrastructure or resources, there will be a risk of maritime disasters. Waters around Clallam County including the Pacific Ocean and the Strait of Juan de Fuca will continue to be utilized by commercial, passenger, personal, and military ships and vessels in the future. Additionally, these waterways and the ports and bays of Clallam County will continue to host busy shipping lanes for commercial vessels and oil tankers. Future development and increased oil production and transportation throughout the area may increase the risk of maritime disasters in the future. It is estimated that the completion of the Trans Mountain Pipeline expansion in British Columbia will bring a significant increase in oil tanker traffic throughout the area.[142] Given the level of shipping traffic off the coasts of Clallam County and improved maritime safety technology, there is an unlikely probability of maritime disasters in the future. An unlikely probability means less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.

4.9.4.3 Active Shooter / Terrorism

Considering the rarity of active shooter and terrorism events in the past, the probability of active shooter scenarios and terrorist attacks within the planning area is considered unlikely. An unlikely probability means less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years. Additionally, Clallam County and participating jurisdictions have locations that are understood to be potential targets for small-scale attacks, but do not have locations that would typically be attacked as part of a large-scale act of terrorism. Nonetheless, it is reasonable to assume that an active shooter or terrorist could target areas within Clallam County.

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[142] The Washington State Standard, *Washington's border waters are on the cusp of a major rise in oil tanker traffic*, https://washingtonstatestandard.com/2024/04/29/washingtons-border-waters-are-on-the-cusp-of-a-major-rise-in-oil-tanker-traffic/, accessed May 1, 2024.

4.9.4.4 Utility Failure/Power Outage [Secondary Impacts]

The planning area has a demonstrated history of utility failure and power outages occurring as a secondary impact to various other hazards. Thus, utility failures and outages have an occasional probability to recur in the future. An occasional probability means a 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years. Power outages can occur from severe weather events, high winds, wildfire, and human-caused hazards. Other utilities are also vulnerable to disruption due to various natural and human-caused hazards. Considering that many hazards with a likelihood to occur in Clallam County may result in utility failure and power outages, it is expected that these will be a recurrent secondary impact in the planning area. The HMCR Steering Committee designated a medium hazard planning consideration for utility failure as a secondary impact considering the future probability and potential for related hazards to trigger outages and disruptions.

4.9.4.5 Supply Chain Interruption [Secondary Hazard]

It is difficult to predict the recurrence of supply chain interruptions. Global and local supply chains rely on a number of variables that could be disrupted by various social, political and economic factors. Additionally, environmental factors such as natural disasters have the potential to impact global and local supply chains. Significant natural disasters such as earthquakes, tsunamis, flood, and severe storms could occur within the planning area or anywhere that goods are produced, processed, and shipped. These events are also unpredictable and would potentially result in significant supply chain interruptions. However, historical incidents have not resulted in major impacts within the planning area. It is reasonable to assume that there is an occasional probability for supply chain interruptions to impact the planning area in the future. An occasional probability means a 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.

4.9.5 Climate Change

4.9.5.1 Hazardous Materials Spill

Climate change poses an indirect risk related to hazardous materials release. According to the U.S. Environmental Protection Agency (EPA), climate change may increase exposure to chemicals. More frequent and intense storms may increase the likelihood

of flooding, causing chemicals held in underground storage tanks, landfills, and storm debris to leak or spread to previously unsoiled areas.[143] Further, hazardous materials releases during wildfire or severe weather events could spread contamination to large geographic areas and amplify long-term impacts to human and ecological health. Spills or releases in challenging clean-up conditions can result in more severe damage or impacts compared to spills during normal conditions.

4.9.5.2 Maritime Disasters

Despite advances in navigation and communication tools, climate change may increase the risk of maritime disasters. Increasing global temperatures and increased water vapor in the atmosphere becomes fuel for more powerful storms to develop.[144] As climate change increases, winter and tropical storms and other disasters are becoming more common and pose a serious threat to maritime infrastructure.[145] Coastal infrastructure, bays, ports, marinas, and shipping vessels may experience damages due to the increased frequency and severity of storm events – causing dangerous conditions that make maritime disasters more likely. Increased wind speeds in tropical storms and rising sea levels expose create a potential threat to vulnerable coastal infrastructure such as marinas, sea walls, and bridges. Additionally, more severe storms may cause more shipwrecks and collisions involving shipping vessels and oil tankers.

4.9.5.3 Active Shooter / Terrorism

Active shooter events and terrorism are not directly tied to climate change impacts. However, prolonged climate change impacts can cause conflicts regarding natural resources and livelihood insecurity, as well as food insecurity or water scarcity. Terrorist organizations could operate more easily in fragile and conflict-affected environments, according to the Climate Diplomacy Organization.146 In these scenarios, climate

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[143] United States Environmental Protection Agency, *Climate Adaptation – Chemical Exposure and Health*, https://www.epa.gov/arc-x/climate-adaptation-chemical-exposure-and-health, published June 21, 2023, accessed April 15, 2024.

[144] USGS, *How can climate change affect natural disasters?* https://www.usgs.gov/faqs/how-can-climate-change-affect-natural-disasters, published 2024, accessed April 15, 2024.

[145] International Monetary Fund Blog, *Climate Change is Disrupting Global Trade*, https://www.imf.org/en/Blogs/Articles/2023/11/15/climate-change-is-disrupting-global-trade, published November 15, 2023, accessed April 15, 2024.

[146] Climate Diplomacy Organization, *Insurgency, Terrorism and Organized Crime in a Warming Climate*, https://www.climate-diplomacy.org/publications/insurgency-terrorism-and-organised-crime-warming-climate, accessed May 3, 2024.

change may also prolong conflict and create conditions conducive to terrorism and deprivation, exclusion, and organized crime.[147] Based on these considerations, climate change may indirectly exacerbate the risk of active shooter scenarios and terrorism.

4.9.5.4 Utility Failure/Power Outage [Secondary Impacts]

The effects of climate change pose the potential for heavy strain on power grids in the coming decades. With the increase in severe weather events such as heat waves, people will use more electricity for cooling, increasing the risk of blackouts and power disruptions. Additionally, increased temperatures not only alter how much electricity people consume, but also the efficiency of power generation.

Power outages are an extremely common secondary impact of other natural disasters that may be exacerbated by climate change. Climate change is expected to increase the occurrence of wildfire and various severe weather events that may result in power outages.

4.9.5.5 Supply Chain Interruption [Secondary Hazard]

Climate change may increase the occurrence of supply chain interruptions by creating social, economic or political tensions that may exacerbate supply chain issues. Additionally, climate change is understood to increase the likelihood and severity of certain natural disasters that may cause supply chain interruptions. Natural disasters such as hurricanes, floods, wildfires and other forms of extreme weather that are exacerbated by climate change can disrupt the supply chain of all sorts of goods. Ports, rail lines, highways, and other transportation and supply infrastructures will be threatened by increases in sea level of an estimated 2 to 6 feet or more by 2100.148 Additionally, drought can cause price increases and shortages of agricultural commodities. When considering the impacts of climate change, it is critical to consider how indirect impacts of climate change may impact global and local supply chains.

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[147] United Nations, *Climate Change 'Biggest Threat Modern Humans Have Ever Face', World-Renowned Naturalist Tells Security Council, Calls for Greater Global Cooperation*, https://press.un.org/en/2021/sc14445.doc.htm, published 2024, accessed April 15, 2024.

[148] Yale Environment 360, *How Climate Change Is Disrupting the Global Supply Chain*, https://e360.yale.edu/features/how-climate-change-is-disrupting-the-global-supply-chain, accessed March 10, 2022, published April 19, 2024.

4.9.6 Vulnerability and Risk Assessment

Human-caused hazards have the potential to affect the entire planning area, and therefore the entire population of Clallam County and all critical facilities within the County are considered vulnerable. Specific vulnerabilities by human-caused hazards are discussed in the paragraphs below.

4.9.6.1 Hazardous Materials Spill

Hazardous materials are manufactured, used, stored, and transported throughout the planning area. Certain areas throughout the County have a higher risk of hazardous materials spills; however, hazardous materials are present throughout the County. It is assumed that the entirety of the planning area consisting of 77,333 people and all critical facilities within the County are potentially vulnerable.

Impacts from hazardous materials spills can vary significantly based on the type/content/quantity of hazardous materials and the release location. The threat of a major hazardous materials incident in Clallam County could involve transportation, maritime trade, utilities, industrial/agricultural sources, clandestine operations and/or illegal camping. The HMCR Steering Committee identified 25 critical facilities that handle hazardous materials throughout Port Angeles, Sekiu, Sequim, Neah Bay, Forks, and Carlsborg. These facilities may pose a higher risk to nearby communities if damaged in a hazard event. Additionally, major highways including Highway 101 traverse the planning area and serve as hazardous materials transportation corridors. The Port of Port Angeles and the Strait of Juan de Fuca may be highly vulnerable due to their facilitation of major shipping and thoroughfare. Hazardous materials spills at critical facilities or transportation and shipping corridors throughout the County may result from natural hazards and significantly impact the population, infrastructure, and natural resources of the County.

Although hazardous materials could result in damages to structures and coastal infrastructure, the most significant impacts are the potential human health hazards or potential environmental contamination. Environmental contamination could impact air or water quality and could involve costly long-term clean-up measures. Damage to utility systems could disrupt service or cause significant outages. The intent behind hazardous materials spills can influence the magnitude of impact as well. An intentional hazardous materials release linked to terrorism or sabotage attempts could have wider-

ranging impacts compared to an unintentional release. Thus, the threat of harm and injury is highly dependent on the actual incident.

4.9.6.2 Maritime Disasters

It is difficult to quantify the potential impacts of maritime disasters in the planning area. Impacts would vary greatly depending on the type, location, and severity of event. Additionally, the at-risk population and critical facilities are difficult to estimate. Thus, it is assumed that all coastal resources and communities throughout Clallam County are potentially vulnerable to maritime disasters. Shipwrecks, oil spills, and fires could occur anywhere off the coast of the County and impact the nearest coastlines. Marinas, bays, ports, and areas near shipping lanes such as Quileute Harbor Marina, Neah Bay, Clallam Bay, Ediz Hook, Port Angeles Harbor, Sequim Bay, and Discovery Bay are particularly vulnerable due to increased transportation. Due to shipping traffic throughout the Strait of Juan de Fuca, any areas along the northern coast of Clallam County have a notable risk of impacts. Maritime disasters may result in significant environmental degradation in the case of an oil spill or collision involving large shipping vessels as well as economic and supply chain disruptions. Disasters involving passenger vessels pose the highest risk of loss of life; however, any type of maritime disaster may result in casualties within the site and along the coastline.

4.9.6.3 Active Shooter/Terrorism

Terrorism and active shooter incidents may occur anywhere within the County and thus the entirety of the County, including the population of 77,333 individuals and all critical facilities, is considered vulnerable. Active shooters specifically target people, and attacks usually occur at places or events where large numbers of people congregate. Places such as schools, specific businesses, churches, City Halls, police stations, etc. Comparatively, terrorism attacks may either focus on places where people gather or target schools, government facilities or public utility or transportation infrastructure. Depending on the nature of the attack, impacts could be widespread throughout the planning area or highly localized. Impacts would depend on the type of terrorism but could result in significant injury and loss of life as well **as long-term psychological impacts throughout the affected community. Day to day operations throughout Clallam County could also be impacted by an active shooter or terrorist attack.**

4.9.6.4 Utility Failure/Power Outage [Secondary Impacts]

Utility failure or power outage could potentially impact any area within the County. Thus, it is assumed that the entirety of the planning area, with a population of 77,333 individuals and all critical facilities, is potentially vulnerable. Utility failure and power outages are more likely to occur during a severe weather event, primarily strong winds, thunderstorms, or other winter storms. Proactive power outages are becoming more common from utility providers during predicted strong wind conditions due to the risk of wildfires. The associated power outages can impact the County's ability to provide services and respond to emergencies. Utility failure and power outages can also disrupt transportation, water, and communications. This can include stores, banks, and other essential services. Power outages can cause refrigeration and filtering equipment to shut down which can lead to food and water contamination. Utility failure and power outages can also affect healthcare as medical devices and HVAC systems can shut down if not backed up by generators. The entirety of the planning area may be at risk or a small portion of the County depending on the severity of the event. The effects of utility failure and power outage can be short or long-term depending on if the power outage lasts for hours or for days.

4.9.6.5 Supply Chain Interruption [Secondary Impacts]

Interruptions to the supply chain has the potential to impact the entirety of the planning area consisting of approximately 77,333 people. The risk of Clallam County experiencing supply chain interruption is dependent on current events throughout nation and internationally such as natural disasters, pandemics, cyberattacks, terrorist attacks, economic collapse, and consumer demand. Vulnerability can occur especially to remote communities where transportation routes are already limited. This includes routes such as the Highway 101 and State Routes 110, 112, 113, and 117 which can be prone to landslides, fallen debris, and washouts that can interrupt transportation of resources. Transportation routes also includes local shipping lanes, ports, and bays of the County's coastlines as well as the Strait of Juan de Fuca, bordering Canada. Interruption to supply chain may have short-term or long-term effects. Enhancements to transportation infrastructure may decrease vulnerability to supply chain interruption, especially to remote communities.

4.9.6.6 Changes in Vulnerability

Since the 2019 MJHMP, population patterns, development and land use have not substantially changed in the planning area. As discussed in Section 3.5, the County population within the planning area has increased from the 2019 MJHMP by 1,859 individuals during the last five years, or 2.46 percent increase. This is concurrent with the County's housing stock which increased by 1,082 units or 2.93 percent increase. Generally, population and housing growth over the past five years is concentrated within the urbanized areas of Clallam County, primarily in the Cities of Port Angeles and of Sequim. Because the population and development to accommodate this population increased in the last five years, the overall vulnerability to wildfire increased as well.

At the time of this MJHMP preparation, the County anticipates the majority of population growth, land use changes and development to occur within the designated Urban Growth Areas (UGAs) which are identified as Port Angeles, Sequim, Forks, Carlsborg, Joyce and Clallam Bay. Since the previous iteration of the 2019 MJHMP development and land use has not substantially changed in the planning area. Additionally, no proposed projects under the purview of the County are expected to substantially increase human caused hazards vulnerability at this time. Future construction would be subject to the County Building and Safety Code and relevant hazardous materials regulations, which would decrease vulnerability associated with hazardous materials risk. Additionally, generators may be considered to offset the impacts of power outages.

The Washington State Office of Financial Management developed population projects at the County level while local jurisdiction zoning is required to accommodate this projected growth. However, the exact type, location and timing of projected growth and development is unknown at the time of this writing. It is reasonable to assume that any population growth and development to accommodate that growth would result in increased human caused hazard vulnerability during the next five years.

4.9.6.7 Socially Vulnerable Populations

The impacts of human-caused hazards would generally apply to the entirety of the planning area, including SVPs within Census Tracts 3, 7, 21, 24 and 9400; individuals below the 150-percent poverty rate, aged 65 or older, disabled persons, persons reporting minority status, persons living within a mobile home; populations of the

Quileute Tribe, Makah Tribe, Lower Elwha Klallam and the Jamestown S'Klallam Tribe; and tourists, seasonal visitors, and transient populations visiting for special events. These SVPs are located throughout the planning area and face their own unique challenges to human-caused hazards. Likewise, each human-caused hazard presents unique challenges for SVPs located throughout Clallam County. The primary concern for SVPs is the resources and ability to prepare for and recover from human-caused hazards as well as access to emergency services.

Hazardous materials spills can disproportionately impact SVPs by exposing them to toxic chemicals, which can cause serious health issues such as respiratory problems, skin irritation, and long-term illnesses. These groups often have limited resources to respond to and recover from such incidents and may face barriers in accessing timely information and emergency services. Additionally, the displacement caused by spills can be particularly challenging for those with mobility issues, financial constraints, or lack of local knowledge, further exacerbating their vulnerability.

Maritime disasters and their impacts would generally be limited to coastal areas, however, SVPs throughout Clallam County and particularly in coastal communities may be disproportionately impacted. SVPs and other high-risk individuals throughout the County may lack the resources to effectively respond to and recover from maritime disasters such as shipwrecks, collisions, fires, and oil spills. For example, those below the 150-percent poverty rate may struggle with financial constraints, while elderly and disabled individuals face mobility challenges that hinder evacuation and access to emergency services. Minorities and tribal populations might encounter additional barriers due to language and cultural differences. Mobile home residents are particularly at risk due to the susceptibility of their homes to damage. Transient groups like tourists and seasonal visitors may lack local knowledge and resources, making it difficult for them to respond effectively to maritime emergencies. Overall, these populations are more likely to suffer from delayed rescue operations, prolonged displacement, and increased health risks due to the compounded effects of maritime disasters and inadequate emergency response.

SVPs would potentially face similar challenges in the event of an active shooter or terrorist attack. Specifically, elderly populations and individuals with a disability may experience mobility issues leaving then unable to evacuate areas under attack. Minorities and tribal communities may face language and cultural differences that

impact access to timely information such as warnings and alters. Active shooter threats can significantly impact tourists, seasonal visitors, and transient populations by creating confusion and panic due to their unfamiliarity with the area and local emergency procedures. These groups may lack access to timely information and resources, making it difficult for them to respond effectively and increasing their vulnerability during such incidents.

Utility failures, such as power outages, can have severe impacts on SVPs. SVPs and other high-risk individuals within Clallam County may rely heavily on electricity for essential services like heating, cooling, and medical equipment, making them particularly susceptible to health risks during outages. Financial constraints can limit their ability to access alternative power sources or relocate to other areas. Additionally, communication barriers and limited access to timely information can hinder their ability to respond effectively. For transient groups like tourists and seasonal visitors, unfamiliarity with local resources and emergency procedures can further exacerbate their vulnerability.

Supply chain interruptions may cause shortages of essential goods like food, medicine, and other essential resources, which can increase the cost of living and limit access to basic needs. SVPs throughout the planning areas may lack the financial resources to cope with price hikes and may face additional barriers in accessing timely information and alternative supplies. For elderly and disabled individuals, disruptions can mean a lack of critical medical supplies and services. Transient populations, such as tourists and seasonal visitors, may struggle with unfamiliarity and limited local support, exacerbating their vulnerability during times of limited supplies.

Considerations for SVPs throughout the planning area were incorporated into the mitigation strategy in Section 5.0. Specifically, the HMCR Steering Committee tailored Mitigation Actions #CC27, #CC32 and #CC37, to mitigate the impacts of human-caused hazards on SVPs such as those related to the resources and ability to prepare for, respond and recover from hazards.

4.10 Landslide

4.10.1 Description

A landslide is the movement of rock, earth, or debris down a slope. When a hillside or slope becomes unstable, downslope movement of rock and soil occurs under the direct influence of gravity. Landslides are often sudden, although some occur very slowly over a long period of time. Loose and fractured materials are more likely to slide than compact materials or solid rock, and steep slopes are at greater risk than gentle rises.

Landslides are usually induced by earthquakes, saturated slopes, removal of vegetation, or change in type of vegetation covering slopes. The shaking of an earthquake can decrease slope stability, or in more severe instances, can fracture the earth material enough that the material slides. Moisture-induced landslides can occur when the ground soaks up enough water that the soil becomes loose and unstable. This is often the result of intense or long-lasting rainfall but can also result from a pipeline burst or overwatering landscapes. Loss of vegetation to fire or drought may cause an area to be more vulnerable to landslides. Vegetation holds soil in place and without the root system of trees, bushes, and other plants, the land is more likely to slide away.[149]

In general, landslides can be categorized as shallow or deep-seated which can determine their speed and size.[150] Shallow and deep-seated landslides can occur at any time, but typically occur during the winter months in western Washington and during the summer months in eastern Washington.[151] Shallow landslides are rooted in soil layer and often form slumps along roadways or fast-moving debris flows down valley. Deep seated landslides are those that fail below the rooting depth of trees and vegetation and can be both slow and rapid moving. Deep-seated landslides are typically much larger than shallow landslides and can devastate infrastructure and housing developments.

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[149] National Geographic Society, *Landslide*, https://education.nationalgeographic.org/resource/landslide/, published 2024, accessed April 10, 2024.

[150] Washington State Department of Natural Resources, *Landslides*, https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/landslides#some-historic-landslides-in-washington-state, published 2024, accessed April 10, 2024.

[151] Washington State Department of Natural Resources, *Landslides*, https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/landslides#some-historic-landslides-in-washington-state, published 2024, accessed April 10, 2024.

Regardless of the cause or specific form, a landslide can damage or destroy structures and roadways in its path. Underground infrastructure, such as pipelines or telecommunication lines, may be severed during a landslide. This could lead to infrastructure-induced flooding if water pipes or sewage lines burst. In addition to property damage, landslides can crush or bury people, creating a risk of serious injury or death.

Image 5. Landslide Block Roads In and Out of Makah Reservation[152]

4.10.2 Location/Extent

The State of Washington is one of the most landslide-prone states in the country with hundreds to thousands of landslides per year. The Washington Department of

[152] The Seattle Times, Landslides block most roads in and out of Makah Reservation, https://www.seattletimes.com/seattle-news/weather/landslides-block-most-roads-in-and-out-of-makah-reservation/, November 17th, 2021.

Transportation routinely budgets $15 million a year for cleanup of landslides on highways. Warning signs and indicators of potential landslide hazard areas include:[153]

- A hillside that has increased spring and (or) seep activity, or newly saturated ground, especially if it was previously dry.
- New or developing cracks, mounds, or bulges in the ground.
- Sagging or taut utility lines; leaning telephone poles, deformed fences, or tilting of trees on a hillside.
- Sticking windows or doors; growing cracks in walls, ceilings, or foundations.
- Changes in water well levels or water wells that suddenly run dry.
- Movement of the ground

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.

The Washington Department of Natural Resources (DNR) produces statewide data mapping on landslide hazard zones. This data is mapped for Clallam County and presented in *Exhibit 4-5. Washington DNR Landslide Hazard Zone.* The DNR landslide hazard zone identifies large areas in western Clallam County as vulnerable to landslide. Northeastern areas of the County are not shown to be in the landslide hazard zone. The HMCR Steering Committee determined based on local knowledge and past experience that the DNR landslide hazard zone underestimated current landslide risk and vulnerability in Clallam County.

Acknowledging the data limitations associated with the DNR landslide hazard map, the HMCR Steering Committee evaluated Washington Geological Survey (WGS) data for

[153] Washington State Department of Natural Resources, *Landslides*, https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/landslides#some-historic-landslides-in-washington-state, published 2024, accessed April 10, 2024.

historical landslide data as presented in the Washington State Enhanced Hazard Mitigation Plan (SEHMP). The SEHMP identifies previous landslide hazard areas in Clallam County based on Washington Geological Survey data.[154] Data of previous landslide footprints along with a 1,000-foot buffer zone around previous landslide footprints were mapped to indicate areas that are potentially vulnerable to landslide. This data is mapped in *Exhibit 4-6. WGS Historical Landslide Compilation*.

Both the DNR landslide hazard zones and WGS historical landslide data were assessed to determine collective landslide risk areas throughout the County. Mapped landslide risk areas primarily include steep slopes located throughout the planning area and particularly in western Clallam County. Areas along the north and northeastern coast were mapped as landslide risk areas based on historical landslide data. Areas to the east of Crescent Lake and south of Port Angeles and various spots throughout eastern Clallam County also indicated landslide risk based on historical data. Particular areas of concern for landslides are major roadways including Highways 101, 110 and 112, areas along major rivers including the Quillayute River, Lower Elwha roads, along the Port Angeles marine bluff, the Olympic Discovery Trail, bluff area along Sequim Bay, Johnson Creek, and Bell Creek.

[154] Washington Emergency Management Division, *Washington State Enhanced Hazard Mitigation Plan*, dated October 1, 2023.

Exhibit 4-5. Washington DNR Landslide Hazard Zone

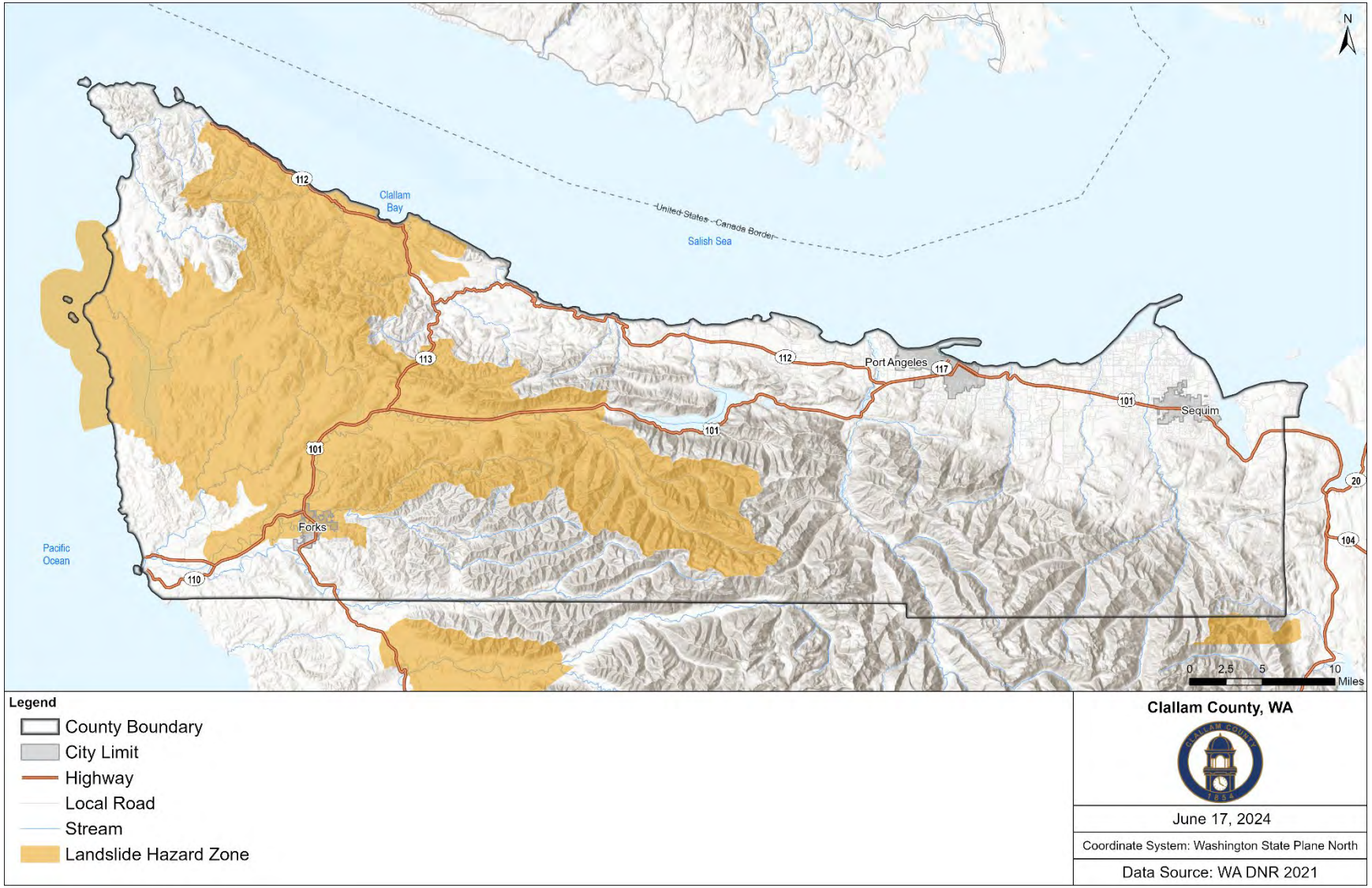
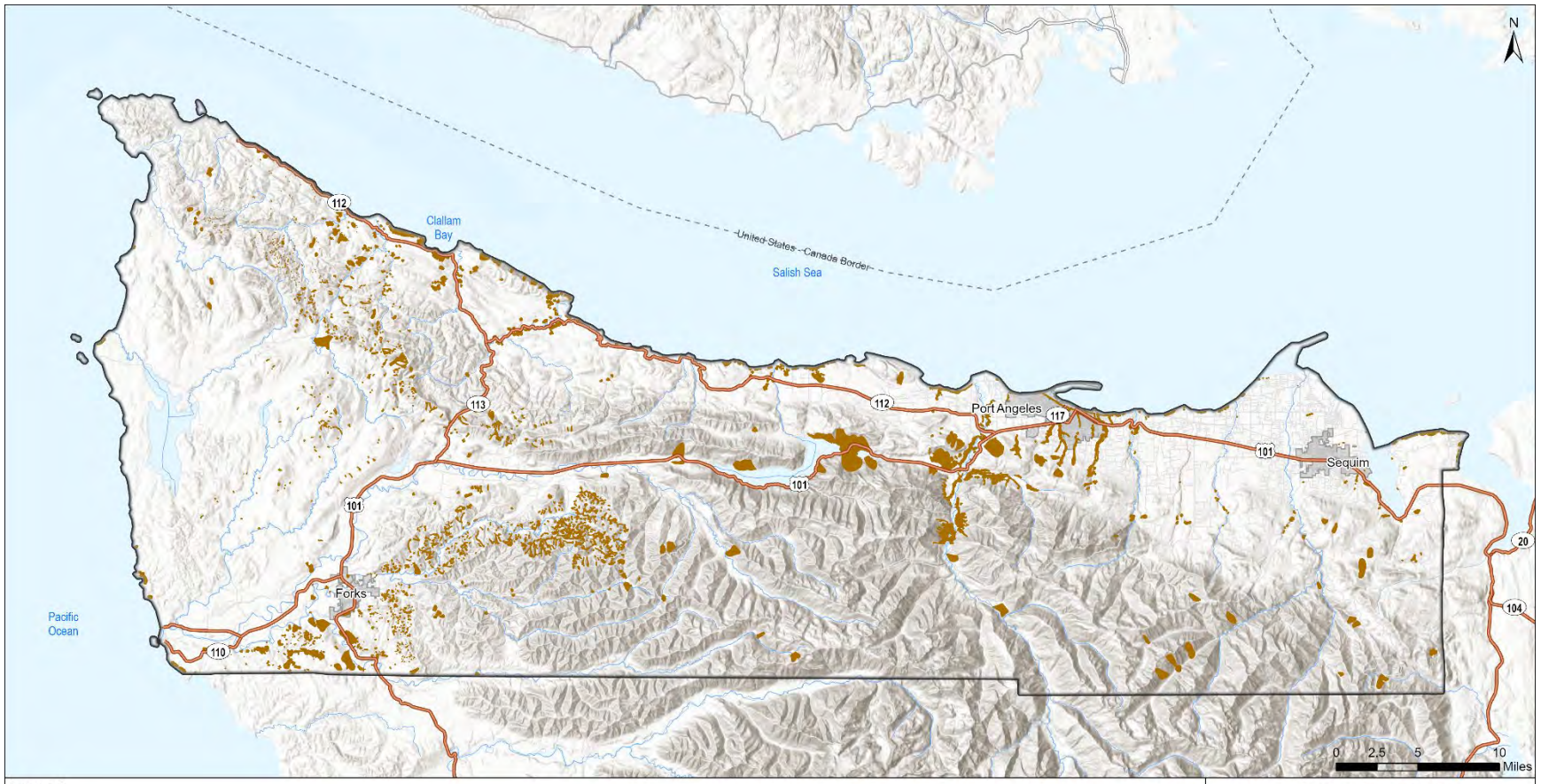


Exhibit 4-6. WGS Historical Landslide Compilation



4.10.3 Previous Occurrences

Clallam County has a history of landslide events due to a combination of heavy rain and unstable slopes. Damaged roadways and road closures have historically been common impacts following landslides. The Washington State Department of Natural Resources maintains a list of deep-seated landslides from 1984 to 2014, noting four major landslides in Clallam County:[155]

- In February 1990, a landslide destroyed approximately 500 ft of State Route 112 and toed out in the Straits, resulting in an 8-month closure. The Highway was realigned away from the active portion.
- In November 1990, a landslide destroyed approximately 300 ft of State Route 112 and toed out in Jim Creek, resulting in a 2-month-long highway closure with a long detour.
- On September 17, 1997, a debris flow-avalanche/mudslide hit a Port Angeles tavern situated below a steep slope. One person was reported dead and five were reported injured. The County only received about 0.5 inches of rainfall prior to the incident. [156]
- In October 2003, heavy rainfall caused severe flooding and landslides in 15 counties, including Clallam County. A presidential emergency declaration was issued for the State of Washington due to the severe weather and flooding. The landslide closed SR 112 in Clallam County.[157]

Landslides have continued to occur throughout the planning area in recent years. The Washington Department of Natural Resources now maintains a map of all landslides reported throughout the County. *Table 4-10. Landslides in Clallam County from 2015 – 2024*, lists landslides by year from 2015 to 2024.

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[155] Washington State Department of Natural Resources, *Significant Deep-Seated Landslides in Washington State – 1984 to 2014*, https://file.dnr.wa.gov/publications/ger_list_large_landslides.pdf, published 2015, accessed April 10, 2024.

[156] Seattle Times, *Mudslide Kills Man – Tavern in Port Angeles Hit; One Person Still Hospitalized*, https://archive.seattletimes.com/archive/?date=19970918&slug=2561148, published September 18, 1997, accessed April 10, 2024.

[157] Washington State Department of Natural Resources, *Significant Deep-Seated Landslides in Washington State – 1984 to 2014*, https://file.dnr.wa.gov/publications/ger_list_large_landslides.pdf, published 2015, accessed April 10, 2024.

The following are the Washington State emergency proclamations over the last five years concerning landslides or the possibility of landslides from severe weather events which impacted the planning area:

- Proclamation 20-02 (2/5/2020) by the Lieutenant Governor of Washington State – severe weather storm event on January 20, 2020 experienced by certain counties including Clallam County;
- Governor Proclamation 21-03 (3/1/21) for entire State– severe weather storm events beginning December 17, 2020;
- Governor Proclamation 21-18 (11/15/21, amended 12/1/21) – severe wind and rain event beginning November 12, 2021, resulting in flooding in several counties, including Clallam and Jefferson County;
- Governor Proclamation 22-01 (1/7/22) for entire State – severe winter storm beginning December 17, 2021, resulting in expected flooding;
- Governor Proclamation 22-06 (12/15/21) – series of severe autumn storms between November 3, 2022 and November 8, 2022 causing landslides and impacting several counties, including Clallam;
- Governor Proclamation 23-01 (1/31/23) – extreme weather and flooding event between December 18, 2022 and December 28, 2022 impacting several counties, including Clallam and Jefferson County;
- Governor Proclamation 24-01 (1/24/24) – storm damage from atmospheric river event on December 3, 2024 impacting several Counties, including Clallam County; and
- Governor Proclamation 25-01 (1/7/25) – bomb cyclone weather event from November 17, 2024 and November 25, 2024, impacting several counties, including Clallam County.

Image 6. Landslide Block Roads In and Out of Makah Reservation[158]

Notable events with damages throughout the planning area include landslides occurring in December 2020, November 2021, and December 2023. Landslides following heavy rains, snow, and seasonal tides on December 21, 2020 caused damage to SR 112 in Clallam County, taking the repair project 9 months to complete (December 2020 – July 2021) and costing approximately $1.4 million.[159]

[158] The Seattle Times, Landslides block most roads in and out of Makah Reservation, https://www.seattletimes.com/seattle-news/weather/landslides-block-most-roads-in-and-out-of-makah-reservation/, November 17th, 2021.

[159] Washington State Department of Transportation, *SR 112- W of Jim Creek Landslides – Emergency Repairs – Complete July 2021*, https://wsdot.wa.gov/construction-planning/search-projects/sr-112-w-jim-creek-landslides-emergency-repairs-complete-july-2021, accessed April 10, 2024.

Table 4-10. Landslides in Clallam County from 2015 – 2024

Water Year (October 1st – September 30th)	Reported Landslides	Damage
2023 - 2024	13	Blockage on SR 112, SR 113, SR 114, and US 101
2022 – 2023	1	Blockage on US 101
2021 – 2022	29	Blockage on SR 112, US 101, roads. Forests and rivers impacted
2020 – 2021	6	Blockage on US 101, SR 112, public and private roads
2019 – 2020	14	Road damage and forests impacted
2018 – 2019	3	Blockage on SR 112 and roads
2017 – 2018	4	Blockage on SR 112. Forestland and stream drainage impacted
2016 – 2017	4	Blockage on US 101, SR 112, roads, and sediment delivered to Boundary Creek upstream of drinking water
2015 – 2016	3	Roads impacted, debris onto the waterfront trail

Source: Washington State Department of Natural Resources, Reported Landslides in Washington State, https://wadnr.maps.arcgis.com/apps/webappviewer/index.html?id=ef7ea514f7e54dde8cf1e8eefd2037b4, published 2024, accessed April 10, 2024.

In November 2021, a series of landslides blocked major roads in Clallam County. One landslide blockage closed SR 112, cutting off the Makah Reservation and Neah Bay from the rest of the planning area.[160] Heavy rain and flooding lead to another notable landslide that was 275 feet wide and covered 325 feet of State Route 112 near Clallam

[160]The Seattle Times, *Landslides block most roads in and out of Makah Reservation*, https://www.seattletimes.com/seattle-news/weather/landslides-block-most-roads-in-and-out-of-makah-reservation/, published November 17, 2021, accessed April 10, 2024.

Bay.[161] The Washington State Department of Transportation initially closed the highway on November 15, 2021; however, the landslide was still active, extending another 200 feet and falling into SR 112 on November 28, 2021. The landslide also broke a water main, requiring Clallam County Public Utility District crews to create a bypass to restore water service in Clallam Bay.[162]

Most recently, on December 14, 2023, a landslide caused the Spruce Railroad Trail at Olympic National Park to close. The Daley-Rankin Tunnel structure and bridge were also damaged.[163]

Several federally declared disasters related to severe storms and flooding have impacted the planning area since the adoption of the previous MJHMP. A list of federally declared flood disasters is included below; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years* for further details regarding specific impacts to Clallam County and participating jurisdictions.

- DR 4775-WA, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides and Mudslides – April 28, 2024
- DR 4682-WA, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides and Mudslides – January 12, 2023
- DR 4593-WA, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides and Mudslides – April 8, 2021
- DR 4418-WA, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides, Mudslides, Tornado – March 4, 2019

[161] KIRO 7 News, *Active landslide keeps Clallam County highway closed*, https://www.kiro7.com/news/local/active-landslide-keeps-clallam-county-highway-closed/L4RXEEK3SRCATOJLU6Y2RQIYOU/, published December 2, 2021, accessed April 8, 2024.

[162] Peninsula Daily News, *Clallam Bay landslide spread threatens water pipe*, https://www.peninsuladailynews.com/news/clallam-bay-landslide-spread-threatens-water-pipe/, published December 2, 2021, accessed April 10, 2024.

[163] Radio Pacific Inc., *My Clallam County, Spruce Railroad Trail in ONP Closed Due to Landslide*, https://www.myclallamcounty.com/2023/12/14/spruce-railroad-trail-in-onp-closed-due-to-landslide/, published December 14, 2023, accessed April 10, 2024.

4.10.4 Probability of Future Occurrences

The topography of Clallam County is considered susceptible to landslides as the County has a history of damaging landslides impacting the planning area. Additionally, the planning area is vulnerable to hazards that contribute to landslide risk such as severe weather, wildfire, and earthquakes. The SEHMP specifically notes that rapid increase in soil moisture as seen with severe weather may trigger landslide activity. Additionally, post-fire debris flows can occur following wildfires where burned vegetation and exposed topsoil remain.[164] It is likely that these contributing factors such as severe weather and wildfire will continue into the future. Given the topographic conditions of the planning area and likelihood for contributing factors, there is an occasional probability of landslides occurring in the future. An occasional probability of occurrence means a 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.

4.10.5 Climate Change

Landslides are generally caused by one of two factors: seismic activity or soil saturation. Earthquakes and ground shaking are not linked to climate change; however, heavy rains are affected by climate change and understood to contribute to saturated soils and landslides. Climate change is linked to increased precipitation and more frequent severe storm events. Increased rainfall due to climate change will lead to saturated slopes, erosion, and likely will exacerbate the effects of landslide within the planning area.

Landslides can also be a secondary impact of other hazards that are worsened by climate change. With climate change, more severe wildfires, increases in pests, and frequent drought will occur causing secondary damage. Fire, insect damage, and drought can reduce vegetation coverage and lead to increased erosion and landslides eroding roadways during or following heavy rains and snowmelt.[165] The SEHMP notes

[164] Washington Emergency Management Division, *Washington State Enhanced Hazard Mitigation Plan*, dated October 1, 2023.

[165] State of Washington Department of Ecology, *Preparing for a Changing Climate Washington's State's Integrated Climate Response Strategy,* https://apps.ecology.wa.gov/publications/documents/1201004.pdf, published April 2012, accessed April 10, 2024.

that landslide prone areas are expected to see more frequent landslides due to the impacts of extreme precipitation and wildfire resulting from climate change.[166]

4.10.6 Vulnerability and Risk Assessment

As previously discussed in this hazard profile, the HMCR Steering Committee evaluated the Washington DNR landslide hazard zones and WGS historical landslide data to assess landslide vulnerability and risk. The Washington DNR landslide hazard zone primarily include steep slopes located throughout the planning area and particularly in western Clallam County. This includes areas surrounding Highways 101, 110 and 113, the City of Forks and unincorporated areas throughout the County. The HMCR Steering Committee voiced concerns that the DNR data did not adequately show landslide vulnerability.

The HMCR Steering Committee evaluated WGS historical landslide data as included in the SEHMP and applied a 1,000-foot buffer zone around previous landslide footprints. This data also identified steep slopes located throughout western Clallam County as landslide risk areas. Additionally, areas along the north and northeastern coast, areas to the east of Crescent Lake, areas south of Port Angeles and various spots throughout eastern Clallam County also indicated landslide risk based on historical data.

Areas of concern based on mapped landslide hazard zones, previous landslides, and local experience include Highways 101, 110 and 112, areas along major rivers including the Quillayute River, Lower Elwha roads, along the Port Angeles marine bluff, the Olympic Discovery Trail, bluff area along Sequim Bay, Johnson Creek, and Bell Creek. The Washington DNR landslide hazard zones identified 60 critical facilities as vulnerable. Primarily these included food, hydration and shelter facilities, energy facilities, water system facilities, and safety and security facilities. Approximately 2,350 residential units are located within the landslide hazard area. Vulnerable residential units multiplied by the average 2.23 persons per household for Clallam County indicates that approximately 5,240 people reside in a landslide hazard zone. Additionally, over 191 million square feet of non-residential structures are located within the landslide hazard area. The WGS historical landslide data identified 98 unique critical facilities as

[166] Washington Emergency Management Division, *Washington State Enhanced Hazard Mitigation Plan*, dated October 1, 2023.

vulnerable including primarily facilities that provide food, hydration and shelter, energy, water service, communications, and safety and security. Approximately 8,625 residential units are located within the landslide hazard area. Vulnerable residential units multiplied by the average 2.23 persons per household for Clallam County indicates that approximately 19,294 people reside in a historical landslide hazard zone. Additionally, over 15.4 billion square feet of non-residential structures are located within the landslide hazard area.

Impacts would depend on location and severity of the event, but landslides can have significant impacts on various aspects of a community. Landslides may obstruct transportation and evacuation routes, making it difficult for residents to evacuate and for emergency responders to reach affected areas. Developed areas, including homes and businesses, can be damaged or destroyed, leading to significant economic losses and displacement of residents. Natural resources such as rivers and coasts can be altered or contaminated, affecting water quality and ecosystems. Landslides may also hinder the day-to-day operations of the County, impacting critical facilities that provide essential services like food, hydration, shelter, energy, water, communications, and security. The overall safety and well-being of residents can be compromised, necessitating a coordinated and efficient emergency response to mitigate the adverse effects.

Landslide Hazard Zone Vulnerability

Population & Development

The number of people, residential units, and non-residential development (square feet) located within the mapped landslide hazard zone.

5,240.5
People

2,350
Residential Units

191,759,920.32
Non-Residential Square Footage

Systems & Infrastructure

The number of critical facilities categorized by community lifeline type located within the mapped landslide hazard zone.

19
Food, Hydration, Shelter Facilities

11
Energy (Power and Fuel) Facilities

9
Water System Facilities

8
Safety & Security Facilities

4
Hazardous Materials Facilities

4
Communications Facilities

2
Transportation Facilities

2
Health & Medical Facilities

1
Other Facilities

Refer to Appendix D-2: *Vulnerability Summary*, for a detailed assessment of community lifelines and critical facilities.

Historic Landslide Zone Vulnerability Summary

Population & Development

19,293.96
People

8,652
Residential Units

15.4 billion +
Non-Residential Square Footage

Systems & Infrastructure

29
Food, Hydration, Shelter Facilities

22
Water Systems

20
Communications

12
Safety and Security

12
Hazardous Materials

11
Energy (Power and Fuel) Facilities

4
Transportation

4
Health and Medical

2
Other

Refer to Appendix D-2: *Vulnerability Summary*, for a detailed assessment of community lifelines and critical facilities.

4.10.6.1 Changes in Vulnerability

Since the 2019 MJHMP, population patterns, development and land use have not substantially changed in the planning area. As discussed in Section 3.5, the County population increased nominally, from 75,474 individuals identified in 2019 MJHMP to 77,333 individuals identified in this MJHMP, representing a net growth of 1,859 individuals or 2.46 percent increase in the County. Population and housing growth over the past five years is concentrated within the urbanized areas of Clallam County, primarily in the Cities of Port Angeles of Sequim. Because the population and development to accommodate this population increased in the last five years, the overall County vulnerability to landslides has increased as well.

At the time of this MJHMP preparation, the County anticipates the majority of population growth, land use changes and development to occur within the designated Urban Growth Areas (UGAs). Nearly all mapped UGAs intersect with historical landslide areas within the County, indicating increased landslide vulnerability over the next five years. Port Angeles, Sequim, Forks, and Clallam Bay show the most significant intersection with landslide vulnerability areas, with significant landslide vulnerability being widespread along Highways 110, 112, 113, 117, and especially Highway 101 between Port Angeles and the western limits of Lake Crescent.

It is acknowledged the Washington Office of Financial Management develops population projections at the County level, and local jurisdiction zoning is required to accommodate this projected growth. However, the exact type, location and timing of projected growth and development is unknown at the time of this writing. After consideration of the vulnerability factors listed in this section, is reasonable to assume that any population growth and development to accommodate that growth would result in increased County vulnerability to the landslide hazard over the next five years.

4.10.6.2 Socially Vulnerable Populations

The Washington DNR landslide hazard zones overlay SVPs within Census Tracts 3 and 24, which correspond to areas near the City of Forks and western Clallam County. The WGS historical landslide data shows past landslides near SVPs within Census Tracts 3, 7, 21, 24, and 9400. Additionally, landslide hazards may impact SVPs and other high-risk individuals throughout the planning area. Specifically, individuals below the 150-percent poverty rate, aged 65 or older, disabled persons, persons reporting minority status,

persons living within a mobile home; populations of the Quileute Tribe, Makah Tribe, Lower Elwha Klallam and the Jamestown S'Klallam Tribe; and tourists, seasonal visitors, and transient populations throughout the County would potentially be impacted by landslide. The primary concern for SVPs and other high-risk individuals in the County would be evacuation efforts and access to emergency services and supplies.

Landslide impacts may disproportionately affect SVPs due to difficulties evacuating landslide areas and a lack of access to emergency services. This may be compounded by the potential for landslide to damage or obstruct highways and evacuation routes. Low-income individuals may lack the financial resources to recover from the damages of a landslide, while elderly and disabled individuals may face mobility issues that hinder evacuation efforts and access to emergency services. Minorities and tribal populations might experience additional barriers due to language, cultural differences, or historical marginalization that may complicate emergency response or recovery efforts. Mobile homes may be particularly susceptible to landslide damage due to lower structural integrity. Additionally, SVPs may experience delayed service reconnection of impacted utilities due to damaged infrastructure. Transient groups like tourists and seasonal visitors may lack local knowledge and resources, making it difficult for them to respond effectively to landslide emergencies or struggle with displacement or shelter services. Overall, SVPs are more likely to suffer from delayed rescue operations, prolonged displacement, and increased health risks due to the compounded effects of landslide hazards.

Considerations for SVPs throughout the planning area were incorporated into the mitigation strategy in_Mitigation Strategy. Specifically, the HMCR Steering Committee tailored Mitigation Actions #CC31 and #CC33, to mitigate landslide impacts on SVPs including issues related to preparedness, evacuations, and access to emergency services.

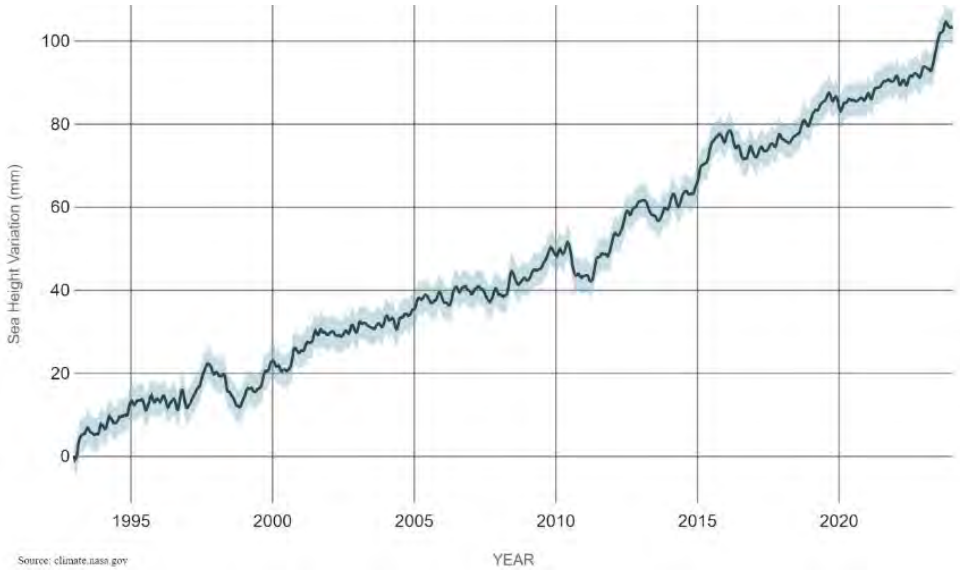
4.11 Sea Level Rise

4.11.1 Description

Sea level rise is an increase in the level of the world's oceans due to overall global warming associated with climate change. The burning of fossil fuels is a major cause of

climate change that contributes to rising sea levels, as carbon dioxide and other heat-trapping gases are released into the atmosphere.[167] Oceans absorb this additional heat, become warmer, and expand, leading to observed sea level rise that impacts global coastlines. There are two types of sea level rise: global mean sea level rise and relative sea level change.[168] Global mean sea level rise is the global average sea level compared to a fixed point. Relative sea level change describes the height of the ocean's surface compared to a specific piece of geography or land.

Exhibit 4-7. NASA Sea Level Rise Satellite Data



Source: NASA, Sea Level, https://climate.nasa.gov/vital-signs/sea-level/?intent=121, accessed May 21, 2024.

U.S. agencies, including the National Oceanic and Atmospheric Administration (NOAA), give a range of five possible sea level rise scenarios based on future rates of greenhouse gas emissions. The most immediate scenario scientists predict is that global mean sea levels will rise almost 1 foot (0.28 meters) above 2000 levels by 2050 – and over 3 feet (1 meter) by 2100 (Exhibit 4-7).[169]

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[167] National Geographic, *Sea Level Rise*, https://education.nationalgeographic.org/resource/sea-level-rise/, updated 2024, accessed April 24, 2024.

[168] National Resources Defense Council, *Sea Level Rise 101,* https://www.nrdc.org/stories/sea-level-rise-101#what-is, published March 25, 2024, accessed April 24, 2024.

[169] Ibid.

Sea level rise can aggravate coastal cliff erosion, the process by which strong wave action and coastal flooding wear down or carry away rocks, soils, and/or sands along the coast.[170] Sea level rise is projected to eliminate valuable coastal habitats damaging the state and county economy. Additionally, increased acidity in marine waters from carbon dioxide and upland runoff threatens aquaculture and the shellfish industry. The State of Washington leads the U.S. in production of farmed clams, oysters, and mussels with an annual industry value of over $107 million.[171] Wildlife recreation in Washington is a $4.5 billion industry, responsible for more than 60,000 jobs in the state. Damaged coastal habitats, and impacts to the shellfish industry, aquaculture, and wildlife recreation, would have negative economic impacts to the County and state.

The State of Washington Department of Ecology's *Preparing for a Changing Climate Washington State's Integrated Climate Response Strategy* (2012) discusses sea level rise actions to support local efforts to prepare for coastal flooding and storm surges. In 2010, the Department of Ecology released voluntary guidance for local governments to incorporate sea level rise into Shoreline Master Program updates.[172] Clallam County prepared a Shoreline Master Program that was adopted by the Board of Clallam County Commissioners in 2018. The Clallam County Shoreline Master Program is based on state guidance and included goals to increase public awareness of sea level rise projections and potential climate change and sea level rise impacts.

[170] U.S. Climate Resilience Toolkit, *Coastal Erosion,* https://toolkit.climate.gov/topics/coastal-flood-risk/coastal-erosion, updated April 2021, accessed April 24, 2024.

[171] State of Washington Department of Ecology, *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy*, apps.ecology.wa.gov/publications/documents/1201004.pdf, published 2012, accessed April 24, 2024.

[172] Ibid.

Image 7. Brant Geese at Dungeness Estuary Clallam County[173]

4.11.2 Location/Extent

Clallam County has 200 miles of coastline that consists of cliffs, beaches, and infrastructure. Coastal communities and infrastructure such as Bullman Beach, Dawn's Ridge, Vista View, Clallam Bay/Sekiu, City of Port Angeles, Ediz Hook, Lower Elwha Indian Reservation, Dungeness, Jamestown, Sequim Bay and Diamond Point on Discovery Bay face additional vulnerability to sea level rise.

The USGS Coastal Vulnerability Index (CVI) for the Pacific Coast provides a preliminary overview at a national scale of the relative susceptibility of the United States coast to sea level rise.[174] The classification is based upon geomorphology, regional coastal slope, tide range, wave height, relative sea-level rise, and shoreline erosion and accretion rates. *Exhibit 4-8. USGS CVI Susceptibility to Sea Level Rise*, displays the USGS CVI map outlining Clallam County's estimated susceptibility to the sea level rise hazard. The CVI shows much of the western side of Clallam County as facing moderate and

[173] WDFW, Brant Geese at Dungeness Estuary, Clallam County, https://www.flickr.com/photos/usfwspacific/8428581350, January 29th, 2013.

[174] USGS, *Coastal Change Hazards Portal*, https://marine.usgs.gov/coastalchangehazardsportal/, updated July 9, 2021, accessed April 24, 2024.

high vulnerability to sea level rise. The CVI shows the majority of the northern coastline as facing low vulnerability with some areas of moderate vulnerability. Coastal vulnerability from Neah Bay to Freshwater Bay and from Ediz Hook to Agnew is low. From Freshwater Bay to Ediz Hook and from Agnew through Jamestown, the CVI is moderate.

Exhibit 4-8. USGS CVI Susceptibility to Sea Level Rise

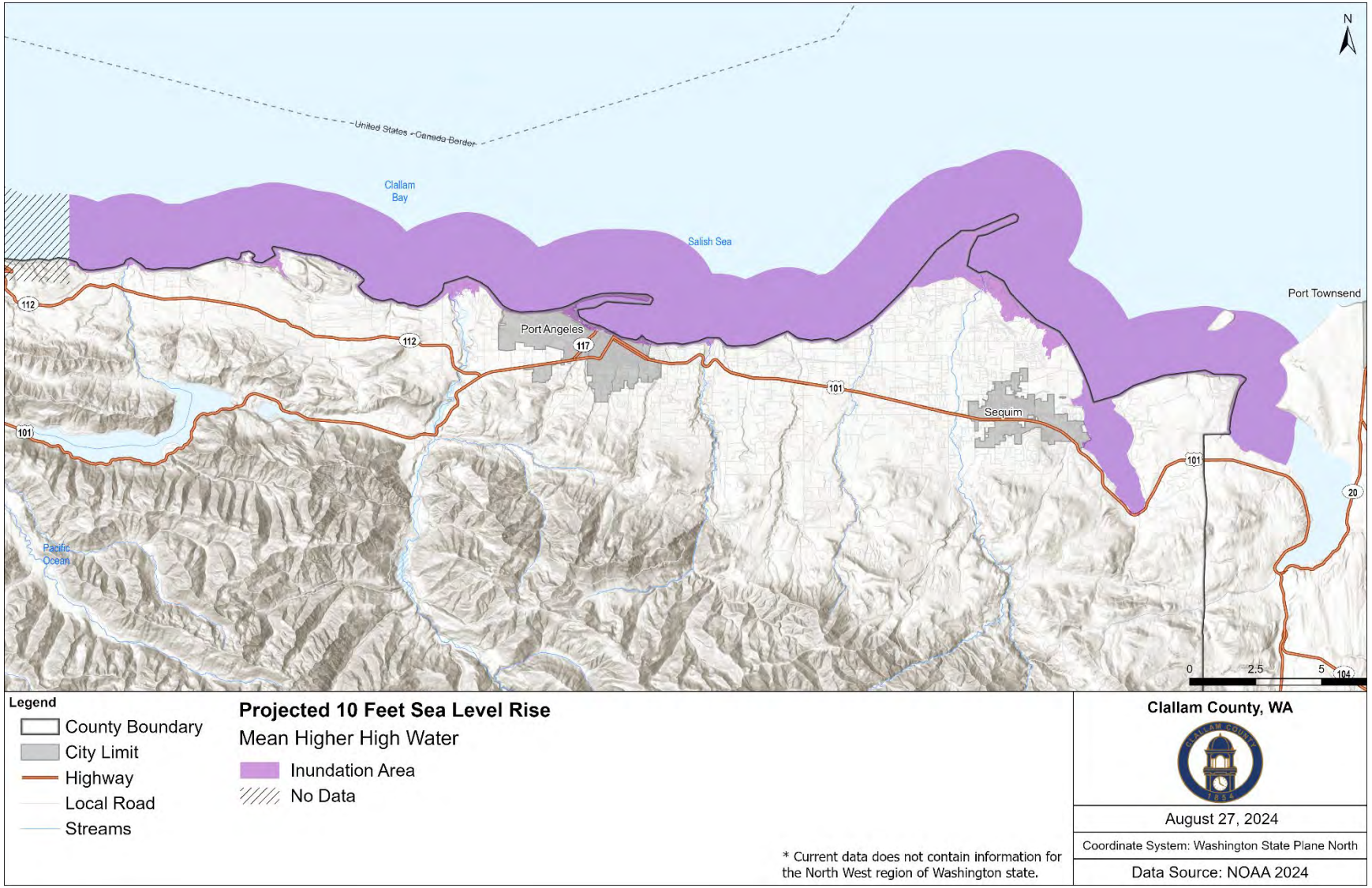
Source: USGS, Coastal Change Hazards Portal, https://marine.usgs.gov/coastalchangehazardsportal/, accessed May 21, 2024.

Additionally, the MJHMP Project Management Team relied on NOAA Office for Coastal Management Sea Level Rise Viewer to identify locations of flooding exacerbated by sea level rise. The Sea Level Rise Viewer is a web mapping tool designed to visualize the impacts of coastal flooding and associated with sea level rise up to 10 feet above average high tides. This tool provides photo simulations of potential future flooding effects on local landmarks and includes data on water depth, connectivity, flood frequency, socio-economic vulnerability, wetland loss and migration, and mapping confidence.

The MJHMP Project Management Team decided to use the 10-foot scenario to assess areas potentially affected by sea level rise in Clallam County. By visualizing the extent of

flooding at this level, potential impacts on populations, development and infrastructure can be estimated. The 10-foot sea level rise scenario helps in planning and preparing for future risks by highlighting areas that could be vulnerable to sea level rise in the future, including the distant future. *Exhibit 4-9. Projected Sea Level Rise*, shows the inundation area for a 10-foot sea level rise scenario. The current data does not contain information on the western and northwestern coasts of Clallam County.

Exhibit 4-9. Projected Sea Level Rise



NOAA sea level rise data shows inundation areas along the northeastern coasts of Clallam County from about 20 miles west of Port Angeles to Discovery Bay. Areas with significant inland inundation include Crescent Bay and Salt Creek, Lower Elwha and Elwha Creek, Ediz Hook, the City of Port Angeles, and areas southeast of Dungeness Bay including Dungeness and Jamestown. Acknowledging the missing data for western areas of Clallam County, it is reasonable to assume the sea level rise would potentially impact areas along the west and northwest coasts, particularly in low-lying areas and at the mouth of rivers.

The extent of impacts due to sea level rise would accumulate over the coming decades. Sea level rise will exacerbate coastal flooding, erosion, or other hazards, causing extensive damage to the planning area. Generally, the western coastline has a higher vulnerability to sea level rise than the northern coastline according to the USGS CVI. For natural areas such as along western coastlines, sea level rise can result in the loss of wetlands, increased salinity in rivers and creeks, and changes in habitat for wildlife. Wetlands, which act as natural buffers against storms and flooding, may be submerged, reducing their effectiveness. The ecological balance of these areas can be disturbed, affecting biodiversity and the health of ecosystems. More densely populated areas such as Port Angeles, Lower Elwha, Dungeness, and Jamestown are concentrated along the northern coastline and were identified as potentially vulnerable. In these more populated areas sea level rise may increase the risk of injury or death and damage to structures and critical facilities in these areas. Flooding exacerbated by sea level rise can lead to increased flooding, damage to infrastructure, loss of property, and displacement of communities. Essential services such as transportation, water supply, and sewage systems can be severely disrupted. Economically, the costs of repairing and reinforcing infrastructure can be substantial.

4.11.3 Previous Occurrences

Sea level rise is a unique hazard, measured over a period of time rather than segmented into an isolated event. Due to the nature of this hazard, no single previous occurrence has been solely accredited to sea level rise within the planning area. Sea level rise continues to threaten the coastal planning area of the County, despite no individual events that identify sea level rise as the direct cause. While it cannot be conclusively determined if incidents involving coastal hazards are directly caused by sea level rise,

sea level rise may have contributed to coastal hazard events by increasing their severity and occurrence within the planning area. For example, storms during December 2020, January 2021, and as recently as January 2024, resulted in coastal flooding within the planning area. In these hazard events, severe storms brought high winds, heavy rain, pounding surf, and coastal flooding along the coasts of Washington and Clallam County. Sea level rise likely contributed to the extent of coastal flooding in the County, demonstrating one example of future effects within the planning area. Refer to Section 4.7.5, *Climate Change* for more information on the potential future effects of climate change on this hazard. For the reasons listed above, no State or federally declared disasters directly relating to sea level rise have impacted the planning area within the last five years. However, the following federally declared disaster occurred since the adoption of the 2019 MJHMP and included significant coastal flooding. Refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years* for further details regarding specific coastal impacts to Clallam County.

- DR 4593, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides, and Mudslides – April 8, 2021 (event date: December 29, 2020)

4.11.4 Probability of Future Occurrences

As sea levels continue to rise over time in the planning area, it likely will continue to be a concern for Clallam County. Examples of hazards of concern for Clallam County that are often aggravated by sea level rise include flood, tsunami, and severe weather events.

Based on previous occurrences and observed risk, there is a likely probability of future sea level rise impacts in the future. A likely probability means there is a 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years. The HMCR Steering Committee assigned a medium hazard planning consideration to the hazards and impacts associated with sea level rise based upon a likely probability and limited impacts of future events.

4.11.5 Climate Change

Climate change can cause a rise in sea level by expanding seawater through thermal expansion and melting ice packs and glaciers.[175] The average sea level or mean sea level is a global measurement that is applied universally across the Earth and is an important indicator for climate change and sea level rise. Relative sea level rise at specific locations may be more or less than the global average due to many local factors: subsidence, upstream flood control, erosion, regional ocean currents, variations in land height, and whether the land is still rebounding from the compressive weight of Ice Age glaciers.[176] As the effects of climate change continue to be observed, higher frequencies of coastal flooding and erosion events may be observed in the planning area. The planning area has expansive coastline on both the northern and western edges of the County, making the threats of coastal flooding and erosion of particular importance as climate change continues to impact sea levels.

By the end of the century, global mean sea level is expected to rise at least one foot (0.3 meters) above 2000 levels, even if greenhouse gas emissions follow a relatively low pathway in coming decades.[177] Refer to Clallam County's *2023 Climate Action Plan* for more information on how the County has outlined key strategies to increase the County's resilience to the evolving effects of climate change. Additionally, in 2024, the Bureau of Indian Affairs granted the Lower Elwha Tribal Community funding for their *Resilience Rising: Lower Elwha's Climate Adaptation Plan* project. This project aims to develop a Climate Action Plan to build government capacity and foster sustainable departments.[178] As evidenced by these plans, the County is taking proactive steps to reduce the impacts of sea level rise and associated hazards on people, property, and infrastructure within the planning area.

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[175] National Ocean Services, NOAA, *How is sea level rise related to climate change?* https://oceanservice.noaa.gov/facts/sealevelclimate.html, updated January 04, 2021, accessed April 29, 2024.

[176] *Ibid.*

[177] Climate.gov, Climate Change: Global Sea Level, *https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level#:~:text=Global%20warming%20is%20causing%20global,expanding%20as%20the%20water%20warms,* accessed May 21, 2024.

[178] U.S. Bureau of Indian Affairs, *Bureau of Indian Affairs Branch of Tribal Climate Resilience FY 2023 Annual Awards Summary*, https://www.bia.gov/sites/default/files/media_document/2023_annual_awards_summary.pdf, published 2024, accessed April 24, 2024.

4.11.6 Vulnerability and Risk Assessment

The MJHMP Project Management Team relied on the NOAA Sea Level Rise Viewer to identify areas and critical facilities at risk from sea level rise. The team used the 10-foot sea level rise scenario to assess vulnerability and mapped where inundation zones intersect with critical facilities and parcels. This allows the HMCR Steering Committee to estimate potential impacts on critical facilities, populations, development, and infrastructure.

NOAA data shows significant inundation along the northeastern coast of Clallam County from about 20 miles west of Port Angeles to Discovery Bay. Areas with notable inland inundation include Crescent Bay and Salt Creek, Lower Elwha and Elwha Creek, Ediz Hook, the City of Port Angeles, and areas southeast of Dungeness Bay, including Dungeness and Jamestown. This analysis identified 77 vulnerable critical facilities, primarily including those located in Port Angeles, Sequim, Jamestown, Lower Elwha, the Port of Port Angeles and unincorporated areas of the County. Vulnerable critical facilities primarily include food, water and shelter, safety and security, hazardous materials use/storage, and water systems. Under a 10-foot inundation scenario, these essential services, including food, water, and shelter, would be severely disrupted, with saltwater intrusion contaminating freshwater supplies and damaging infrastructure. Emergency response efforts would be hampered by flooded roads and damaged facilities, increasing response times and reducing effectiveness. Additionally, facilities storing hazardous materials would face heightened risks of spills and contamination.

A 10-foot inundation scenario (7-8 feet SLR) would have devastating impacts on coastal communities, residents, and County operations. Approximately 4,143 residential units are located within the projected sea level rise inundation zone. Vulnerable residential units multiplied by the average 2.23 persons per household for Clallam County indicates that approximately 9,239 people reside within the sea level rise hazard area. Additionally, over 729 million square feet of non-residential structures are located within the projected sea level rise inundation zone. Coastal areas would experience severe flooding, leading to the displacement of residents and the destruction of homes and businesses. The economic impact would include significant losses in property value, tourism, and local businesses. Overall, the social, economic, and environmental consequences would be far-reaching and require substantial investment in mitigation and adaptation strategies. Although data for the western and northwestern coasts is

missing, it is reasonable to assume that impacts would be experienced along all coasts of Clallam County.

Sea Level Rise Vulnerability Summary

Population & Development

9,239
People

4,143
Residential Units

729 million +
Non-Residential Square Footage

Systems & Infrastructure

20
Food, Hydration, Shelter Facilities

8

16

2
Energy (Power and Fuel) Facilities

5

5

6

12

3

Refer to Appendix D-2: *Vulnerability Summary*, for a detailed assessment of community lifelines and critical facilities.

4.11.6.1 Changes in Vulnerability

Since the 2019 MJHMP, population patterns, development and land use have not substantially changed in the planning area. As discussed in Section 3.5, the County population increased nominally, from 75,474 individuals identified in 2019 MJHMP to 77,333 individuals identified in this MJHMP, representing a net growth of 1,859 individuals or 2.46 percent increase in the County. Generally, population and housing growth over the past five years is concentrated within the urbanized areas of Clallam County, primarily in the Cities of Port Angeles of Sequim. Because the population and development to accommodate this population increased in the last five years, the overall County vulnerability to sea level rise has increased as well.

At the time of this MJHMP preparation, the County anticipates the majority of population growth, land use changes and development to occur within the designated Urban Growth Areas (UGAs). Mapped UGAs intersect with sea level rise hazard areas in Port Crescent, the City of Port Angeles, Lower Elwha Klallam Tribal lands, and the southeastern corner of the City of Sequim. Port Angeles, Lower Elwha, and Port Crescent show the most significant intersection with sea level rise vulnerability with significant portions of each UGA mapped as vulnerable to the sea level rise hazard. Additional areas within the County may also face vulnerability to sea level rise, as this assessment utilized available data from north and northwestern coastal areas of Clallam County.

It is acknowledged the Washington Office of Financial Management develops population projections at the County level, and local jurisdiction zoning is required to accommodate this projected growth. However, the exact type, location and timing of projected growth and development is unknown at the time of this writing. After consideration of the vulnerability factors listed in this section, is reasonable to assume that any population growth and development to accommodate that growth in coastal areas would result in increased County vulnerability to sea level rise over the next five years.

4.11.6.2 Socially Vulnerable Populations

Mapped sea level rise hazard areas intersect with identified SVPs within Census Tract 7 in the City of Port Angeles. However, it is understood that sea level rise would potentially impacts SVPs and other high-risk individuals anywhere along the coast of the planning

area. SVPs including individuals below the 150-percent poverty rate, aged 65 or older, disabled persons, persons reporting minority status, persons living within a mobile home; populations of the Quileute Tribe, Makah Tribe, Lower Elwha Klallam, and the Jamestown S'Klallam Tribe; and tourists, seasonal visitors, and transient populations may be impacted be sea level rise along the coasts throughout Clallam County. Although sea level rise occurs over long periods of time, the primary concern for SVPs in Clallam County is the compounding impacts that sea level rise may have on coastal flooding and how those impact may affect SVPs. Specifically, the impacts of flooding or coastal storms due in part to sea level rise may impact SVPs.

Lower-income individuals, the elderly, disabled individuals, minority groups, and residents of mobile homes often live in low-lying, flood-prone areas with inadequate stormwater or flood management infrastructure, making them more susceptible to flooding and property damage. They may also lack the resources to relocate or rebuild, exacerbating their vulnerability. Tribal populations, particularly those in coastal areas, face threats to their natural resources, cultural sites, and traditional practices. Coastal erosion and rising sea levels can endanger sacred lands and disrupt local ecosystems, affecting their way of life. Additionally, these communities may have limited resources to adapt or relocate, further exacerbating their vulnerability. Similarly, tourists and transient populations would likely lack the resources to relocate and adapt to sudden coastal flooding making them more susceptible to displacement and loss of shelter during coastal flood hazards.

Considerations for SVPs throughout the planning area were incorporated into the mitigation strategy in Section 5.0. Specifically, the HMCR Steering Committee tailored Mitigation Actions #CC20, #CC23 and #CC25, to mitigate sea level rise impacts on SVPs including issues related to preparedness, evacuations, and access to emergency services.

4.12 Seismic Hazards

4.12.1 Description

Seismic hazards occur when accumulated stress between portions of the Earth's crust is released, resulting in the sudden ground movement that is perceived as an

earthquake. The US Geological Survey (USGS) defines an earthquake as a sudden slip on a fault and the resulting ground shaking and radiated seismic energy caused by the slip (or any other sudden stress changes in the earth). Faults are fractures along the Earth's crust between two blocks of earth, and can be further defined as strike slip, normal, or thrust faults.[179] Earthquakes occur without warning, and result in both primary and secondary hazards. Primary seismic hazards are the direct result of the release of this accumulated stress and are typically characterized as earthquake fault rupture and seismic shaking. Earthquakes can also cause secondary seismic hazards such as liquefaction, earthquake-induced landslides (refer to Section 4.12), and tsunamis (refer to Section 4.14).

Potentially active faults are mapped both within the planning area and offshore. Clallam County is also located near the Cascadia Subduction Zone (CSZ), where several tectonic plate boundaries meet. Tectonic plates are the large, thick slabs of solid rock that make up the Earth's crust. Faults occur where these large sections of the Earth's crust interact called tectonic plate boundaries. As the seismic impacts (and therefore, mitigation actions) from on-shore and off-shore earthquakes vary from those caused by the CSZ, discussions regarding these specific scenarios are included in separate subsections below. The CSZ earthquake scenario has the capacity to be extremely destructive to the planning area, and therefore the MJHMP stakeholders determined discussion should be separated from more frequent but less significant seismic activity.

[179] USGS, *What is an earthquake and what causes them to happen?*, https://www.usgs.gov/faqs/what-earthquake-and-what-causes-them-happen, accessed May 7, 2024.

Image 8. SR 112 Road Damage[180]

4.12.1.1 Cascadia Subduction Zone Earthquake

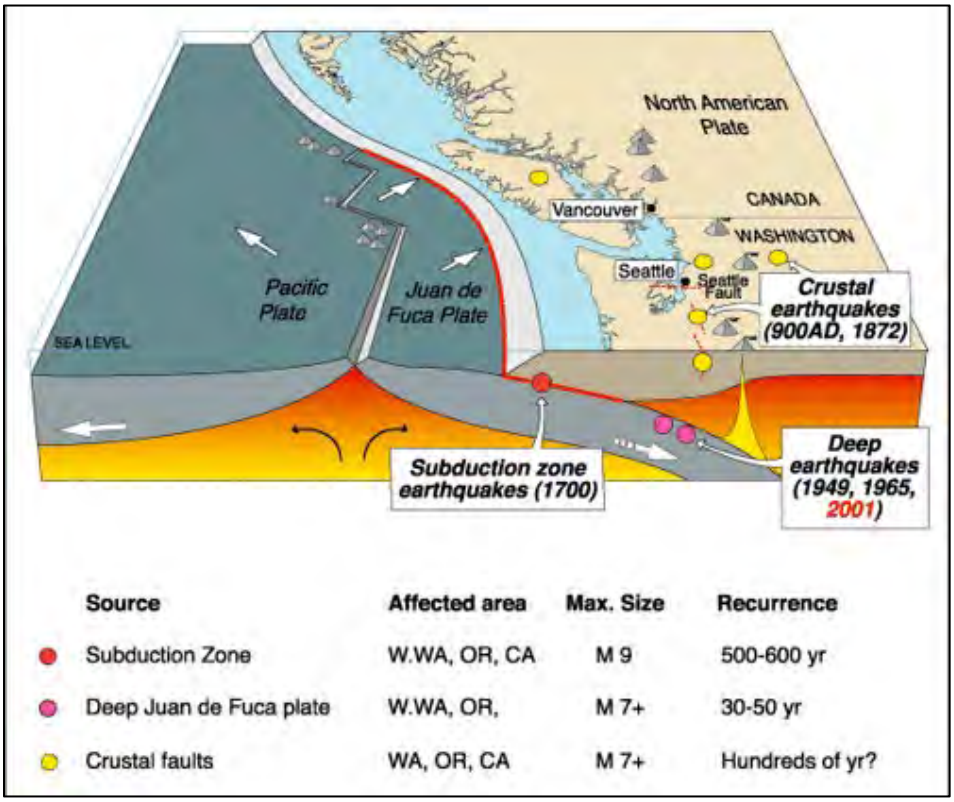
The Cascadia Subduction Zone is the most significant seismic hazard within Clallam County, with the potential for generating the most catastrophic earthquake possible in the planning area. The CSZ is a complex area of geological faults where the oceanic Juan de Fuca plate and other smaller tectonic plates are pushed beneath the continental North American plate in a process known as subduction. The result of this subduction creates "Interface" or deep earthquakes along the Juan de Fuca plate and shallow crustal faults; refer to *Exhibit 4-10. Cascadia Subduction Zone Earthquakes*, below. As the CSZ earthquake would result in the most significant risk and response within the planning area, this scenario is often used for emergency planning at both the state and local levels. This scenario is also referenced in the Washington State Enhanced Hazard Mitigation Plan (SEHMP) against which earthquake hazard mitigation

[180] WSDOT, SR 112 Road Damage

is conducted. Following the precedent set forth by Washington EMD in the SEHMP, this hazard profile and vulnerability assessment relies on the CSZ scenario for planning purposes, data mapping and other relevant background material.

The CSZ extends over 600 miles from northern California to southern British Columbia, and is located approximately 130 miles from Clallam County's western coast. Subduction zones can produce the largest earthquakes in the world, and are the only source zones that can produce earthquakes of magnitude 8.5 or greater. Earthquakes of this magnitude can be catastrophic and the CSZ has produced magnitude 9.0 or greater earthquakes in the past.[181]

Exhibit 4-10. Cascadia Subduction Zone Earthquakes



Source	Affected area	Max. Size	Recurrence
Subduction Zone	W.WA, OR, CA	M 9	500-600 yr
Deep Juan de Fuca plate	W.WA, OR,	M 7+	30-50 yr
Crustal faults	WA, OR, CA	M 7+	Hundreds of yr?

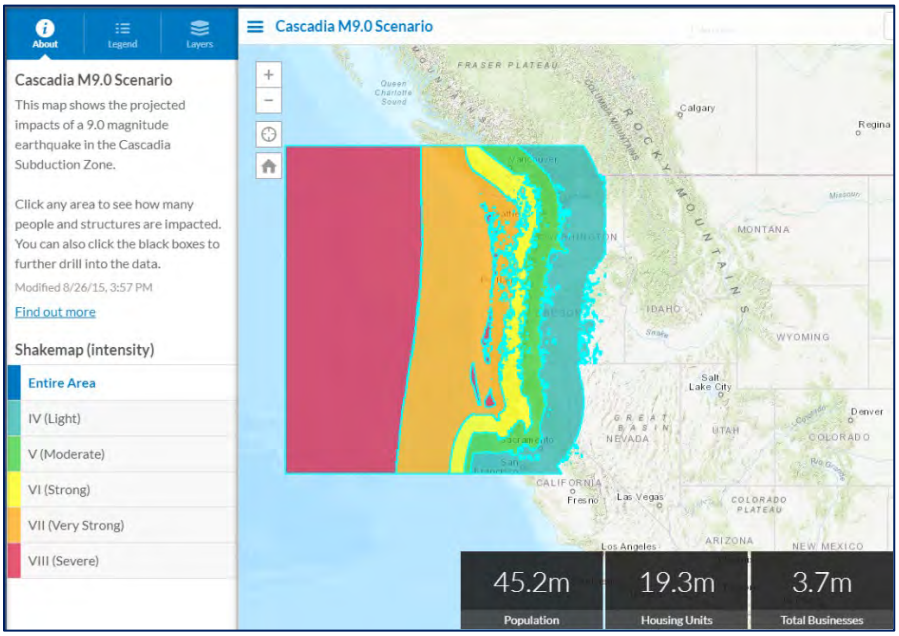
Source: Pacific Northwest Seismic Network, Cascadia Subduction Zone, https://www.pnsn.org/outreach/earthquakesources/csz, accessed May 8, 2024.

[181] Pacific Northwest Seismic Network, *Cascadia Subduction Zone*, https://www.pnsn.org/outreach/earthquakesources/csz, accessed May 8, 2024.

A significant earthquake would produce ground shaking that would likely be felt throughout the Pacific Northwest, and result in substantial damage to buildings and infrastructure throughout the planning area. An event of this magnitude could also produce a tsunami of 20-30 feet in height, and possibly up to 100-feet in height in certain locations, which would have additional catastrophic effects. It is reasonable to assume that a CSZ earthquake would result in many injuries and a substantial loss of life throughout the Pacific Northwest. Several secondary hazards are associated with the strong seismic ground shaking predicted to occur during a CSZ earthquake, including but not limited to: landslides (Section 4.10), tsunamis (Section 4.14), liquefaction (subsection below) and subsidence.

CSZ earthquake subsidence is the sudden sinking of earth surface, caused by movement of the Juan de Fuca tectonic plate under the North American tectonic plate. This movement causes the North American plate to rise and move to the northeast. Based on CSZ scenario planning and models, the planning area is known to be susceptible to seismic activity related to subduction. *Exhibit 4-11. 2022 Cascadia Rising M9.0 Exercise Scenario*, displays County vulnerability to seismic activity related to subduction from the 2022 Cascadia Rising earthquake scenario exercise.

Exhibit 4-11. 2022 Cascadia Rising M9.0 Exercise Scenario



Source: CEST, Cascadia Rising 2022, https://storymaps.arcgis.com/stories/68f09cddfd0e4dad940eb8deefbae1d9, accessed September 10, 2024.

4.12.1.2 Onshore and Offshore Earthquakes, ~7.0 Design Level

In addition to the CSZ, there are various faults within the tectonic plates throughout the area. These fault lines are shallower than the CSZ and are less likely to create catastrophic earthquakes, but still present a seismic threat to Clallam County. Generally, earthquakes greater than or equal to 7.0 in magnitude are considered major earthquakes. Risks associated with onshore and offshore earthquakes throughout the planning area include fault rupture, ground shaking, liquefaction, landslide, and tsunami.

Fault rupture or surface faulting is the differential movement of two sides of a fracture, where the ground breaks apart. The length, width, and displacement of the ground characterize surface faults, which occur based on the type of underlying fault. Faults occur at boundaries between large sections of the Earth's surface, called tectonic plates. The deformation of the plates and the accumulated stress between them causes faults in a wider area than the precise boundary between the plates.[182]

4.12.1.3 Ground Shaking

Ground shaking or ground motion is the movement of the Earth's surface from earthquakes, and would occur during both a CSZ earthquake or onshore/offshore earthquake. Ground motion is produced by seismic waves that are generated by sudden slip on a fault or sudden pressure at the explosive source that travels through the earth and along its surface.[183]

Seismic waves produce ground vibrations above the surface. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter. Seismic shaking can be strong enough to result in widespread devastation or be virtually undetectable by the average person. The intensity of seismic shaking is a result of the release by the fault rupture (how much of the accumulated stress was released), the length of the rupture (the longer the slip along the fault line, the greater the shaking), and the depth at which the rupture occurs (ruptures that occur closer to the surface often cause stronger shaking). Locally, it is

[182] Pacific Northwest Seismic Network, *Surface Rupture*, https://www.pnsn.org/outreach/earthquakehazards/surface-rupture, accessed May 8, 2024.

[183] USGS, *What are the Effects of Earthquakes?*, https://www.usgs.gov/programs/earthquake-hazards/what-are-effects-earthquakes, accessed May 8, 2024.

generally understood that ground shaking is magnified and lasts longer on softer soil site classes.

Seismic shaking can damage or destroy buildings and structures and may cause partial or total collapse. Ground movement can damage or destroy infrastructure on or beneath the surface, such as roads, rail lines, and utility lines and pipes. This in turn can cause hazardous materials releases, water main breaks, and other dangerous situations resulting from infrastructure failure. Falling debris and structures also create a risk of injury or death.[184]

4.12.1.4 Liquefaction

Beyond the direct damage from the ground shaking, earthquakes can also result in liquefaction, which occurs when the force of an earthquake's shaking causes groundwater to mix with the soil. The result is ground failure, as soils lose strength and behave like a viscous fluid, which may in turn cause buildings and other structures to collapse. According to the Federal Emergency Management Agency (FEMA), liquefaction causes three types of ground failure, as described below:[185]

- Lateral spreads involve the lateral movement of large blocks of soil because of liquefaction of an underlying layer. They generally develop on gentle slopes, most commonly between 0.3 and 3 degrees. Horizontal movements commonly are as much as 10 to 15 feet. However, where slopes are particularly favorable, and the duration of ground shaking is long, lateral movement may be as much as 100 to 99 feet. Lateral spread usually breaks up internally, forming numerous fissures and scarp.
- Flow failures consist of liquefied soil or blocks of intact material riding on a layer of liquefied soil and are the most catastrophic type of ground failure caused by liquefaction. They commonly move several feet and up to dozens of miles under

[184] USGS, *What are the Effects of Earthquakes?*, https://www.usgs.gov/programs/earthquake-hazards/what-are-effects-earthquakes, accessed May 8, 2024.

[185] USGS, *What are the Effects of Earthquakes?*, https://www.usgs.gov/programs/earthquake-hazards/what-are-effects-earthquakes, accessed May 8, 2024.

certain conditions. Flow failures usually form in loose saturated sands or silts on slopes greater than three degrees.

Loss of bearing strength occurs when the soil supporting buildings or other structures liquefies. When large deformations occur, structures settle and tip. The general subsurface geometry required for liquefaction-caused bearing failures is a layer of saturated, cohesionless soil that extends from near the ground surface to a depth equal to about the width of the building. The CSZ earthquake scenario is expected to cause significant liquefaction across the planning area. Offshore and onshore earthquakes may also trigger liquefaction, depending on the size and scale of the specific incident. The risk of liquefaction depends on many different factors, including the height of the groundwater table and the types of soil in an area. Certain soils are more susceptible to liquefaction, particularly younger, softer and looser sediment closer to the water table. These soil types are generally understood to experience stronger ground shaking as well, and therefore increasing risk and vulnerability to liquefaction.

Seismically induced landslides and tsunamis are also potential hazards associated with earthquakes. Refer to Section 4.10, *Landslide*, and Section 4.14, *Tsunami*, for full descriptions and hazard analyses. It is also noted that major seismic events are often followed by a series of aftershocks. Depending on the magnitude of such aftershocks, additional damage or trigger further secondary effects such as liquefaction, subsidence, landslides, or tsunamis may occur.

4.12.2 Location/Extent

Two scales are commonly used to measure earthquakes: the Moment Magnitude Scale (MMS) and the Modified Mercalli Intensity Scale (MMI Scale). The MMS is based on the now largely unused Richter scale and measures the amount of energy released by the earthquake.

The MMI Scale measures the effects of an earthquake and is based on qualitative observations rather than a mathematical basis. The Scale consists of a series of certain key responses such as people awakening from sleep, movement of furniture, damage to chimneys, and destruction. This scale, composed of twelve increasing levels of intensity ranging from imperceptible shaking to catastrophic destruction, is designated by

Roman numerals I through XII. *Table 4-11. Modified Mercalli Intensity Scale*, shows the different categories of the Modified Mercalli Intensity Scale.

Magnitude and intensity measure different characteristics of earthquakes, but often correlate. Magnitude measures the energy released at the source of the earthquake, as determined by measurements on seismographs. Intensity measures the strength of shaking produced by an earthquake at a certain location and is determined by effects on people, structures, and the natural environment. Refer to *Table 4-12. Approximate Comparison of Moment Magnitude and Mercalli Intensity Scales*, which lists the intensities that are typically observed at locations near the epicenter of earthquakes of different magnitudes.

Table 4-11. Modified Mercalli Intensity Scale

Intensity	Shaking	Description/Damage
I	Non felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very Strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specifically designed structures; well-designed frame structures thrown out of plumb. Damage great

Intensity	Shaking	Description/Damage
		in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
Source: USGS, *The Modified Mercalli Intensity Scale*, https://www.usgs.gov/natural-hazards/earthquake-hazards/science/modified-mercalli-intensity-scale?qt-science_center_objects=0#qt-science_center_objects, accessed May 3, 2023.		

Table 4-12. Approximate Comparison of Moment Magnitude and Mercalli Intensity Scales

Moment Magnitude	Mercalli Intensity
1.0 to 3.0	I
3.0 to 3.9	II to III
4.0 to 4.9	IV to V
5.0 to 5.9	VI to VII
6.0 to 6.9	VII to IX
7.0 and greater	VIII and greater
Source: USGS, *Magnitude/Intensity Comparison*, https://www.nrc.gov/docs/ML1821/ML18214A882.pdf, accessed May 8, 2024.	

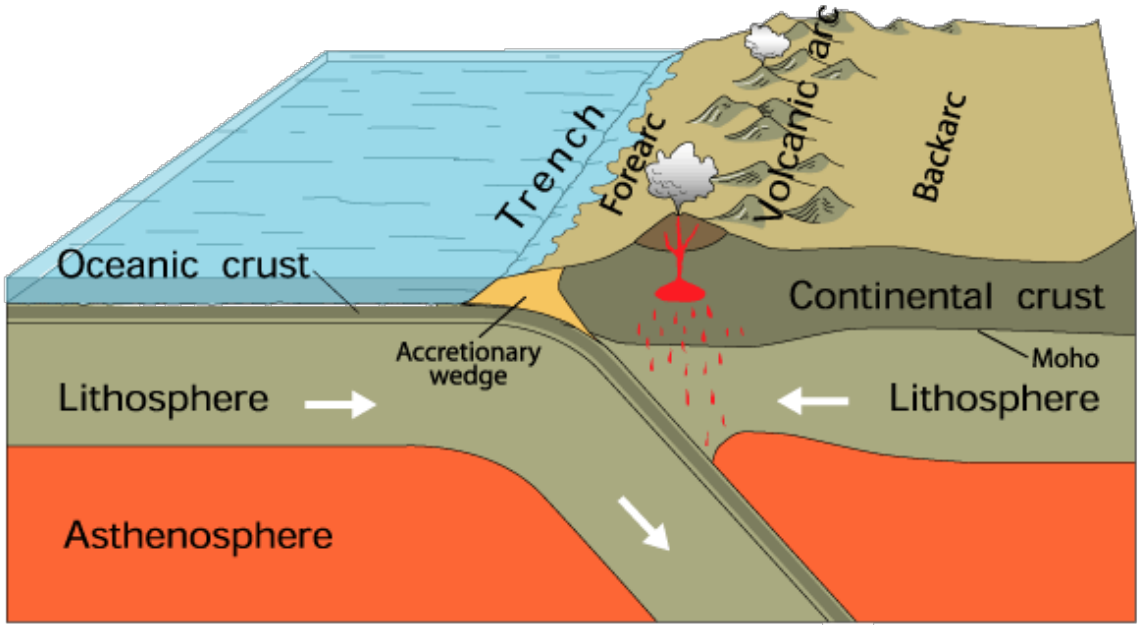
Ground shaking is known to affect different soil classes different. Historically, softer soil classes are more likely to experience magnified and extended ground shaking compared to harder soil classes. Softer soil classes are also more likely to be susceptible to liquefaction as outlined in the following sections.

4.12.2.1 Cascadia Subduction Zone Earthquake

The CSZ is located approximately 130 miles off the west coast of Clallam County. An earthquake along this subduction zone could occur anywhere along the interface between the Juan de Fuca plate and the continental North American plate. While the impacts of earthquakes are typically most severe near the epicenter or central point of the earthquake, potential impacts of an 8.5 or greater magnitude earthquake along the CSZ would be experienced by the entire planning area and surrounding region. Thus, the CSZ poses a significant risk to the entirety of the planning area. *Exhibit 4-12. Subduction Fault Zone Diagram*, displays the composition of a subduction fault zone.

A major earthquake along the CSZ would produce severe ground shaking throughout the planning area for several minutes. Seismically induced liquefaction would potentially cause further building or infrastructure collapse, causing significant injury and loss of life. Additionally, a large earthquake along the CSZ would likely result in a large tsunami which would result in significant impacts throughout coastal areas of Clallam County.

Exhibit 4-12. Subduction Fault Zone Diagram

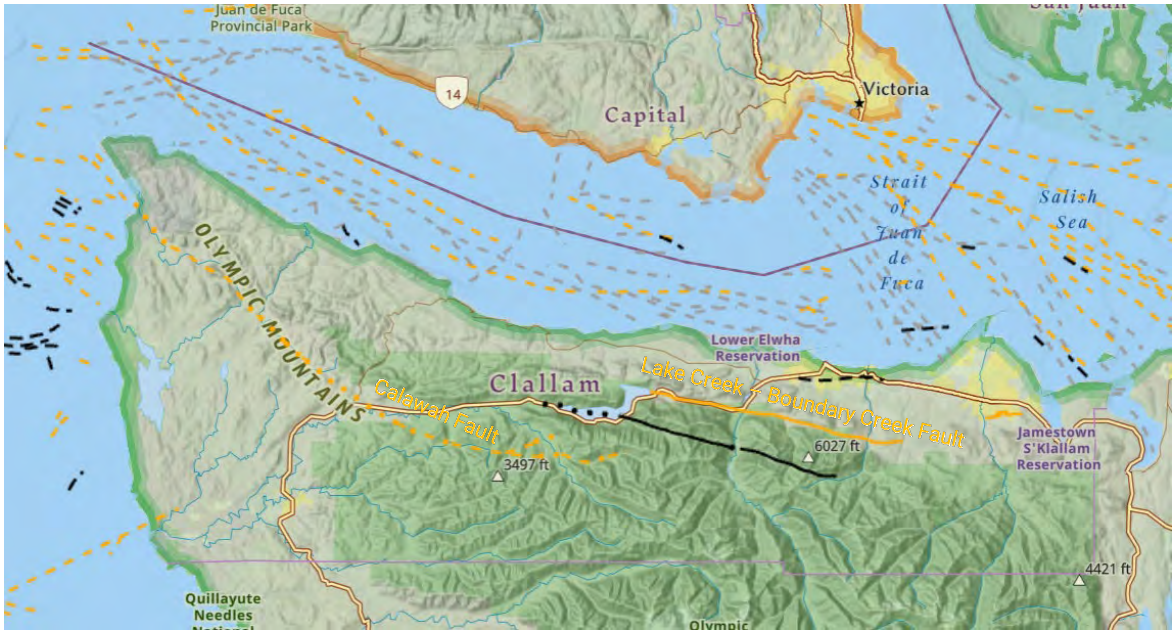


Source: USGS, Subduction Fault Zone Diagram, https://www.usgs.gov/media/images/subduction-fault-zone-diagram, accessed September 10, 2024.

4.12.2.2 Onshore and Offshore Earthquakes, ~7.0 Design Level

While the CSZ has a higher likelihood of producing a high magnitude earthquake, shallow crustal faults have the potential to cause a significant amount of damage due to their proximity to population centers. Quaternary faults are faults that have been active within the past 1,600,000 years. *Exhibit 4-13. Quaternary Fault Map of Clallam County*, below, shows faults in proximity to the planning area. Fault line style and color on the map are included as *Table 4-13. Quaternary Fault Descriptions*. Faults primarily exist off the northern coast of Clallam County; however, onshore faults are located closer to population centers, which may have higher potential for damage. Earthquakes in the planning area can be attributed to the following fault lines:

Exhibit 4-13. Quaternary Fault Map of Clallam County



Source: USGS, U.S. Quaternary Faults, https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf, accessed May 8, 2024.

Table 4-13. Quaternary Fault Descriptions

Fault Line	Fault Description
Yellow Dashed Line	Latest Quaternary (<15,000 years), moderately constrained location

Fault Line	Fault Description
Yellow Solid Line	Latest Quaternary (<15,000 years), well constrained location
Yellow Dotted Line	Latest Quaternary (<15,000 years), inferred location
Grey Dashed Line	Class B (various age), moderately constrained location
Black Dashed Line	Undifferentiated Quaternary (< 1.6 million years), moderately constrained location
Black Solid Line	Undifferentiated Quaternary (< 1.6 million years), well constrained location
Source: USGS, *U.S. Quaternary Faults*, https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf, accessed May 8, 2024.	

Notable faults include the shallow Lake Creek-Boundary Creek fault which runs east-west through Clallam County. This fault runs from approximately Lake Crescent to Siebert Creek, underlying the cities of Port Angeles and Sequim. *Exhibit 4-14. Lake Creek – Boundary Creek Fault*, shows the location of the fault. The Lake Creek – Boundary Creek fault is one of at least nine upper-plate active faults in the Puget Lowland region.[186] Studies of the Lake Creek-Boundary Creek fault show there have been at least three earthquakes over the past 8,000 years in the eastern section of the fault, with additional evidence for multiple earthquakes on the western section of the fault.

[186] Seismological Society of America, *Large Quakes Along Olympic Mountain Faults*, https://www.seismosoc.org/news/large-quakes-along-olympic-mountain-faults/, accessed May 8, 2024.

Exhibit 4-14. Lake Creek – Boundary Creek Fault

Source: Seismological Society of America, Large Quakes Along Olympic Mountain Faults, https://www.seismosoc.org/news/large-quakes-along-olympic-mountain-faults/, accessed May 8, 2024.

In addition, the Calawah Fault is another major fault within Clallam County. The Calawah fault is a northwest-striking fault that occurs in the northern part of the Olympic Peninsula.[187] The fault runs from below Lake Crescent northwest through the northwest portion of Clallam County and out into the Pacific Ocean; refer to *Exhibit 4-13. Quaternary Fault Map of Clallam County*, above. Generally, the epicenters of earthquakes along these faults would be closer to population centers than other regional faults. There are various other unnamed faults in the area that could lead to more widespread damage near developed areas of the planning area. The severity of impacts would depend on many factors including the magnitude of the fault rupture and extent of ground shaking.

[187] USGS, *Quaternary Fault and Fold Database of the United States*, https://earthquake.usgs.gov/cfusion/qfault/show_report_AB_archive.cfm?fault_id=550&section_id=#:~:text=The%20Calawah%20fault%20is%20a%20northwest-striking%20fault%20that,offset%20Pleistocene%20and%20Holocene%20glacial%20and%20fluvial%20deposits., accessed May 8, 2024.

4.12.2.3 Ground Shaking

Ground shaking from either a CSZ earthquake or other onshore or offshore earthquake would cause significant damages. Ground motion would be particularly damaging to residential buildings constructed of unreinforced masonry construction, and to poorly anchored mobile homes. Other buildings that do not typically perform well in earthquakes are soft-story buildings. These types of buildings have a story (typically the first floor) that lacks adequate strength or toughness due to too few shear walls. Ground shaking could affect the entirety of the planning area, and the extent of damage is correlated with the strength of the specific earthquake. *Exhibit 4-15. Ground Shaking Susceptibility*, shows that Clallam County has a moderately high ground shaking hazard potential, especially compared with the rest of the state.

4.12.2.4 Liquefaction

Liquefaction can be a significant contributor to earthquake losses. Liquefaction typically occurs in areas with artificial fill or loose sandy soils that are saturated with water (e.g., low-lying coastal areas, lakeshores, and river valleys). 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's alluvial soils. Refer to *Exhibit 4-16. Liquefaction Potential Zone*, for the locations of liquefaction hazard zones.

The magnitude of liquefaction depends on the location where it occurs. Liquefaction occurring beneath buildings and other structures can cause major damage. Buildings may sink into the ground and tilt, cars can be swallowed into the ground, and roads and bridges can crack and fail.[188] Homes or other development may be damaged beyond repair. Liquefaction may also threaten underground utilities, such as damaging underground water pipes.

[188] National Academics, *Can earthquakes liquify soil?*, https://www.nationalacademies.org/based-on-science/can-earthquakes-liquefy-soil#:~:text=Liquefaction%20can%20trigger%20landslides%2C%20cause%20embankments%20to%20slump%2C,and%20roads%20and%20bridges%20to%20crack%20and%20fail, accessed May 8, 2024.

Exhibit 4-15. Ground Shaking Susceptibility

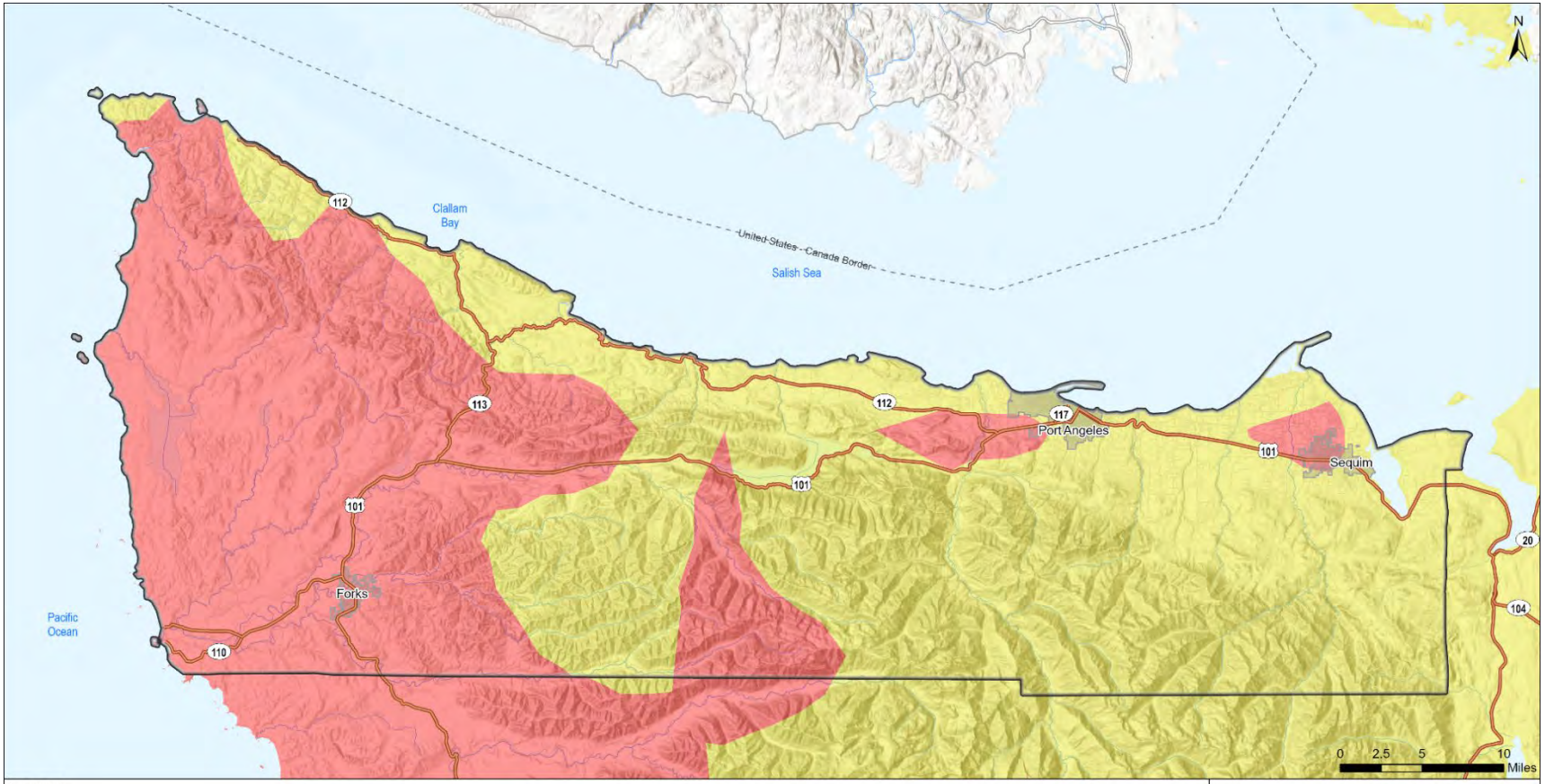


Exhibit 4-16. Liquefaction Potential Zone

4.12.3Previous Occurrences

4.12.3.1 Cascadia Subduction Zone

According to Dr. Chris Goldfinger from Oregon State University, CSZ earthquakes have occurred 42 times during the last 10,000 years. Within the last 4,000 years, the data shows 10 earthquakes of 9.0 moment magnitude or greater, and ten between 8.0 to 8.9 moment magnitude range.[189]

The last major earthquake associated with the Cascadia Subduction zone was estimated during January 1700. This earthquake, one of the largest in the history of North America, was uncovered through Native American oral traditions, tree-ring dating, and other geological evidence. According to the 2023 Makah Hazard Mitigation Plan, oral histories gathered by geologist Ruth Ludwin of the University of Washington confirm the immense devastation caused by the 1700 CSZ earthquake – including ground shaking, liquefaction, landslides, subduction, and tsunamis.

One tsunami was estimated to reach a height of over 50 feet, flooding many villages like Anacla, where only 1 of 600 people survived. Aside from the tsunami, landslides were said to have covered many villages.[190] This event would have included violent shaking, significant building damage, sea waves with major flooding, and injuries and loss of life. For more information on the subsequent tsunami, refer to Section 4.14, *Tsunami*.

4.12.3.2 Onshore and Offshore Earthquakes, ~7.0 Design Level

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 Northwest. Five of those large quakes (including the Nisqually earthquake) directly impacted the planning area.[191] *Table 4-14. Major*

[189] Makah Tribe, *2023 Hazard Mitigation Plan*, effective December 21, 2023.

[190] USGS, *M 9.0 – The 1700 Cascadia Earthquake*, https://earthquake.usgs.gov/earthquakes/eventpage/official17000127050000000/impact, accessed May 8, 2024.

[191] Washington State Parks, *Historic earthquakes (M5+) felt in Washington*, https://storymaps.arcgis.com/stories/f5aeb9f4a3014d92bf946e413dbc1f1a, accessed May 8, 2024.

Historical Earthquakes within the Planning Area, identifies major earthquakes that have affected the County since 1700.

Table 4-14. Major Historical Earthquakes within the Planning Area

Event	Description
1700, CSZ Earthquake, M9.0	Mentioned above
1909, San Juan Island, M6.0	Deep earthquake felt over an area of 58,000 square miles. There were reports of cracked and fallen chimneys and broken windows.
1939, Bremerton, M5.8	Deep earthquake felt over an area of 60,000 square miles. There were reports of fallen and twisted chimneys, cracked masonry, concrete, fallen plaster, broken windows, and power outages.
***1949, Olympia, M6.8*:**	Deep earthquake felt over an area of 594,000 square miles. Eight people were killed and property damage in Olympia, Seattle, and Tacoma was estimated at $25 million. School buildings in widely separated towns were damaged seriously. Water spouted from cracks that formed in the ground in towns south of Olympia, with one new spring developing as a consequence. Downed chimneys and walls were reported from towns throughout the area.
1965, Seattle – Tacoma, M6.7	Deep earthquake felt over an area of 500,000 square miles. There were pockets of high earthquake intensity, with damage such as fallen chimneys. The low-lying and filled areas along the Duwamish River and its mouth settled, causing considerable building damage.
2001, Nisqually, M6.8	Deep earthquake felt over an area of 800,000 square miles. About 400 people were injured and major damage occurred in the Seattle-Tacoma-Olympia area, primarily in downtown Seattle.

Source: Washington State Parks, *Historic earthquakes (M5+) felt in Washington*, https://storymaps.arcgis.com/stories/f5aeb9f4a3014d92bf946e413dbc1f1a, accessed May 8, 2024.

4.12.3.3 Ground Shaking

As discussed above, a variety of faults are located near Clallam County. *Table 4-15. Recent Earthquakes in Clallam County*, identifies recent earthquakes of magnitude 2.5 or greater that have impacted the planning area since the previous MJHMP. Overall, Clallam County has not experienced earthquake events resulting in significant damage due to ground shaking or of severe magnitude over the last five years.

4.12.3.4 Liquefaction

Comprehensive, historic accounts of damage within Clallam County from liquefaction are not readily available. Additionally, the previous 2019 MJHMP did not report any liquefaction incidents occurring in Clallam County in recent history.[192] Liquefaction events within Clallam County are historically uncommon, but still present a threat to assets and local populations within the planning area. No State or federally declared disasters relating to seismic hazards have impacted the planning area within the last five years; refer *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years*.

Table 4-15. Recent Earthquakes in Clallam County

Date	Magnitude	Location
January 15, 2024	3.5	7km SSW of River Road, WA
May 30, 2023	2.7	11km ESE of Forks, WA
October 1, 2022	3.0	25km WNW of Forks, WA
September 22, 2022	3.5	26km WNW of Forks, WA
June 19, 2022	2.9	SW of Quillayute, WA
October 13, 2020	2.9	25km WNW of Forks, WA
February 27, 2020	3.0	1km WSW of Bell Hill, WA
January 17, 2019	2.8	8km WNW of Carsborg, WA
February 13, 2018	2.6	7km ESE of Neah Bay, WA

[192] Clallam County Emergency Management, *2019 Plan Update*, accessed September 9, 2024.

Source: USGS, *Latest Earthquakes*, https://earthquake.usgs.gov/earthquakes/map/?currentFeatureId=uw61876107&extent=47.68943,-124.78683&extent=48.48658,-122.58957&range=search&timeZone=utc&search=%7B%22name%22:%22Search%20Results%22,%22params%22:%7B%22starttime%22:%222018-01-01%2000:00:00%22,%22endtime%22:%222024-09-09%2023:59:59%22,%22maxlatitude%22:48.431,%22minlatitude%22:47.748,%22maxlongitude%22:-122.596,%22minlongitude%22:-124.783,%22minmagnitude%22:2.5,%22orderby%22:%22time%22%7D%7D, accessed September 9, 2024.

4.12.4 Probability of Future Occurrences

4.12.4.1 Cascadia Subduction Zone Earthquake

According to Dr. Chris Goldfinger of Oregon State University, current estimates suggest a 37 percent chance that a megathrust earthquake of 7.1 or greater magnitude in this fault zone (CSZ) will occur in the next 50 years.[193] Given the severity of impacts and estimated likelihood of a major earthquake along the CSZ, the HMCR Steering Committee has assigned a medium hazard planning consideration for seismic hazards.

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 have varied from 140 to 1,000 years, with the last event occurring just over 300 years ago.[194]

4.12.4.2 Onshore and Offshore Earthquakes, ~7.0 Design Level

There is an occasional probability that an onshore of offshore earthquake with an approximate magnitude of 7.0 will occur within the planning area in the future. An occasional probability means a 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years. 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". 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

[193] State of Oregon, Cascadia Subduction Zone, https://www.oregon.gov/oem/hazardsprep/pages/cascadia-subduction-zone.aspx, accessed May 8, 2024.

[194] Pacific Northwest Seismic Network, *Cascadia Subduction Zone*, https://www.pnsn.org/outreach/earthquakesources/csz, accessed May 8, 2024.

faults is higher than it is for a megathrust earthquake, at least on average, over the last few thousands of years". [195]

4.12.4.3 Ground Shaking & Liquefaction

The HMCR Steering Committee determined that the probability of future ground shaking and liquefaction would be comparable to the probability of onshore and offshore earthquakes. As such the HMCR Steering Committee determined that there is an occasional probability that ground shaking or liquefaction would impact the planning area in the future. An occasional probability means a 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.

4.12.5Climate Change

Future climate conditions are unlikely to have any effect on earthquake magnitude, severity, or probability. However, the severity of an earthquake's cascading effects can be exacerbated by climate change. Increased high-intensity storms associated with climate change, when coupled with an earthquake, can result in more devasting landslides and liquefaction. Climate change-related sea level rise can also cause tsunamis triggered by earthquakes to reach farther inland, potentially harming more people and development.

4.12.6 Vulnerability and Risk Assessment

The full range of potential seismic impacts that may cause property damage, injuries, and fatalities in Clallam County are difficult to quantify at this time. The Vulnerability and Risk Assessment conducted for this MJHMP focuses on an analysis of the following types of seismic hazards that may impact the planning area: fault rupture, ground shaking (classified by seismic site classes), and liquefaction. For the CSZ earthquake scenario and Onshore and Offshore Earthquakes at the ~7.0 Design Level, seismic fault rupture data was utilized to assess the vulnerability of County critical facilities, parcels, and population to a major earthquake. Previously mentioned seismic

[195] Seismological Society of America, *Large Quakes Along Olympic Mountain Faults*, https://www.seismosoc.org/news/large-quakes-along-olympic-mountain-faults/, accessed May 8, 2024.

site class data was also utilized to assess County vulnerability to other seismic hazards including ground shaking and liquefaction.

As identified in this hazard profile, a seismic event within the CSZ would yield devastating effects to the entirety of Clallam County. With a CSZ earthquake potentially producing a magnitude 9.0 earthquake or greater, this MJHMP risk assessment is not designed to capture the full extent of a catastrophic seismic event of this magnitude. While the following seismic fault rupture data does provide an overall County vulnerability assessment to a CSZ earthquake scenario and Onshore and Offshore Earthquakes at the ~7.0 Design Level, it is not meant to cover extraordinary events such as a magnitude 9.0 quake that would cause widespread devastation to Clallam County.

4.12.6.1 Fault Rupture

Approximately 2,154 residential units are located within the fault rupture hazard area. Vulnerable residential units multiplied by the average 2.23 persons per household for Clallam County indicates that approximately 4,803 people reside in a seismic fault rupture hazard zone. Additionally, over 93.1 million square feet of non-residential structures are located within the seismic fault rupture hazard area.

Clallam County is surrounded by active seismic faults in the Pacific Ocean and Salish Sea, with a few significant fault lines extending into the County. The most notable of these faults are the Lake Creek-Boundary Creek fault and the Calawah fault lines, which extend from the eastern border of Lake Crescent to Siebert Creek and from the Tsoo-Yess River to the region of Boulder Lake near Happy Lake Ridge, respectively. Additional active fault lines are located on the southern edge of the City of Sequim (Sequim fault), an unnamed fault along the southern portion of the City of Port Angeles, and the Cascadia fold and fault belt extending into the County near the Quillayute Airport. The Cascadia Subduction Zone is also a notable region of potential seismic activity, located along the western coastline of the County.

Depending upon the extent and magnitude of a fault rupture, many buildings throughout Clallam County may collapse or face severe damage, resulting in widespread devastation. Major active fault lines intersect Highways 101 and 113 within the County; a fault rupture would potentially result in critically damaged roads due to ground displacement, which would hinder emergency management operations and evacuations. Socially vulnerable populations could face additional vulnerability during a

seismic fault rupture event and may need more immediate access to medical care that would be unavailable or severely delayed if roads are critically damaged. Seismic fault ruptures may also lead to secondary impacts including tsunamis or flooding, which may result in dissolution, cover-subsidence or cover-collapse sinkholes in the planning area due to displaced sediment.[196]

In the event of a major fault rupture, impacts to critical facilities in the planning area such as grocery stores, water treatment plants, and reservoirs could limit the availability of food and water for impacted residents and visitors who are unable to evacuate. Critical facilities that are designated as shelter locations may be destroyed, as a result of the seismic event itself or secondary hazards such as fire or flooding, displacing residents and visitors who are unable to evacuate due to disabled roads or other associated hazards. Damage to critical facilities storing hazardous materials such as Masko Petroleum in the City of Forks or McKinley Paper in the City of Port Angeles could cause a major chemical release in the County, releasing asbestos, toxic fumes, and other chemical agents into the air to impact the health of residents and visitors.[197]

4.12.6.2 Ground Shaking (Seismic Site Class)

Approximately 1,582 residential units are located within the identified seismic site class hazard area. Vulnerable residential units multiplied by the average 2.23 persons per household for Clallam County indicates that approximately 3,528 people reside in a seismic site class hazard zone. Additionally, over 232.2 million square feet of non-residential structures are located within the seismic site class hazard area.

The entirety of Clallam County faces vulnerability to very strong or severe earthquake shaking intensity, with western regions of the County facing the highest risk. The Modified Mercalli Intensity Scale (MMI) rates “Very Strong” shaking as a MMI 7 rating, and “Severe” shaking as a MMI 8 rating. The majority of the City of Sequim, the entirety of the City of Forks, and some southwestern areas of the City of Port Angeles face an MMI 8 shaking intensity value in the event of an earthquake, with nearly the entire western coastline extending to past Sappho also facing a MMI 8 shaking intensity

[196] USGS, *Sinkholes*, https://www.usgs.gov/special-topics/water-science-school/science/sinkholes, accessed September 4, 2024.

[197] WHO, *Chemical Releases Associated With Earthquakes*, https://iris.who.int/bitstream/handle/10665/272391/WHO-CED-PHE-EPE-18.01-eng.pdf?sequence=1, accessed September 4, 2024.

rating. Most of the land area along Highway 112 and throughout Olympic National Park faces a shaking intensity of MMI 7, while the intersection between Highways 112 and 101 falls within a MMI 8 shaking intensity zone.

Depending upon the extent and magnitude of a seismic event in the planning area, many buildings within the City of Sequim, City of Forks, City of Port Angeles, and on tribal lands could collapse, resulting in numerous deaths, injuries, and unsafe conditions for first responders. The entirety of Highway 110 and large sections of Highways 113 and 101 are located within the MMI 8 shaking intensity zones, which could cut off access to these major transportation corridors during an earthquake. If these highways were to be unpassable, evacuees would be forced to travel eastbound on Highway 101 in order to evacuate by road. The intersection of Highway 112 and 101 as well as a section of Highway 101 near Sequim are located in MMI 8 shaking intensity zones, which could result in a complete suspension of road access after a major earthquake.

Socially vulnerable populations within the County face increased vulnerability as they may need more time to seek adequate shelter and evacuate, placing additional need on accessible evacuation routes. Following a major earthquake, multiple secondary hazards may impact the planning area including a tsunami, urban and wildland fires, and flooding.[198] Areas with the greatest population density within the planning area including the Cities of Forks, Sequim, and Port Angeles face the greatest vulnerability to these secondary hazards.

In the event of a major earthquake, hazard impacts to critical facilities in the planning area such as communication towers may disable communication systems, greatly increasing the response time for critical police, fire, and medical services. If communication towers such as the Angeles Buff Tower or Barnes Point Tower were to topple and impact the ground, a wildfire or urban fire could result and cause additional devastation to the planning area. Impacts to critical facilities housing hazardous materials may result in toxic substances and other chemical agents being released into the environment.[199]

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[198] PNSN, *Earthquake Hazards Overview*, https://pnsn.org/outreach/earthquakehazards, accessed September 4, 2024.

[199] WHO, *Chemical Releases Associated With Earthquakes*, https://iris.who.int/bitstream/handle/10665/272391/WHO-CED-PHE-EPE-18.01-eng.pdf?sequence=1, accessed September 4, 2024.

4.12.6.3 Liquefaction

Approximately 8,353 residential units are located within the liquefaction susceptibility hazard area. Vulnerable residential units multiplied by the average 2.23 persons per household for Clallam County indicates that approximately 18,627 people reside in an area susceptible to liquefaction. Additionally, over 317.3 million square feet of non-residential structures are located within a liquefaction susceptibility zone.

Clallam County faces a moderate to high overall susceptibility to liquefaction in the event of seismic hazards, with risk being concentrated in a few specific areas throughout the County. Liquefaction risk is most heavily concentrated in the northern and western areas of the City of Sequim, throughout the communities of Dungeness, Carlsborg, and River Road, across Lower Elwha Klallam Tribal lands bordering the Elwha River, along the Hoh River into the Hoh Rain Forest, and from La Push on Quileute Tribal lands into the City of Forks along the Quillayute, Bogachiel, Sol Duc, and Calawah Rivers. Clallam Bay, segments of Makah Tribal lands, and large sections of Highways 101, 110, and 112 are located within moderate to high liquefaction susceptibility zones.

Depending upon the extent and magnitude of a liquefaction event, many buildings within the City of Sequim and City of Forks could collapse, resulting in a mass casualty event and dangerous conditions for first responders. Highways 110 and 101 include large sections of road vulnerable to liquefaction, rendering them potentially unpassable in the event of a major earthquake and inaccessible for evacuation purposes. Socially vulnerable populations could face additional vulnerability during a liquefaction event, increasing the need for accessible evacuation routes. As liquefaction impacts communities across the planning area, buried structures such as sewer lines, tanks, and pipes may float as a result of the increased ground saturation.[200] This presents the potential for a major water main break or hazardous materials spill to impact areas across the County and exacerbate the widespread impacts of a major seismic event.

In the event of a major liquefaction event, hazard impacts to critical facilities in the planning area such as substations could lead to widespread power outages that inhibit the response capabilities of first responders and may lead to hypothermia if residents are unable to heat their homes during the winter months. Critical facilities that are

[200] PNSN, *Liquefaction*, https://www.pnsn.org/outreach/earthquakehazards/liquifaction, accessed September 4, 2024.

designated as shelter locations such as Groveland Cottage and Sequim High School may experience non-uniform or differential settlement of their structures, resulting in cracking or other loss of bearing support and rendering them unsafe for sheltering purposes.[201]

[201] USGS, *Liquefaction*, https://www.pnsn.org/outreach/earthquakehazards/liquifaction, accessed September 4, 2024.

Seismic Fault Rupture Vulnerability Summary

Population & Development

4,803.42
People

2,154
Residential Units

93,134,566.27
Non-Residential Square Footage

Systems & Infrastructure

7

5

5
Food, Hydration, Shelter Facilities

3
Energy (Power and Fuel) Facilities

2

Refer to Appendix D-2: *Vulnerability Summary*, for a detailed assessment of community lifelines and critical facilities.

Seismic Site Class Vulnerability Summary

Population & Development

3,527.86
People

1,582
Residential Units

232,290,998.75
Non-Residential Square Footage

Systems & Infrastructure

155
Food, Hydration, Shelter Facilities

95

85

52
Energy (Power and Fuel) Facilities

30

22

21

16

5

Refer to Appendix D-2: *Vulnerability Summary*, for a detailed assessment of community lifelines and critical facilities.

Liquefaction Vulnerability Summary

Population & Development

18,627.19
People

8,353
Residential Units

317,350,217.83
Non-Residential Square Footage

Systems & Infrastructure

51
Food, Hydration, Shelter Facilities

35

15

14

12

12
Energy (Power and Fuel) Facilities

12

4

2

Refer to Appendix D-2: *Vulnerability Summary*, for a detailed assessment of community lifelines and critical facilities.

4.12.6.4 Changes in Vulnerability

Since the 2019 MJHMP, population patterns, development and land use have not substantially changed in the planning area. As discussed in Section 3.5, the County population increased nominally, from 75,474 individuals identified in 2019 MJHMP to 77,333 individuals identified in this MJHMP, representing a net growth of 1,859 individuals or 2.46 percent increase in the County. Generally, population and housing growth over the past five years is concentrated within the urbanized areas of Clallam County, primarily in the Cities of Port Angeles of Sequim. Because the population and development to accommodate this population increased in the last five years, the overall County vulnerability to seismic hazards including seismic fault rupture, ground shaking, and liquefaction has increased as well.

At the time of this MJHMP preparation, the County anticipates the majority of population growth, land use changes and development to occur within the designated Urban Growth Areas (UGAs). All mapped UGAs intersect with areas of high ground shaking and liquefaction hazard risk within the County, which ultimately increases seismic hazard vulnerability over the next five years. Additionally, UGAs intersect with areas of high seismic fault vulnerability in the City of Port Angeles, and City of Sequim, further increasing County vulnerability to earthquake hazards. Port Angeles, Sequim, Forks, and Clallam Bay show the most significant intersection with earthquake vulnerability with significant portions of each UGA mapped in ground shaking, liquefaction, and ground shaking hazard areas. To a lesser extent, Lower Elwha Klallam Tribal lands show an intersection with identified ground shaking and liquefaction hazard areas as well.

It is acknowledged the Washington Office of Financial Management develops population projections at the County level, and local jurisdiction zoning is required to accommodate this projected growth. However, the exact type, location and timing of projected growth and development is unknown at the time of this writing. After consideration of the vulnerability factors listed in this section, is reasonable to assume that any population growth and development to accommodate that growth would result in increased vulnerability to all seismic hazards including seismic fault rupture, ground shaking, and liquefaction over the next five years.

4.12.6.5 Socially Vulnerable Populations

Fault zones underlie various areas throughout the planning area; however, these faults do not intersect with the census tracts flagged for SVPs. Thus, impacts directly caused by fault rupture are not the main seismic concern for SVPs. On the other hand, very strong and severe ground shaking areas overlay SVPs within Census Tracts 3, 7, 21, 24 and 9400, which correspond to the cities of Forks, Port Angeles, and Sequim, as well as western Clallam County and the Makah Indian Reservation. Additionally, SVPs and other high-risk individuals throughout the planning area would be impacted by ground shaking. Specifically, individuals below the 150-percent poverty rate, aged 65 or older, disabled persons, persons reporting minority status, persons living within a mobile home; populations of the Quileute Tribe, Makah Tribe, Lower Elwha Klallam and the Jamestown S'Klallam Tribe; and tourists, seasonal visitors, and transient populations throughout the County would potentially be impacted by seismic ground shaking. Moderate to high liquefaction susceptibility zones are located near SVPs in Census Tracts 3, 7, 21, 24 and 9400. Additionally, liquefaction hazards may impact SVPs and other high-risk individuals located throughout the planning area. The primary concern for SVPs and other high-risk individuals in the County would be preparedness, evacuation, and access to emergency services and supplies. Evacuation maps now exist for Dungeness, Kalaloch, Lower Elwha Klallam, Neah Bay, Tsoo-Yess River Valley, La Push, Port Angeles, and Sequim through the NVS Tsunami Evacuation Zone website and app.

Earthquakes can disproportionately impact lower-income individuals, minority populations, tribal communities, and those living in mobile homes due to their increased vulnerability to structural damage and displacement. These groups often reside in older, less resilient buildings or mobile homes, which are more susceptible to damage. The economic hardship, displacement, and limited access to recovery resources exacerbate their challenges. Additionally, tribal populations may face unique issues such as damage to culturally significant sites and geographic isolation. Elderly individuals and disabled persons face higher risks of injury and difficulty evacuating, and they may struggle to find accessible temporary housing if displaced. Disruptions to medical care and increased financial strain from property damage and medical expenses further exacerbate their challenges. Additionally, communication barriers can hinder their ability to receive emergency alerts. Tourists, seasonal visitors, and transient populations may

be particularly vulnerable due to their unfamiliarity with the area and lack of preparedness. Direct impacts include injury or death from structural damage and ground shaking, as these individuals may be in buildings not designed to withstand seismic activity. Indirect impacts involve displacement, difficulty accessing emergency services, and disruptions to travel plans. These populations may also face challenges in communicating with local authorities and accessing necessary resources, exacerbating their vulnerability during and after an earthquake.

Similarly, seismically induced liquefaction can severely impact SVPs within Clallam County. SVPs and other high-risk individuals are at higher risk due to their increased likelihood of residing in areas with poor soil conditions and less resilient infrastructure. Liquefaction can lead to ground failure, causing buildings to collapse or sink, which disproportionately affects those in older or mobile homes. Displacement, loss of access to essential services, and challenges in communication and mobility further exacerbate the difficulties faced by these populations during and after an earthquake or liquefaction event.

Addressing these vulnerabilities requires targeted policies and resources to ensure inclusive disaster preparedness and targeted support are essential to address these vulnerabilities effectively. Considerations for SVPs throughout the planning area were incorporated into the mitigation strategy in Section 5.0. Specifically, the HMCR Steering Committee tailored Mitigation Actions #CC29, #CC31 and #CC38, to mitigate seismic impacts on SVPs including issues related to awareness and preparedness, evacuations, and access to emergency services.

4.13 Severe Weather

4.13.1 Description

4.13.1.1 Windstorms and Tornado

High winds are defined as wind events that last longer than one hour at greater than 39 miles per hour (mph) or for any length of time at greater than 57 mph. A windstorm has sustained winds of 55 to 74 mph. Severe windstorms pose a significant risk to life and property by creating conditions that disrupt essential systems such as public utilities, telecommunications, and transportation routes. Destructive impacts to trees, power

lines, and utility services also are associated with high winds. Falling trees can occasionally cause fatalities and serious structural damage and fallen power lines could cause widespread power outages and fire.

High wind can contribute to the closure of ports and facilities in coastal communities. Wind blowing across smooth water surfaces can cause friction or drag between the air, causing the water to stretch the surface. As waves form, the surface becomes rougher, making it easier for the wind to push the water surface and intensify waves.[202]

Tornadoes are violently rotating columns of air reaching from the ground's surface to a cloud, usually a thundercloud. The very high wind speeds of tornadoes can directly damage structures and other objects (such as trees) and can cause further damage by picking up heavy objects and hurling them. These types of incidents within the planning area are rare.

[202] NOAA, *Waves*, https://www.noaa.gov/jetstream/ocean/waves, published September 20, 2023, accessed April 10, 2024.

Image 9. Peninsula Daily News Storm Damage[203]

4.13.1.2 Winter Storm (Rain, Freezing Rain, Ice, Snow, Cold Temperature)

Winter storms may include various forms of precipitation such as heavy rain, freezing rain, ice, and snow; winter storms may also bring cold temperatures. Precipitation and low temperatures may create hazardous conditions and may cause substantial damages, injuries, or contribute to other natural hazards.

Heavy rains refer to events during which the amount of rainfall in a location substantially exceeds normal or typical rainfall conditions. Heavy precipitation is not necessarily an indicator that the total amount of precipitation has increased, rather that precipitation is falling faster. Changes in precipitation intensity, coupled with changes in the interval between events, can affect overall precipitation totals.[204] Extreme wind and rainfall are

[203] Peninsula Daily News, Clallam County Storm Damage https://www.peninsuladailynews.com/wp-content/uploads/2019/01/15142601_web1_190116-pdn-fema-application-2-web.jpg, accessed November 4th, 2024.

[204] US EPA, *Climate Change Indicators: Heavy Precipitation,* https://www.epa.gov/climate-indicators/climate-change-indicators-heavy-precipitation, accessed May 6, 2024.

often associated with atmospheric rivers which are long, narrow jets of air that can transport enormous volumes of water vapor from lower latitudes to the Pacific Northwest. Potential impacts of heavy rains include property damage, soil erosion, and increased flood risk (refer to Section 4.8, *Flood*), which in turn contribute to other hazards such as debris flows, flooding, and landslides (refer to Section 4.10, *Landslide*). The contribution of heavy rains to other hazards has the potential to cause significant property damage and loss of life within the planning area.

Cold temperatures and precipitation can lead to freezing rain, ice, hail, and snowstorm hazards. Freezing rain occurs when snowflakes descend into a warmer layer of air and melt completely.[205] When liquid water drops fall through another thin layer of freezing air just above the surface, the water drops don't have enough time to refreeze before reaching the ground and instantly refreeze upon contact with anything that is at or below 0 degrees Celsius or 32 degrees Fahrenheit. The contact creates a glaze of ice on the ground, trees, power lines, buildings, and other objects. A significant accumulation of freezing rain lasting several hours, or more is called an ice storm.

Icy conditions are particularly hazardous on roadways but can also be dangerous for pedestrians in developed areas. If dew point temperatures are above freezing, liquid water forms surface dews. If the temperature is below freezing, dew can freeze and create ice or frost. Frost formed on roadways creates hazardous conditions for drivers. Heavy accumulations of ice can bring down trees and topple utility poles and communication towers. Ice can also disrupt communications and power for days, as utility companies repair the extensive and costly damages.

Hail is a form of precipitation, consisting of solid ice formed inside thunderstorm updrafts. Hail falls when it becomes heavy enough to overcome the strength of the thunderstorm updraft and is pulled toward the earth by gravity. Thunderstorms producing hail are uncommon but have occurred in the planning area. They may cause traffic issues but seldom damage property.[206]

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[205] NOAA, *Severe Weather 101 – Winter Weather*, https://www.nssl.noaa.gov/education/svrwx101/winter/types/, accessed April 3, 2024.

[206] NOAA National Severe Storms Laboratory, *Severe Weather 101*, https://www.nssl.noaa.gov/education/svrwx101/hail/, accessed May 6, 2024.

Winter storms are a combination of heavy snow, blowing snow, and/or dangerous wind chills. These storms can create a higher risk of car accidents, property damage, hypothermia, frostbite, carbon monoxide poisoning, and heart attacks from overexertion.[207] Winter storms, including blizzards, can bring extreme cold, freezing rain, snow, ice, and high winds.

A freeze refers to a cold spell of weather where the temperature drops below 32 degrees Fahrenheit. Freeze conditions are common during winter in Clallam County. Severe freezing conditions in lower elevations, especially in the spring, can damage crops and cause considerable discomfort to area residents.

Winter storms can bring excess heavy snow. Severe winter storms can result in avalanches in the Olympic Mountains neighboring the planning area. This can also lead to flooding when snow melts during the spring and summer months. Refer to Section 4.8, *Flood*, for information on flooding due to winter storms.

4.13.1.3 Extreme Heat

On the opposite end of the spectrum, extreme heat conditions refer to temperatures that are significantly higher than average for a particular regional location and time of year. Extreme or excessive heat can be a combination of high heat and high humidity, leading to heat-related illness. The heat index, or the apparent temperature, is what the temperature feels like to the human body when relative humidity and air temperature are both considered. Relative humidity can significantly increase the heat index and contribute to dangerous health conditions.[208] High heat and humidity can cause heat-related illness, including heat cramps, heat exhaustion, and heat stroke.[209]

Extreme heat is location specific and determined based on average temperature for a given location. While there is no universal definition for an extreme heat event, a common definition for planning in Washington identifies extreme heat as a period of

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[207] Ready, *How to Protect Yourself from Winter Weather*, https://www.ready.gov/winter-weather#:~:text=Winter%20storms%20create%20a%20higher,snow%2C%20ice%20and%20high%20winds, accessed May 6, 2024.

[208] National Weather Service, *What is the Heat Index?*, https://www.weather.gov/ama/heatindex#:~:text=The%20heat%20index%2C%20also%20known,sweat%20to%20cool%20itself%20off., accessed April 15, 2024.

[209] National Weather Service, *Excessive Heat Conditions*, https://www.weather.gov/phi/heatcond#Overview, accessed May 6, 2024.

high heat and humidity with temperatures of 90° F for at least two to three days.[210] Although heat has not been considered a traditional natural hazard or disaster incident, the extreme heat event in June 2021 led to deaths of more than 150 people in Washington becoming the deadliest natural hazard event in the state's history.[211]

A heat wave is a period of abnormally hot weather generally lasting more than two days.[212] The threat of extreme heat can be higher in urban areas, where dark-colored roofs and paving materials cause the air temperature to be hotter. The dense concentrations of pavement, buildings, and other surfaces that absorb and retain heat is known as the urban heat island effect.[213] Whereas a heat wave describes a rise in temperature in the weather pattern, a heat dome refers to a high-pressure system that traps heat.[214] The deadliest heat dome occurred in state of Washington in June 2021, seen in *Exhibit 4-17. Temperature Anomalies During WA Heat Dome Event June 28, 2021*.

No State or federal emergency declaration regarding excess heat has occurred in the last five years within the planning area.

[210] University of Washington, *UW Emergency Management*, https://www.washington.edu/uwem/preparedness/know-your-hazards/extreme-heat/#:~:text=Extreme%20heat%20is%20a%20period,least%20two%20to%20three%20days., published 2024, accessed April 12, 2024.

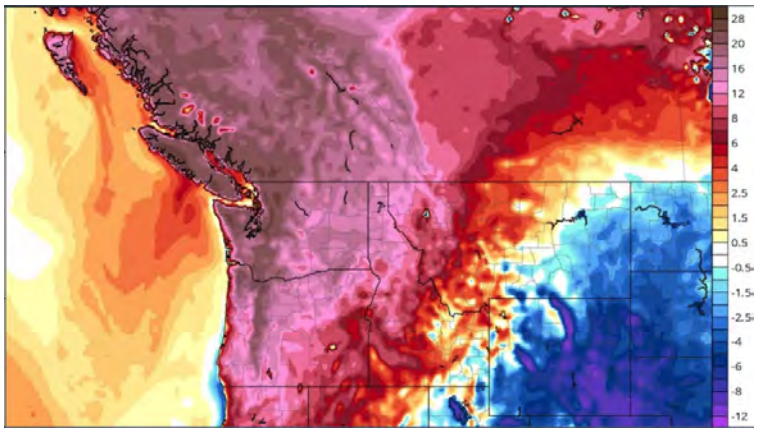
[211] Emergency Management Division, *Washington State Enhanced Hazard Mitigation Plan*, https://mil.wa.gov/asset/651ec296d76a9/2023_WA_SEHMP_final_20231004.pdf, approved October 1, 2023, accessed August 13, 2024.

[212] National Weather Service NOAA, *During a Heat Wave*, https://www.weather.gov/safety/heat-during, published 2024, accessed April 12, 2024.

[213] US EPA, *Reduce Urban Heat Island Effect*, https://www.epa.gov/green-infrastructure/reduce-urban-heat-island-effect#:~:text=%22Urban%20heat%20islands%22%20occur%20when,heat%2Drelated%20illness%20and%20mortality, accessed April 15, 2024.

[214] The New York Times, *A short guide to understanding heat domes*, https://www.nytimes.com/article/what-is-heat-dome.html, published June 20, 2024, accessed September 3, 2024.

Exhibit 4-17. Temperature Anomalies During WA Heat Dome Event June 28, 2021



Source: Washington State Enhanced Hazard Mitigation Plan, published 2023, accessed September 3, 2024.

4.13.2 Location/Extent

4.13.2.1 Windstorms and Tornado

Windstorms (all wind events) are common in the planning area. They usually occur between October and February but can happen at any time of the year. These result in downed trees, blocked roads, damaged power lines, and power outages. Occasionally, there are damaged buildings, infrastructure, and personal property, including vehicles and homes. Impacts can be widespread or very localized depending on the track the weather system approaches the coast. Storms coming from the southwest tend to be the most damaging to the entire planning area. Storms approaching from due south or west tend to impact the area east of Sequim or west of Lake Crescent. The average hourly wind speed in Clallam County is 6.5 mph, with the most recent strong wind event occurring on January 9, 2024, at 64 mph.[215] Windstorms can be accompanied by heavy rain causing severe flooding and landslides throughout the County. *Table 4-16. Beaufort Wind Scale*, relates wind speed to observed conditions and is used to measure the intensity of wind events up to 74 miles per hour.

No tornadoes have been observed in the planning area. Two have been observed in neighboring counties. Unconfirmed anecdotal observations indicate tornadoes may

[215] Willy Weather, *Clallam Bay Wind Forecast*, https://wind.willyweather.com/wa/clallam-county/clallam-bay.html, published 2024, accessed April 12, 2024.

have occurred at Cannon Ball Way in 2006 and at the Makah Reservation in August 2021.

The Beaufort Wind Scale shows that structural damages begin to occur at or above 39 mph winds. Hurricane force winds occur when sustained wind speeds exceed 73 mph and can cause significant damage. Hurricane events known as mid-latitude Pacific cyclones are common to the planning area every few years. Examples are the Inauguration Day Storm of 2007 and the Hood Canal Bridge Storm of 1978. The severity and magnitude of hurricane winds are measured using the Saffir-Simpson Hurricane Wind Scale. The scale can be used to measure strong winds that are not associated with a hurricane event. The scale uses measurements in pressure, wind speed, and damage potential to identify the types of damage associated with sustained wind events; refer to *Table 4-17. Saffir-Simpson Hurricane Wind Scale*. The specific magnitude, severity, and actual impacts from wind events in Clallam County can vary greatly depending on sustained windspeed and event duration.

Table 4-16. Beaufort Wind Scale

Beaufort Scale	Wind Speed	Description
0: Calm	Less than 1 mph	Smoke rises vertically.
1: Light air	1 to 3 mph	Direction shown by smoke drift but not by wind vanes.
2: Light breeze	4 to 7 mph	Wind felt on face; leaves rustle; wind vane moved by wind.
3: Gentle breeze	8 to 12 mph	Leaves and small twigs in constant motion; light flags extended.
4: Moderate breeze	13 to 18 mph	Raises dust and loose paper; small branches moved.
5: Fresh breeze	19 to 24 mph	Small trees in leaf begin to sway; crested wavelets form on inland waters.

Beaufort Scale	Wind Speed	Description
6: Strong breeze	25 to 31 mph	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.
7: Near gale	32 to 38 mph	Whole trees in motion; inconvenience felt when walking against the wind.
8: Gale	39 to 46 mph	Twigs break off trees; generally impedes progress.
9: Strong gale	47 to 54 mph	Slight structural damage (chimney pots and slates removed).
10: Storm	55 to 63 mph	Seldom experienced inland; trees uprooted; considerable structural damage.
11: Violent storm	64 to 72 mph	Very rarely experienced; accompanied by widespread damage.
12: Hurricane	73 mph and above	Devastation.

Source: National Weather Service, *Beaufort Wind Scale*, https://www.weather.gov/mfl/beaufort, accessed May 15, 2024.

Table 4-17. Saffir-Simpson Hurricane Wind Scale

Category	Sustained Wind Speed	Description of Damage
1	74–95 mph	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to roof, shingles, vinyl siding, and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96–110 mph	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	111–129 mph	**Devastating damage:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	130–156 mph	**Catastrophic damage:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	157 mph or higher	**Catastrophic damage:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas.

		Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Center, *Saffir-Simpson Hurricane Wind Scale*, https://www.nhc.noaa.gov/aboutsshws.php, accessed May 15, 2024.

4.13.2.2 Winter Storm (Rain, Freezing Rain, Ice, Snow, Cold Temperature, Hail)

Rain, freezing rain, ice, hail, snow, and cold temperature are also regional events that could potentially impact all of the planning area. However, some areas within Clallam County do receive more precipitation than others. A phenomenon unique to some jurisdictions in the area is the Olympic Rain Shadow. A rain shadow is a patch of land that becomes a desert due to mountain ranges blocking much of the rainfall necessary for plant growth.[216] On one side of the mountain, wet weather systems drop rain and snow while precipitation is blocked on the other side of the mountain.

The Olympic Rain Shadow encompasses the City of Sequim and Port Angeles.[217] The average annual precipitation of areas within the Olympic Rain Shadow are 16.51 inches in the City of Sequim and 25.57 inches in Port Angeles, in comparison to areas outside the Olympic Rain Shadow where the average annual precipitation is 59.30 inches in Elwha and 118.83 inches in the City of Forks.[218] In contrast to of the Olympic Rain Shadow, 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 – 100 inches over the Coastal Plans to 150 inches or more along the windward slopes of the mountain.[219]

Clallam County averages 6 inches of snow per year, whereas the U.S. averages 28 inches of snow per year. Any ice, hail, or snowstorm event could last from a number of hours to a number of days. In the West-Olympic Coastal area, winter season snowfall ranges from 10 to 30 inches in the lower mountain elevations and between 250 – 500 inches at higher elevations.[220] In midwinter, the snowline in the Olympic Mountains is between 1,500 and 3,000 feet above sea level. Winter temperatures are low throughout

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[216] National Geographic, *Rain Shadow*, https://education.nationalgeographic.org/resource/rain-shadow/, published 2023, accessed April 8, 2024.

[217] Olympic Rain Shadow Information and Resources, *Location*, https://www.olympicrainshadow.com/olympicrainshadowmap.html, accessed April 8, 2024.

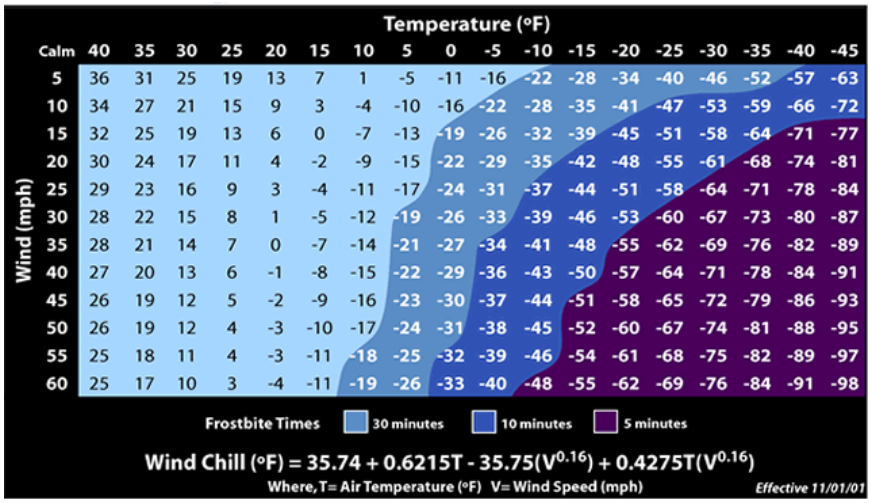
[218] Olympic Rain Shadow Information and Resources, *Location*, https://www.olympicrainshadow.com/olympicrainshadowmap.html, accessed April 8, 2024.

[219] Western Regional Climate Center (WRCC), *Climate of Washington*, https://wrcc.dri.edu/Climate/narrative_wa.php, copywrite 2016 – 2024, 2024, accessed May 8, 2024.

[220] Western Regional Climate Center (WRCC), *Climate of Washington*, https://wrcc.dri.edu/Climate/narrative_wa.php, copywrite 2016 – 2024, 2024, accessed May 8, 2024.

the County, usually at 30 degrees Fahrenheit. The National Weather Service Wind Chill Temperature (WCT) index shown in *Exhibit 4-18. Wind Chill Temperature Index*, calculates the dangers of winter winds and freezing temperatures. Specifically, this determines wind chill in degrees Fahrenheit and considers the risk of frostbite based on air temperature and wind speed.

Exhibit 4-18. Wind Chill Temperature Index



Source: National Weather Service, Wind Chill Chart, https://www.weather.gov/safety/cold-wind-chill-chart, May 15, 2024.

Falling ice and hail can damage structures and personal property including vehicles and homes. The size of hailstones varies greatly, but small stones are typically less than an inch, and severe hailstones are between 1 inch and up to 4 inches or more. Most hailstorms are made up of a mix of different sizes, and larger hailstones pose serious risk to people and property caught in the open. The size of hailstones also affects the speed at which they fall, with larger hailstones falling significantly faster than smaller stones. Damage caused by hailstorms depends on the duration of the event, the size of the hail, and other factors of the storm. Severe hailstorms, especially if coupled with significant winds, can damage buildings, tear up siding on houses, break windows, damage vehicles and cause severe injury or death to people and animals.[221] Additionally, these events may result in hazardous road conditions leading to vehicle collisions. The Clallam County Department of Public Works' Road Division performs

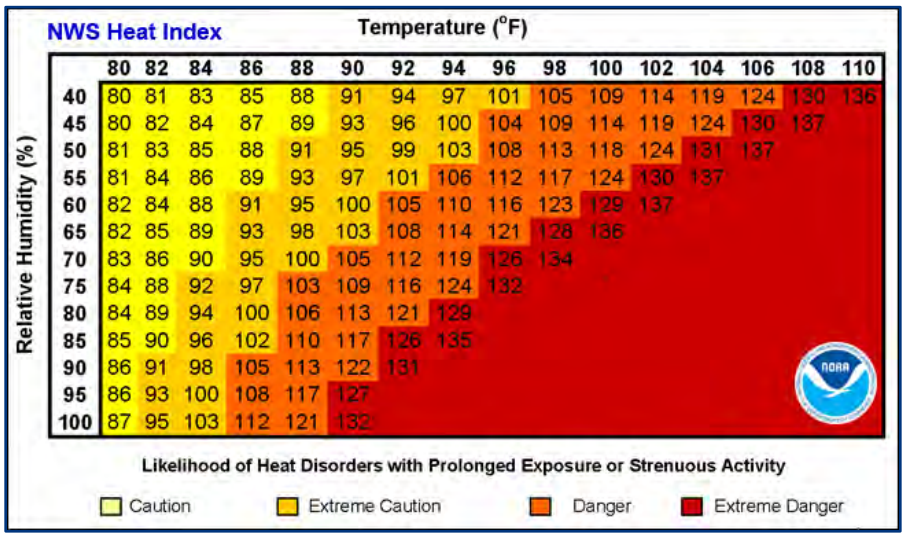
[221] NOAA National Severe Storms Laboratory, *Severe Weather 101 – Hail*, https://www.nssl.noaa.gov/education/svrwx101/hail/, accessed March 14, 2024.

snow/hail plowing and ice removal on County roadways when necessary. The Washington State Department of Transportation also has a snow and ice plan for parts of the County, mainly focusing on US Highway 101.[222] The County often operates warming centers for the public during the winter months.

4.13.2.3 Extreme Heat

The geographic extent of extreme heat conditions would extend to every resident within the planning area, including participating jurisdictions. Extreme heat events typically last for a few days. The National Weather Service (NWS) uses a heat index, or apparent temperature, to help identify extreme heat events and predict extent of potential impacts. The dangers of extreme heat increase with time and exposure, meaning that a prolonged period of extreme heat over just a few days can be particularly dangerous. *Exhibit 4-19. Heat Index*, shows the likelihood of heat disorder with prolonged exposure or strenuous activity associated with temperature and relative humidity.

Exhibit 4-19. Heat Index



Source: National Weather Service, What is the Heat Index?, https://www.weather.gov/ama/heatindex#:~:text=The%20heat%20index%2C%20also%20known,sweat%20to%20cool%20itself%20off., accessed May 15, 2024.

[222] Washington State Department of Transportation, *Snow and ice plan*, Chapter 1 Roadway Treatment Goals, published 2024, accessed April 15, 2024.

The greatest risks from extreme heat events are health related. Although some heat-related illnesses are often minor and/or temporary such as heat rash, heat cramps, and heat exhaustion, extreme heat can overwhelm the body's ability to maintain a safe internal temperature, causing a person's body temperature to reach dangerous levels. If a person's internal temperature rises to 104 degrees Fahrenheit or above, heatstroke can occur.[223] Heatstroke can cause fainting, seizures, and mental impairment. If left untreated, it may lead to permanent organ damage, coma, or death.

Extreme heat is unlikely to result in physical damage to structures; however, residents may experience the effects of heat exhaustion or heat stroke. Additionally, the increased use of air conditioning may put stress on the power grid and lead to power outages. The National Weather Service (NWS) provides weather forecasts for jurisdictions out of the local Seattle, Washington office. Anticipated extreme heat events would be reported by these weather stations, including specific anticipated duration and severity.

4.13.3Previous Occurrences

4.13.3.1 Windstorms and Tornado

High winds and windstorms occasionally occur throughout the planning area. Historically, windstorms and strong winds have occurred as part of larger storm events. The following windstorms in recent years have resulted in damages within the planning area:

- 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

In addition to the historical windstorms above, recent storms have brought high winds and potential damages. Several federally declared disasters related to severe storms and straight-line winds have impacted the planning area since the adoption of the

[223] Mayo Clinic, *Heat Exhaustion*, https://www.mayoclinic.org/diseases-conditions/heat-exhaustion/symptoms-causes/syc-20373250, accessed March 4, 2024.

previous MJHMP. A list of federally declared flood disasters is included below; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years* for further details regarding specific impacts to Clallam County and participating jurisdictions.

- DR 4775-WA, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides and Mudslides – April 28, 2024
- DR 4682-WA, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides and Mudslides – January 12, 2023
- DR 4593-WA, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides and Mudslides – April 8, 2021
- DR 4418-WA, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides, Mudslides, Tornado – March 4, 2019

Most recently in January 2024, high winds downed utility lines and caused power outages in Clallam County. The Port Angeles Public Works Department closed Ediz Hook due to high waves and rocks being blown onto the roadway.

Tornadoes have been a much rarer occurrence in the County; the State of Washington receives an approximate average of two tornadoes a year.[224] Tornado warnings have occurred within the vicinity of planning area, but no tornadoes have been reported in jurisdictions within Clallam County. The most recent tornado warning near the planning area occurred in 2021, when tornado warnings were issued for Jefferson County and Kalaloch south of the City of Forks. No Clallam County jurisdictions were affected by the tornado warnings at this time.[225]

No federally declared disasters relating to tornadoes have impacted the planning area within the last five years; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years*.

[224] Kitsap Sun, *A history of twisters: Tornadoes in Washington since 1950*, https://datacentral.kitsapsun.com/tornado-archive/, published 2023, accessed April 8, 2024.

[225] KIRO 7 News, *Tornado warnings issued for parts of Olympic Peninsula*, https://www.kiro7.com/news/local/brief-tornado-warning-issued-southwestern-jefferson-county/THQ6MDCPBZGA5MO44DJLEUMI6E/, published March 19, 2021, accessed April 8, 2024.

The following are the Washington State emergency proclamations over the last five years concerning severe weather which included high winds that impacted the planning area:

- Proclamation 20-02 (2/5/2020) by the Lieutenant Governor of Washington State – severe weather storm event on January 20, 2020 impacting counties, including Clallam County;
- Governor Proclamation 21-03 (3/1/21) for entire State– severe weather storm events beginning December 17, 2020;
- Governor Proclamation 21-18 (11/15/21, amended 12/1/21) – severe wind and rain event beginning November 12, 2021, resulting in impacts in several counties, including Clallam and Jefferson County;
- Governor Proclamation 22-01 (1/7/22) for entire State – severe winter storm beginning December 17, 2021;
- Governor Proclamation 22-06 (12/15/21) – series of severe autumn storms between November 3, 2022 and November 8, 2022 causing flooding and wind damage impacting several counties, including Clallam and Jefferson County;
- Governor Proclamation 23-01 (1/31/23) – extreme weather, wind and flooding event between December 18, 2022 and December 28, 2022 impacting several counties, including Clallam and Jefferson County;
- Governor Proclamation 24-01 (1/24/24) – storm damage from atmospheric river event on December 3, 2024 impacting several Counties, including Clallam County; and
- Governor Proclamation 25-01 (1/7/25) – bomb cyclone weather event from November 17, 2024 and November 25, 2024, impacting several counties, including Clallam County.

4.13.3.2 Winter Storm (Rain, Freezing Rain, Ice, Snow, Cold Temperature, Hail)

Winter storms and associated hazards have affected the planning area in the past. These storms have included significant amounts of snow, rain, and ice, and resulted in flooding, power outages, and downed trees as well as other impacts such as the snowing in of residents.

On December 27, 1996, Clallam County experienced the Christmas Snowstorm. Freezing rain occurred heavily in the south end and snow fell in the north end. As much as two to

three feet of snow was on the ground in some areas was followed by excessive flooding after the weather warmed. About 300,000 homes and businesses lost electrical power across the County in addition to trees crashing on homes, streets, and powerlines during the storm. Some structures also collapsed from the weight of snow and ice. [226]

In March 2015, Clallam County experienced a heavy rainstorm followed by flooding in Sequim homes that pushed 7 million gallons of diluted sewage into the Port Angeles Harbor. Hurricane Ridge experienced 19 inches of snowfall in 12 hours bringing up the snowpack by 11 percent.[227] In February 2019, the City of Sequim experienced a massive snowstorm with more than two feet of snowfall. Many residents were snowed in and some car wrecks and fallen trees were reported throughout Clallam County. [228]

In January 2024, a severe winter storm hit Clallam County, causing several power outages for customers and residents. The City of Port Angeles also experienced power outages due to high winds. Port Angeles Public Works Department closed Ediz Hook, the three-mile crescent-shaped sand spit extending from Port Angeles Boat Haven to the marina, due to high waves. Wind gusts were close to 60 mph at William R. Fairchild International Airport in Port Angeles.

The following are the Washington State emergency proclamations over the last five years concerning severe winter storms that impacted the planning area:

- Proclamation 20-02 (2/5/2020) by the Lieutenant Governor of Washington State – severe weather storm event on January 20, 2020 impacting counties, including Clallam County;
- Governor Proclamation 21-03 (3/1/21) for entire State– severe weather storm events beginning December 17, 2020;

[226] Peninsula Daily News, *Snowstorm of 1996 remembered 20 years later*, https://www.peninsuladailynews.com/news/white-christmas-week-snowstorm-of-1996-remembered-20-years-later/, published January 1, 2017, accessed April 15, 2024.

[227] Peninsula Daily News, *Sequim homes flood*, *snow dumps on Hurricane Ridge and Forks sees rare rainshadow effect in unusual storm*, https://www.peninsuladailynews.com/news/sequim-homes-flood-snow-dumps-on-hurricane-ridge-and-forks-sees-rare-rainshadow-effect-in-unusual-storm/, published March 16, 2015, accessed April 12, 2024.

[228] K5, *Sequim digs out 2 feet of snow after massive storm*, https://www.king5.com/article/news/sequim-digs-out-after-massive-snow-storm/281-a0df3f2e-ee83-434e-b0ba-38d4499bd5b0, published February 9, 2019, accessed April 8, 2024.

- Governor Proclamation 21-18 (11/15/21, amended 12/1/21) – severe wind and rain event beginning November 12, 2021, resulting in impacts in several counties, including Clallam and Jefferson County;
- Governor Proclamation 22-01 (1/7/22) for entire State – severe winter storm beginning December 17, 2021;
- Governor Proclamation 22-06 (12/15/21) – series of severe autumn storms between November 3, 2022 and November 8, 2022 causing flooding and wind damage impacting several counties, including Clallam and Jefferson County;
- Governor Proclamation 23-01 (1/31/23) – extreme weather, wind and flooding event between December 18, 2022 and December 28, 2022 impacting several counties, including Clallam and Jefferson County;
- Governor Proclamation 24-01 (1/24/24) – storm damage from atmospheric river event on December 3, 2024 impacting several Counties, including Clallam County; and
- Governor Proclamation 25-01 (1/7/25) – bomb cyclone weather event from November 17, 2024 and November 25, 2024, impacting several counties, including Clallam County.

Four federally declared disasters relating to winter storms have impacted the planning area over the last five years:

- DR 4775-WA, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides and Mudslides – April 28. 2024;
- DR 4682-WA, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides and Mudslides – January 12, 2023;
- DR 4593-WA, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides and Mudslides – April 8. 2021;
- DR 4418-WA, Washington Severe Winter Storms, Straight-line Winds, Flooding, Landslides and Mudslides – March 4. 2019.

4.13.3.3 Extreme Heat

The planning area does not have an extensive history of extreme heat events. Instances of heat wave and extreme heat have been rare but have occurred in recent years. From June to July 2021, a heat dome, a rare atmospheric event that consists of a ridge of high pressure and covers a larger area, broke records in the North Olympic Peninsula. The City of Port Angeles reached 95°F, breaking the all-time record of 94°F on August 18, 2016, and July 28, 2009. The highest experienced temperature within the City of Forks during the heat wave was 86°F; areas south of Neah Bay reached 92°F. [229] Additionally, in August 2023, Clallam County was under a Red Flag Warning, indicating a high probability of fire ignition.[230]

No State or federally declared disasters relating to extreme heat have impacted the planning area within the last five years; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years*.

4.13.4 Probability of Future Occurrences

4.13.4.1 Windstorms and Tornado

Pacific midlatitude cyclones and high wind events are probable events within Clallam County, while tornado events are far less probable. Historical occurrences of high winds indicate a likelihood for future events.

Based on previous occurrences and the seasonal climate of the area, there is a likely probability of future windstorm impacts in the future. A likely probability means there is a 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years. The HMCR Steering Committee designated a medium hazard planning consideration for high winds and windstorms after considering the future probability and potential impacts to interrupt communication lines, exacerbate wildfire, and result in power outages.

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[229] Peninsula Daily News, *Heat breaks records*, https://www.peninsuladailynews.com/news/heat-breaks-records/, published June 27, 2021, accessed April 3, 2024.

[230] Clallam County Washington, *[Archived] Extreme Fire Danger*, https://www.clallamcountywa.gov/CivicAlerts.aspx?AID=144&ARC=256, published August 20, 2023, accessed April 4, 2024.

4.13.4.2 Winter Storm (Rain, Freezing Rain, Ice, Snow, Cold Temperature)

Based on previous occurrences and the seasonal climate of the area, there is a likely probability of future winter storm impacts in the future. A likely probability means there is a 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years. The HMCR Steering Committee assigned a medium hazard planning consideration to the hazards and impacts associated with winter storms based upon a likely probability and limited impacts of future events.

4.13.4.3 Extreme Heat

Jurisdictions have historically experienced extreme heat, especially within the past five years. There is an occasional probability of future extreme heat occurrences, meaning a 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years. The HMCR Steering Committee designated a medium hazard planning consideration for extreme heat considering the likelihood for future extreme heat events. Extreme heat events will likely occur with a higher frequency and longer duration as climate change causes increased global temperatures.

4.13.5 Climate Change

4.13.5.1 Windstorms and Tornado

It is anticipated that wind patterns and development may be altered due to climate change. The resulting change is expected to cause an increase in the number of intense storms, which could in turn lead to an increase in the frequency of strong winds, thunderstorms, and other severe weather.[230]

It is unclear how climate change will impact tornado occurrences.[231] However, individual weather components including moisture and wind shear leading to the development of tornadoes are understood. As global temperatures rise, the atmosphere will hold more moisture, thereby increasing atmospheric instability; wind shear is expected to decrease. These two forces counteract each other, making it difficult to predict how tornado formation may change. Recent years have shown that tornado events are

[231] National Geographic, *Tornadoes and Climate Change*, https://education.nationalgeographic.org/resource/tornadoes-and-climate-change/, updated 2024, accessed April 15, 2024.

becoming more clustered in time. Research also suggests that the geographic patterns of tornadoes have shifted; fewer tornadoes are occurring in "Tornado Alley" while more tornadoes are beginning to occur in outlying states.

4.13.5.2 Winter Storm (Rain, Freezing Rain, Ice, Snow, Cold Temperature)

Climate change will affect the frequency and intensity of winter storms. Heavy rainfall will become more intense and frequent, causing secondary impacts such as flooding. As global temperatures increase, on average the amount of moisture in the air will increase. This in turn leads to more severe storms including winter storms and related secondary impacts. Approximately twice as many extreme U.S. snowstorms occurred in the latter half of the 20th century compared to the first.[232] Climate change will result in more frequent and more intense winter storms and exacerbate the impacts of ice, hail, and snowstorms in the planning area.

4.13.5.3 Extreme Heat

Climate change is understood to have a direct impact on temperature. As global temperatures rise, there will be an increased occurrence and prolonged duration of extreme heat events. According to Risk Factor, a hot day in Clallam County is any day above a "feels like" temperature of 82°F.[233] Clallam County is expected to experience seven hot days this year and 15 days above 82°F in 30 years.

4.13.6 Vulnerability and Risk Assessment

Severe weather includes windstorms and tornados, winter storms (rain, freezing rain, ice, snow, cold temperature), and extreme heat. These natural hazards are not location-specific and typically occur as regional events that could impact the entirety of the planning area. Certain areas may experience more severe impacts for different types and locations of different extreme weather events; however, severe weather events have the potential to impact any areas within the County to some extent. Therefore, it is

[232] NOAA, *Climate Change and Extreme Snow in the U.S.*, https://www.ncei.noaa.gov/news/climate-change-and-extreme-snow-us#:~:text=Years%20with%20heavy%20seasonal%20snow,increased%20over%20the%20past%20century., published January 25, 2015, accessed April 15, 2024.

[233] Risk Factor, *Heat Factor*, https://riskfactor.com/county/clallam-county-wa/53009_fsid/heat, accessed April 8, 2024.

reasonable to assume that all critical facilities and the entirety of the Clallam County population of 77,333 people are considered vulnerable to severe weather.

Windstorms and tornadoes can cause extensive damage to critical facilities by destroying infrastructure, disrupting communications, and causing power outages. These impacts can further hinder emergency management, transportation and evacuation routes. Winter storms, including heavy snow, ice, and freezing rain, can lead to hazardous road conditions, power failures, and structural damage due to the weight of snow and ice. These events can overwhelm emergency services and delay response times, impacting residents by limiting access to essential services, increasing the risk of accidents, and causing prolonged periods without power or heat. Additionally, the economic burden from repairs and recovery efforts can be substantial for communities and individuals. The most likely impacts to Clallam County of severe weather events include power outages and transportation impacts as a result of windstorms and winter storms.

Extreme heat does not typically damage buildings and infrastructure. Only in severe cases would infrastructure failures, such as buckling roads, runways, and railways occur. More likely, extreme heat may strain infrastructure such as energy systems and water systems leading to power outages water reliability issues in the County. These issues can impact the day-to-day operations of the County, communication systems, emergency management and residents. For individuals, extreme heat can lead to heat-related illnesses, heat stroke, increased hospitalizations, and even fatalities, particularly among vulnerable populations like the elderly and those with pre-existing health conditions. Cooling centers may be used to mitigate the health effects of extreme heat.

4.13.6.1 Changes in Vulnerability

As discussed in Section 3.5, the population within the planning area has increased during the last five years, representing a population increase of 2.46 percent. Therefore, the number of vulnerable individuals located within the planning area has increased by the same percentage when compared to the 2019 MJHMP. No major changes in land use of development occurred while the previous 2019 MJHMP was active that affected risk or vulnerability associated with severe weather.

Clallam County anticipates the majority of population growth, land use changes and development to occur within the designated Urban Growth Areas (UGAs) at the time of this MJHMP preparation. The Washington State Office of Financial Management identified Carlsborg, Clallam Bay, Forks, Joyce, Port Angeles, and Sequim as UGAs. Future development in these UGAs may consider including air conditioning in residential housing or commercial buildings.

As the entirety of the planning area would be vulnerable to windstorms and tornados, winter storms, and extreme heat, any projected population growth would increase the number of vulnerable individuals. At this time, no proposed projects under the purview of the County are expected to substantially increase severe weather vulnerability. Therefore, no substantial changes in vulnerability are anticipated due to changing land use patterns or development.

4.13.6.2 Socially Vulnerable Populations

The impacts of severe weather hazards would apply to the entirety of the planning area, including SVPs within Census Tracts 3, 7, 21, 24 and 9400; individuals below the 150-percent poverty rate, aged 65 or older, disabled persons, persons reporting minority status, persons living within a mobile home; populations of the Quileute Tribe, Makah Tribe, Lower Elwha Klallam and the Jamestown S'Klallam Tribe; and tourists, seasonal visitors, and transient populations visiting for special events. These SVPs are located throughout the planning area and face their own unique challenges to severe weather. Different severe weather hazard present unique challenges for SVPs located throughout Clallam County. The primary concerns for SVPs are health impacts due to harsh weather conditions, the resources or ability to prepare for or respond to hazards, and complications with evacuation measures.

Low-income populations, minorities, tribal populations, and individuals living in mobile homes often face heightened vulnerabilities during windstorms, winter storms, and extreme heat. Limited financial resources can restrict their ability to prepare for and recover from these events, such as securing adequate housing, insulation, and heating or cooling systems. Mobile homes, in particular, are more susceptible to damage from high winds and extreme temperatures. Additionally, these communities may have less access to emergency services, healthcare, and information about weather-related risks, exacerbating their struggles during and after such events. Social and economic disparities further compound these challenges, making it harder for them to bounce back from the impacts of severe weather.

Elderly populations and individuals with disabilities often face significant challenges during windstorms, winter storms, and extreme heat. Mobility issues can make it difficult for them to evacuate or seek shelter quickly. They may also rely on medical equipment that requires electricity, which can be disrupted during severe weather. Additionally, these individuals might have pre-existing health conditions that are exacerbated by extreme temperatures, such as respiratory or cardiovascular issues. Limited physical strength and social isolation can further hinder their ability to prepare for and respond to these events, making them particularly vulnerable to the impacts of severe weather.

Tourists, seasonal visitors, and transient populations often face unique challenges during windstorms, winter storms, and extreme heat due to their unfamiliarity with the local environment and lack of established support networks. They may not have access to reliable information about impending weather events or know where to seek shelter. Additionally, they might lack appropriate clothing or supplies to cope with extreme temperatures. Limited access to local emergency services can further complicate their ability to respond effectively. These factors make it difficult for transient populations to navigate and recover from severe weather conditions.

Considerations for SVPs throughout the planning area were incorporated into the mitigation strategy in Section 5.0. Specifically, the HMCR Steering Committee tailored Mitigation Actions #CC37, #CC33 and #CC28, to mitigate the impacts of severe weather on SVPs such as those related to health impacts and the resources and ability to prepare for, respond and recover from severe weather hazards.

4.14 Tsunami

4.14.1 Description

A tsunami is a wave or series of waves generated by a large and sudden vertical movement of the ocean floor or other natural disturbance of the water column. Usually, tsunamis occur because of an earthquake below or near the ocean floor. Volcanic eruptions, landslides, and in rare instances meteorites may also trigger tsunamis. The sudden and forceful displacement of the ocean floor creates waves that radiate outward in all directions away from their source, sometimes crossing entire ocean basins.[234] In the open ocean, a tsunami travels 500 to 600 miles per hour, but is only a few feet in height and may be undetectable by ships. Once the wave nears the shore, the shallow depth pushes against the motion of the wave, causing it to decelerate and increase in height.[235]

Tsunamis typically rush ashore in multiple waves like fast-rising tide with powerful currents. When the tsunami makes landfall, the wave can violently disperse inland, causing immense damage and risk of injury or death. These waves often travel much further inland than normal waves. Most tsunami damage is caused by these strong currents and floating debris.[236]

Approximately 80 percent of tsunamis occur worldwide within the Pacific Ocean's "Ring of Fire," the geologically active area where tectonic shifts make volcanoes and earthquakes common.[237] The Ring of Fire surrounds the Pacific tectonic plate along the east coast of Asia and along the west coast of North and South America. All coastlines are potentially vulnerable to tsunamis that occur in the Pacific, Washington State

[234] FEMA, *Understanding Tsunamis*, https://www.fema.gov/fact-sheet/understanding-tsunamis, accessed April 15, 2024.

[235] National Oceanic and Atmospheric Administration, *Tsunami Propagation*, https://www.noaa.gov/jetstream/tsunamis/tsunami-propagation, accessed April 15, 2024.

[236] United States Geological Survey, *Tsunamis and Tsunami Hazards*, https://www.usgs.gov/special-topics/water-science-school/science/tsunamis-and-tsunami-hazards, accessed April 15, 2024.

[237] National Geographic, *Tsunamis*, https://www.nationalgeographic.com/environment/article/tsunamis#:~:text=Most%20tsunamis%E2%80%93about%2080%20percent,underwater%20landslides%20or%20volcanic%20eruptions., accessed April 16, 2024.

(particularly the planning area on the Olympic Peninsula) are especially vulnerable.[238] This hazard profile includes discussion on two specific subtypes of tsunamis that may affect the planning area, as defined below:

4.14.1.1 Distant Tsunami

Distant tsunamis originate from distant earthquakes, such as those in Alaska, Russia and Japan. There is generally 3 to 12 hours of warning for these events, and damage from such incidents rarely occurs. Advanced warning is provided to the planning area by both radio and tsunami sirens. Warning is critical for distant tsunamis, as ground shaking from distant earthquakes may not be perceptible within the planning area. Generally, earthquakes from further away result in smaller tsunami wave heights.

4.14.1.2 Near Tsunami

Near tsunamis originate near the planning area, originating from seismic activity or undersea earth movements near the Clallam County coast. The most significant near tsunami risk to the planning area would be caused by a Cascadia Subduction Zone (CSZ) earthquake. Within the first minutes of ground shaking from a CSZ earthquake, tsunami waves would reach the western coast of the planning area with waves sized up to 40 feet in height. Generally, areas lower than 50 feet above msl are at risk of inundation during a CSZ earthquake. Therefore, opportunity for advance warning in some parts of the planning area will be limited. The tsunami waves would then travel through the Salish Sea, impacting the northern coast of Clallam County and other parts of the state.

Both distant tsunamis and near tsunamis are generally unpredictable, as the only warning sign is the preceding earthquake. However, the initial earthquake may occur far away and be imperceptible to people on land. The trough of the tsunami is the low point beneath the crest of the wave. This trough often reaches shore first and produces a vacuum effect, which pulls coastal water seaward and exposes the harbor and sea

[238] United States Geological Survey, *Tsunamis and Tsunami Hazards*, https://www.usgs.gov/special-topics/water-science-school/science/tsunamis-and-tsunami-hazards, accessed April 15, 2024.

floors. This is one of the few warning signs or indicators that the wave crest and full force of the tsunami will soon hit the coast.[239]

Tsunamis may last for hours, and additional waves may continue to impact coastlines. This leads to the destruction or damage of structures; disruption of transportation, power, and communications; and more.[240]

4.14.2 Location/Extent

The Pacific Ocean and the Strait of Juan de Fuca coastlines of Clallam County are most vulnerable to tsunamis. Tsunami inundation zones exist all along the coast but are most pervasive near river mouths and bays. These are low-lying areas where tsunami runup and impacts would be most significant. Mapped tsunami hazard zones are included in *Exhibit 4-20. Tsunami Hazard Area*.

The following coastlines, rivers, and topographic features throughout Clallam County are specific areas with significant tsunami inundation zones:

- The Quillayute River near the southwest coast of Clallam County.
- Coastal areas near Cedar Creek, Allens Slough, Wish Creek and Ozette River along the western coast.
- Shores surrounding Ozette Lake.
- Coastline of Makah Bay and the Tsoo-Yess River along the northwest coast.
- Neah Bay and the floodplain surrounding the Waatch River in the northwest.
- The Sekiu River and Hoko River along the north coast.
- Clallam Bay and the Clallam River along the north coast.
- The Pysht River, Deep Creek, and Twin Rivers.
- The Lyre River.
- Crescent Bay and Salt Creek along the north coast.

[239] FEMA, *Understanding Tsunamis*, https://www.fema.gov/fact-sheet/understanding-tsunamis, accessed April 15, 2024.

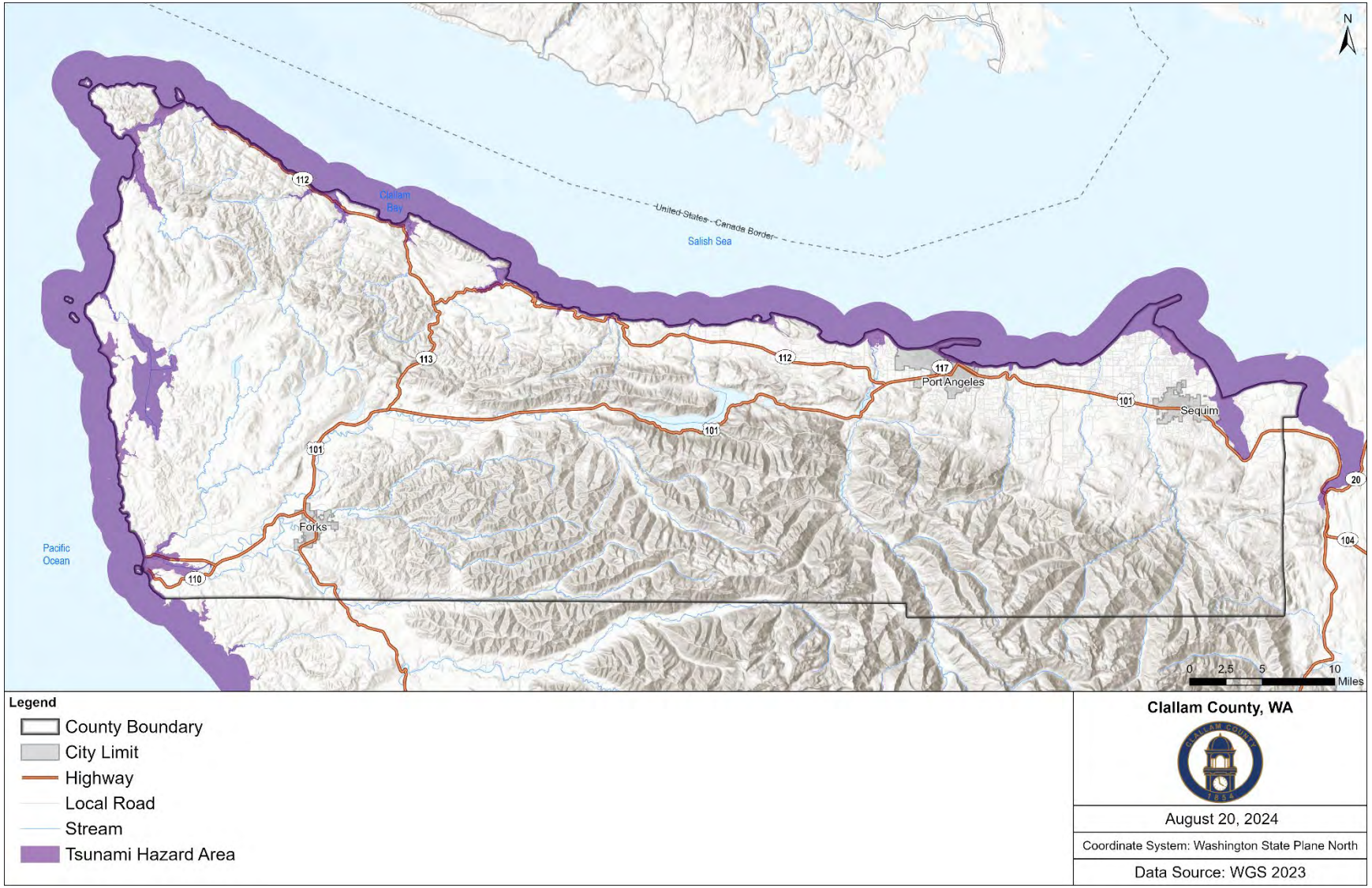
[240] FEMA, *Understanding Tsunamis*, https://www.fema.gov/fact-sheet/understanding-tsunamis, accessed April 15, 2024.

- Freshwater Bay and the Elwha River delta along the north coast.
- Coastlines throughout Port Angeles and Ediz Hook.
- Coastal areas from the mouth of the Dungeness River through Jamestown.
- Shores throughout Sequim Bay.
- Lack Crescent (landslide driven tsunamis)

The majority of damages from a tsunami would be caused by the surge of water, wave impacts, strong currents, erosion, and debris. The severity of impacts can vary greatly depending on the circumstances, but even moderate tsunamis can cause the destruction or damage of structures and disruption of transportation, power, and communications. Tsunami damages are closely tied to the magnitude and severity of the on-shore or off-shore earthquake trigger; refer to 4.12, *Seismic Hazards* for the magnitude and severity of earthquakes. In the worst-case scenario, tsunamis may cause severe and widespread structural and property damage and substantial loss of life.

Tsunami evacuation routes are mapped throughout the County for Dungeness, Kalaloch, Lower Elwha Klallam, Neah Bay, Tsoo-Yess River Valley, La Push, Port Angeles, and Sequim. From east to west, the Port Angeles vicinity evacuation routes include W Hill St, S Cedar St, W 2nd St, S Lincoln St, N Ennis St, and Strait View Dr. The Port Angeles vicinity near Joyce include evacuation routes along Camp Hayden Rd and Crescent Beach Rd, while the evacuation points for the Elwha River mouth include Place Rd and Lower Elwha Rd. The evacuation routes for Sequim and vicinity from north to south include Clark Rd, E Anderson Rd, Sequim-Dungeness Wy, Jamestown Rd, Serpentine Ave, Wilcox Ln, Schmuck Rd, Diamond Point Rd, Washington Harbor Rd, West Sequim Bay Rd, Whitefeather Rd, and Highway 101.

Exhibit 4-20. Tsunami Hazard Area



4.14.3 Previous Occurrences

Historically, Clallam County has experienced both near and distant tsunamis, outlined below.

4.14.3.1 Distant Tsunami

The most recent distant tsunami to reach the planning area occurred after a 9.1 magnitude earthquake in Tohoku Japan in 2011.[241] The tsunami killed 16,000 people and caused the Fukushima nuclear power plant to meltdown. Huge amounts of debris from the plant washed up on the State of Washington's shore. This prompted communities such as the Quileute Tribe in La Push in the County to move to higher ground. Additionally, on January 15, 2022, a tsunami advisory for the entire West Coast led to public safety mobilization in Clallam County. Neah Bay and other areas in Clallam experienced 1 foot waves after an underwater volcano exploded near the Pacific nation of Tonga.

On March 24, 1964, a 9.2 magnitude earthquake struck Alaska's Prince William Sound causing tsunamis along the coastal communities and killing over 139 people.[242] The tsunamis caused about USD $311 million in damages in 1964 (about $2.3 billion today) and affected coastal communities in Clallam County.

4.14.3.2 Near Tsunami

The most significant previous occurrence of near tsunamis occurred during the last full rupture CSZ earthquake in January 1700. Geologic evidence and oral history from Native American Tribes point to a Cascadia Subduction Zone megathrust earthquake and subsequent tsunami off the western coast of the planning area. Estimates suggest the event may have been as large as a 9.2 magnitude earthquake, and the subsequent tsunami caused widespread destruction and loss of human life within the planning area.

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[241] King 5, *Washington coastal communities build upward after lessons of 2011 Japan tsunami,* https://www.king5.com/article/weather/earthquakes/japan-tohoku-earthquake-fukushima-10-years-washington/281-0e39390c-efed-49be-ac9a-fb441f8c8e85, published March 10, 2021, accessed August 13, 2024.

[242] NOAA, *On This Day: Great Alaska Earthquake and Tsunami*, https://www.ncei.noaa.gov/news/great-alaska-earthquake, updated June 15, 2021, accessed August 13, 2024.

Makah oral history reports that it took four days for the sea to calm after the initial tsunami wave hit Clallam County.[243]

The tsunami traveled as far as Japan and had significant impacts along the western United States, including what is now Clallam County. Geologic evidence and modelled reproductions of the event indicate devastating impacts, destruction, and significant inundation along the western coast of the United States.[244]

No State or federally declared disasters relating to tsunami have impacted the planning area within the last five years; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years*.

4.14.4 Probability of Future Occurrences

Earthquakes, and therefore tsunamis will continue to occur within the planning area. Given the location of the planning area, the amount of low-lying coastal features throughout the County, and the previous history of tsunami occurrence in the Pacific Ocean, it has been determined that the probability of tsunami impacting the planning area in the future is considered unlikely. An unlikely probability means a less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.[245] However, members of the HMCR provided additional context around probability of occurrence and pointed to research at Oregon State University that estimates a 37 percent chance that a megathrust earthquake of 7.1 or greater magnitude in this fault zone (CSZ) will occur in the next 50 years.

The probability of distant tsunamis is linked to the probability of earthquakes across the Pacific Ocean. The probability of near tsunamis is linked to the probability of earthquakes immediately offshore from the planning area; as discussed in Section 4.12, *Seismic Hazards*, the CSZ earthquake is often used for emergency planning purposes as this earthquake and associated tsunami represents the most significant scenario for the planning area. The CSZ has produced earthquakes measuring M8.0 and above at

[243] Makah Tribe, *Hazard Mitigation Plan*, effective December 21, 2023.

[244] National Oceanic and Atmospheric Administration, *Tsunami Historical Series: Cascadia - 1700*, https://sos.noaa.gov/catalog/datasets/tsunami-historical-series-cascadia-1700/, accessed April 16, 2024.

[245] State of Oregon, Cascadia Subduction Zone, https://www.oregon.gov/oem/hazardsprep/pages/cascadia-subduction-zone.aspx, accessed May 8, 2024.

least seven times in the past 3,500 years. The time intervals between these events have varied from 140 to 1,000 years, with the last event occurring just over 300 years ago. The Washington SEHMP notes that pattern detection on previous indents can be misleading (e.g., pattern recognition bias), as an often-cited reoccurrence interval for CSZ earthquakes states that one occurs on average every 247 years. This is based on calculating the average duration between the 41 documented CSZ events, although most events were not full-scale ruptures. There is variation between these 41 incidents that makes the 247-year recurrence interval an unreliable planning metric. Scientific research has also found no apparent relationship between the incident period and earthquake strength.[246]

4.14.5 Climate Change

Climate change is not directly tied to the probability of tsunami occurrence. Tsunami triggers including earthquakes, volcanic eruptions, and landslides are not expected to occur more frequently or be more severe due to climate change. However, sea level rise due to climate change may increase the severity of damages due to tsunamis. Increased mean sea levels would potentially cause tsunami waves and surges to travel further inland. Tsunami impacts would therefore be exacerbated by sea level rise and would cause more destruction and potential loss of life. This nexus between climate change and tsunami suggests that mitigation of climate change and sea level rise would indirectly mitigate the severity of tsunami impacts.

4.14.6 Vulnerability and Risk Assessment

Approximately 1,582 residential units are located within the tsunami hazard area. Vulnerable residential units multiplied by the average 2.23 persons per household for Clallam County indicates that approximately 3,528 people reside in a tsunami hazard zone. Additionally, over 232.2 million square feet of non-residential structures are located within the tsunami hazard area.

The entire coastline of Clallam County has been identified as within the tsunami hazard area, but only the coast of the Strait of Juan de Fuca east of Neah Bay is in the planning

[246] Washington Emergency Management Division, *Washington State Enhanced Hazard Mitigation Plan*, https://mil.wa.gov/enhanced-hazard-mitigation-plan, dated October 1, 2023, accessed September 6, 2024.

area. That said, certain areas of the County are threatened by more extensive tsunami inundation. The entirety of the Ediz Hook including land area up to Port Angeles Terminal 3 is contained within the tsunami hazard area, along with Sequim Bay just outside of the eastern limits of the City of Sequim. Significant portions of the Lower Elwha S'Klallam Tribal lands, Quileute Tribal lands, Ozette Lake, and a northeastern section of the Makah Tribal lands spanning Cape Flattery Road are located within the tsunami hazard area.

Depending upon the extent and magnitude of a tsunami event, major transportation routes could become severely congested or inaccessible. Highway 101 is the only supply chain transportation route for evacuation during a hazard event, presenting significant logistic and evacuation vulnerability for the County. Logistic and evacuation efforts may face challenges due to limited exit routes available in the event of a tsunami where roads are destroyed or blocked by water, especially for socially vulnerable populations. As tsunami waters force sediment, pollutants, toxic substances, and debris into its inundation zones, water sources may be contaminated, and agricultural lands may be rendered useless.[247]

In the event of a major tsunami event, hazard impacts to critical facilities in the planning area such as local medical centers and bridges could severely impact the ability for first responders to enter the area, treat the injured, and would inhibit the ability for residents and visitors to evacuate. Critical facilities that are designated as shelter locations may be destroyed, flooded, or inaccessible during a tsunami event, increasing the vulnerability of the local population to secondary hazards such as associated structure fires or hazardous material spills in the event that facilities such as the Bunker Fuel Station or Port Angeles Boat Station are damaged.[248]

[247] NOAA, *Tsunami Dangers*, https://www.noaa.gov/jetstream/tsunamis/tsunami-dangers, accessed September 4, 2024.

[248] Ibid.

Tsunami Vulnerability Summary

Population & Development

3,527.86
People

1,582
Residential Units

232,290,998.75
Non-Residential Square Footage

Systems & Infrastructure

15
Food, Hydration, Shelter Facilities

15
Hazardous Materials

15
Safety and Security

6
Communications

3
Health and Medical

3
Energy (Power and Fuel) Facilities

3
Transportation

3
Water Systems

1
Other

Refer to Appendix D-2: *Vulnerability Summary*, for a detailed assessment of community lifelines and critical facilities.

4.14.6.1 Changes in Vulnerability

Since the previous update of the 2019 MJHMP, population patterns, development and land use have not substantially changed in Clallam County. As discussed in Section 3.5, the population increased nominally, from 75,474 individuals identified in 2019 MJHMP to 77,333 individuals identified in this MJHMP, representing a net growth of 1,859 individuals or 2.46 percent increase in the County. Generally, population and housing growth over the past five years is concentrated within the urbanized areas of Clallam County, mainly in the Cities of Port Angeles and Sequim. Because the population and development to accommodate this population represents a slight increase in these coastal communities over the last five years, the overall vulnerability to tsunamis increased slightly as well.

At the time of this MJHMP preparation, the County anticipates the majority of population growth, land use changes and development to occur within the designated Urban Growth Areas (UGAs). Mapped UGAs intersect with areas of tsunami vulnerability, which would ultimately increase tsunami vulnerability impacting portions of Port Angeles and Sequim. To a greater extent, Clallam Bay shows more intersection with tsunami vulnerability. However, there has been very limited development within the tsunami zone over the last 5 years and therefore the overall risk has not materially changed from the 2019 MJHMP.

The Washington Office of Financial Management develops population projections at the County level while local jurisdiction zoning is required to accommodate this projected growth. However, the exact type, location and timing of projected growth and development is unknown at the time of this MJHMP update. With limitations and assumptions of with the DNR Washington Geological Survey documented in the hazard profile above, it is reasonable to assume that any population growth and development to accommodate that growth along the coastline would increase tsunami vulnerability during the next five years.

4.14.6.2 Socially Vulnerable Populations

Mapped tsunami hazard areas intersect with identified SVPS within Census Tracts 7 and 9400 which correspond with portions of Port Angeles and parts of the Makah Indian Reservation. Specifically, individuals below the 150-percent poverty rate, aged 65 or older, disabled persons, persons reporting minority status, persons living within a

mobile home; populations of the Makah Tribe; and tourists, seasonal visitors, and transient populations throughout the coast of the County would potentially be impacted by a tsunami. The primary concern for SVPs and other high-risk individuals in the County would be evacuation efforts and access to emergency services and supplies.

Tsunamis can have severe impacts on socially vulnerable populations by affecting health and well-being, creating economic hardship, hindering access to resources, and causing social disruption. Those below the 150-percent poverty rate may be disproportionality affected as they lack the financial and healthcare resources to prepare for or recover from tsunamis, while elderly and disabled individuals may face mobility issues that delay evacuation and access to emergency services. Destruction of infrastructure from a tsunami can lead to poor drainage and sanitation causing breeding grounds for mosquitoes and other vectors. Minorities and tribal populations might experience additional barriers due to language, cultural differences, or historical marginalization. Mobile home residents are particularly at risk due to the susceptibility of their homes to flood damage caused by a tsunami. Transient groups such as tourists and seasonal visitors may lack local knowledge and resources, making it difficult for them to respond effectively tsunami hazards. Overall, these populations are more likely to suffer from delayed rescue operations, prolonged displacement, and increased health risks due to the compounded effects of flooding and inadequate infrastructure.

Considerations for SVPs throughout the planning area were incorporated into the mitigation strategy in Section 5.0. Specifically, the HMCR Steering Committee tailored Mitigation Actions #CC04, #CC21, and #CC35, to mitigate tsunami impacts on SVPs including issues related to preparedness, evacuations, and access to emergency services.

4.15 Wildfire

4.15.1 Description

Wildfire is an integral component of natural ecosystems. However, uncontrolled fires threaten lives, property, and natural resources, and present considerable risk to vegetation and wildlife habitats. Fires can occur in either wildland or urban areas and can be caused by human error (such as campfires), arson, mechanical ignition (such as

heaters and generators), and natural events (such as lightning). There are various types of wildfires including agricultural fires, forest fires, and wildland urban interface fires.

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.

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 the designated burn areas.

Wildland Urban Interface: There are three categories of interface fire: the classic wildland urban interface exists where well-defined urban and suburban development adjoins open wildland areas; the mixed wildland urban interface is characterized by isolated homes, subdivisions, and small communities situated predominantly in wildland settings; and the occluded wildland urban interface exists where islands of wildland vegetation occur inside a largely urbanized area.

Clallam County is at risk of agricultural, forest, and the various types of wildland urban interface fires. The County is characterized by various wildland urban interfaces, as well as forests and national parks.

In addition, the Clallam County Community Wildfire Protection Plan (CWPP) notes four types of wildfires the planning area experiences, listed below:

- Ground fires burn in natural litter, duff, roots, and sometimes high organic soils; these types of wildfires are difficult to detect and control, with a tendency to rekindle.
- Surface fires burn in grasses and low shrubs (up to 4’ tall) or in the lower branches of trees; these types of fires may move rapidly, ease of fire control depends on the fuel involved.

- Crown fires burn in the tops of trees; once started, these fires are very difficult to control as wind plays a significant role in the spread and movement.
- Spotting fires can be produced by crown fires as well as wind and topography conditions; large burning embers are thrown ahead of the main fire; once spotting begins, the wildfire is difficult to control.

Certain conditions must be present for significant wildfires to occur. Generally, the most common conditions include hot, dry, and windy weather; the inability of fire protection forces to contain or suppress the fire; the occurrence of multiple fires that overwhelm firefighting resources; and a large fuel load (dense vegetation). Individual factors known to affect wildfire risk, vulnerability and behavior within the planning area are summarized as follows:

- Fuels: Fuel for the planning area were modeled in the 2009 CWPP with available data from LANDFIRE, linking the vegetation type to an average set of fuel load to predict wildfire behavior. The majority of the planning area ranks between medium to high fuel hazard levels, with some lower hazard areas noted around urbanized areas such as the City of Sequim and Port Angeles.
- Slope: The geologic history of the planning area created a varied landscape of valleys and drainages running from the Olympic Mountains to the surrounding ocean. Intense precipitation in the area shapes sedimentary rocks, carving both steep canyons and wide drainages. Steep slopes increase a fire's rate of spread uphill and can create topographic influences on wind.
- Aspect: The planning area has many cloudy days, but solar insolation still has a large effect on fuels, especially during fire season. South-facing slopes receive much more solar radiation than slopes with a north aspect, due to the planning area mid latitude location near the 48th parallel. South slopes thus typically have drier fuels and soils, which affects fuel types and densities that can be grown on the slopes, as well as potential fuel moisture levels.
- Climate: Average maximum temperature and average precipitation measurements are used to represent climate hazard. These are the two factors that heavily influence fuel moisture content, and increased hazards are associated with higher temperatures and lower levels of precipitation.

- Response Time: Due to the rural nature of the region, response times for wildfire crews can be a critical factor in early suppression of wildfires that threaten development. There are few fire stations, and even fewer of them are staffed with full-time fire crews. The roadless areas of the planning area (including Wilderness Areas managed by NPS and USFS) also pose a challenge for transportation of fire suppression resources. Fire stations considered within the assessment include stations operated by the cities of Forks and Port Angeles, Clallam County Fire Districts, the Makah Reservation, Olympic National Forest, Olympic National Park, and Washington DNR.
- Viewshed: The transportation network across the Peninsula can be valuable for early fire detection. A viewshed of areas visible from major roads provides an assessment of areas of the Peninsula that—because fires or smoke plumes might be more quickly seen from areas more frequently traveled—could be detected more quickly after ignition. Faster detection can lead to better chances of earlier suppression by fire crews.

The CWPP concludes the following parameters create "Watch-Out" weather conditions where specific metrics can create more intense and destructive wildfire behavior, below:

- 20-foot wind speeds greater than 7 miles per hour.
- Sustained winds from the east (common in August to early October).
- Relative humidity below 40 percent.
- Temperatures above 72 degrees Fahrenheit.
- 1,000-hour fuel moisture below 17 percent.
- 14 days without rain.

Wildfires can pose secondary hazards such a flooding, erosion, and sedimentation. In addition, wildfire smoke is a recognized significant concern for the planning area and is discussed under a separate header within this hazard profile.[249]

[249] Ibid.

Image 10. Wildfire Makah Indian Reservation[250]

4.15.1.1 Wildfire Smoke [Secondary Impact]

Wildfire smoke poses a risk to Clallam County as a secondary hazard. Wildfire smoke is a mixture of gases and fine particles from burning trees, plants, buildings, and other materials.251 Fine particulate matter are particles smaller than 2.5 micrometers, which can be inhaled deeply into the lungs. When inhaled, fine particulate matter, also referred to as PM2.5, increases the risk of cardiovascular and respiratory problems. Additionally, wildfire smoke is a complex mixture that consists of other pollutants that have also been shown to lead to a variety of health effects.

Wildfire smoke distribution is affected by factors such as wind, weather, terrain, and fire heat intensity.252 Wind may affect wildfire smoke by either clearing out an area or blow more smoke in or fan the flames which can therefore intensify the fire and worsen

[250] KOMO News Staff, 3 wildfires burning on Makah Indian Reservation, evacuation orders issued, https://keprtv.com/news/local/makah-indian-reservation-wildfires-neah-bay-cape-flattery-hobuck-clallam-county-evacuations-emergency, November 17th, 2022.

[251] Centers for Disease Control and Prevention, *Protect Yourself from Wildfire Smoke*, https://www.cdc.gov/air/wildfire-smoke/default.htm, accessed April 15, 2024.

[252] United States Environmental Protection Agency, *Health Effects Attributed to Wildfire Smoke*, https://www.epa.gov/wildfire-smoke-course/challenges-predicting-smoke-concentrations, updated February 2, 2024, accessed June 19, 2024.

smoke.253 Intense heat generated by wildfire can drive smoke high into the air where it remains until it cools and beings to descend to ground level however it becomes more diluted and widespread. Terrain affects smoke concentrations by altering dispersal patterns. For example, as the sun warms mountain slopes, air is heated and rises, ultimately bringing smoke and fire with it from lower elevations. After sunlight passes, the terrain cools and the air descend, creating a down-slope airflow that can alter smoke dispersal. Wildfire smoke from more local fires can travel and impact large population centers.

Image 11. Brush Fire West of Port Angeles[254]

4.15.2Location/Extent

As previously discussed, the location of wildfire risk is dependent on many variables including availability of fuel, climate and rainfall, topography, temperature, and wind patterns. In general, wildfire risk is lower where vegetation receives adequate rainfall

[253] Ibid.

[254] Sequim Gazette, Brush fire burns 5 acres west of Port Angeles, https://www.sequimgazette.com/news/brush-fire-burns-5-acres-west-of-port-angeles/, July 2023.

and temperatures are low. Despite the temperate climate, the risk of wildfire exists throughout Clallam County; refer to *Exhibit 4-21. Wildland Urban Interface*. The Washington Department of Natural Resources (DNR) produces statewide data mapping the Wildland-Urban Interface, data illustrating where wildlands and human development either meet or intermingle. Wildlands within Clallam County are generally mapped as forests, but also include grassland and sagebrush-steppe habitat.

DNR defines the wildland urban interface as those areas where development and structures meet areas covered with more than 50 percent wildlands. To be considered urban interface, development and structures must be bordered by wildlands on at least one side. The wildland urban intermix is defined as those areas where structures intermingle with wildlands. To be considered intermix, a development or structure must be surrounded on two or more sides by wildlands. Wildland urban intermix is generally found mapped between the interface and the wildlands in *Exhibit 4-21. Wildland Urban Interface*, below.[255]

DNR stipulates the Wildland-Urban Interface map is not a wildfire risk map, and therefore should be used as a tool or resource to assist decision making in coordination with other data. In acknowledging the data limitations associated with the DNR Wildland-Urban Interface map, the HMCR Steering Committee evaluated alternative wildfire risk maps and resources for use of understanding vulnerability in Clallam County. The previous 2019 MJHMP cited data from the United States Department of Agriculture (USDA) and United States Forest Service (USFS) Wildfire Hazard Potential map. In reviewing the latest 2022 USDA Wildfire Hazard Potential Map, the HMCR Steering Committee concluded that this risk map product significantly underestimated current risk and vulnerability in Clallam County. The Washington SEHMP generated wildfire risk data based on wildfire "hot spots" between 1970 – 2020; the majority of Clallam County was mapped as "not significant" in terms of wildfire risk, with approximately 1/3rd of the planning area mapped as "cold spots" with 90 to 95 percent confidence indicating a low wildfire hazard risk. The HMCR Steering Committee determined these findings were not an accurate reflection of local conditions and

[255] Washington Department of Natural Resources, *The Wildland-Urban Interface – Mapping Washington State's Fastest Growing Environment,* https://storymaps.arcgis.com/stories/7016c437623a445997c072a05e26afbb, published May 30, 2024, accessed August 19, 2024.

experience. In addition, the MJHMP Project Management Team was unable to locate geographic information system (GIS) mapping data or products associated with the 2009 CWPP.

Due to these data gaps and limitations outlined above, the MJHMP Project Management Team determined that the DNR Wildland-Urban Interface map is the most relevant product for vulnerability mapping purposes in this plan. Areas of highest vulnerability for wildfire risk were determined to be the wildland urban interface and the wildland urban intermix zones, mapped on *Exhibit 4-21. Wildland Urban Interface*. It is acknowledged that wildfire risk and vulnerability does exist in both the mapped Long-Term Non-Buildable Areas and Vegetated Uninhabited zones; a wildfire that occurs within these mapped areas has the potential to affect or impact populations, development and systems within the planning area. The steep slopes and heavy vegetation of Olympic National Park, Olympic National Forest, and other state/federal parks and lands are at risk of large forest fires. The wildfire risk associated with these areas largely encompass central areas of Clallam County, where wildfire could easily spread into more developed or urbanized areas of the planning area. Forest fires in this area would be particularly difficult to combat considering the terrain, limited fire roads and other access challenges.

The wildland urban interface and intermix zones have a significant cross section with Clallam County populations, development, and critical facilities where wildfire impacts would be most significant. Therefore, for the purposes of this hazard profile and vulnerability assessment, populations, development, and critical facilities within the wildland urban interface and intermix zones are considered vulnerable.

The most significant wildland urban interface areas generally surround the three cities within the planning area, Cities of Port Angeles, Sequim, and Forks. Pockets of wildland urban intermix can be found around major transportation corridors in Clallam County, including Highways 101, 112, 113 and 110. In addition, the City of Forks is surrounded by commercial forests, posing a unique risk and vulnerability to this jurisdiction. Many older structures throughout the County were constructed before modern fire codes and fire-resistant building materials, which could further compound the locations of risk and vulnerability. To support understanding of wildfire risk and response efforts, the County is currently working on the creation of a Community Wildfire Protection Plan utilizing a $125,000 grant awarded by USDA.

The extent of wildfire impacts can vary significantly based on the size, scale, location, and duration of the fire. Wildfires are usually classified by size or impact. Significant wildfires may burn hundreds of thousands of acres and/or destroy large numbers of buildings. The size and severity of any fire depends on the availability of fuel, weather conditions, and topography, although wildfires in the wildland urban interface do not need to be significant in acreage to be damaging. Even small fires have been known to cause significant property damage or loss of human life. *Table 4-18. NWCG Wildfire Size Classifications*, shows the National Wildfire Coordinating Group (NWCG) Wildfire Size Classifications, which detail the potential extent of a wildfire event in the planning area.

Table 4-18. NWCG Wildfire Size Classifications

Classification	Description
Class A	One-fourth acre or less
Class B	More than one-fourth acre, but less than 10 acres
Class C	10 acres or more, but less than 100 acres
Class D	100 acres or more, but less than 300 acres
Class E	300 acres or more, but less than 1,000 acres
Class F	1,000 acres or more, but less than 5,000 acres
Class G	5,000 acres or more

Source: NWCG, *Size Class of Fire*, https://www.nwcg.gov/node/432922, accessed May 13, 2024.

While wildfire size is helpful in describing the magnitude of a wildfire, wildfire size is not always the optimal indicator of extent and magnitude due to the complexity of wildfire events. Measuring the severity of a fire through impacts to the population, property, and environment provides a more comprehensive approach in determining the potential extent of wildfires. Wildfires can be measured by a variety of metrics including acreage, impacts to the local population such as fatalities, structural damage, or response requirements from public safety agencies.

Fire severity refers to the effects of a fire on the environment, typically focusing on the loss of vegetation both above ground and below ground but also including soil impacts.[256] Wildfire severity can be broken into categories of low, medium, and high severity as defined by the Northwest Fire Science Consortium (NFSC). Beyond the size of the fire, classifying wildfire by severity allows the potential extent of the fire to be demonstrated through additional metrics, such as how destructive it may be to the surrounding area. These fire severity classifications are shown in *Table 4-19. NFSC Fire Severity Classifications*, below.

[256] NFSC, *What is Fire Severity?*, https://www.nwfirescience.org/sites/default/files/publications/Fire%20Severity.pdf, accessed May 13, 2024.

Exhibit 4-21. Wildland Urban Interface

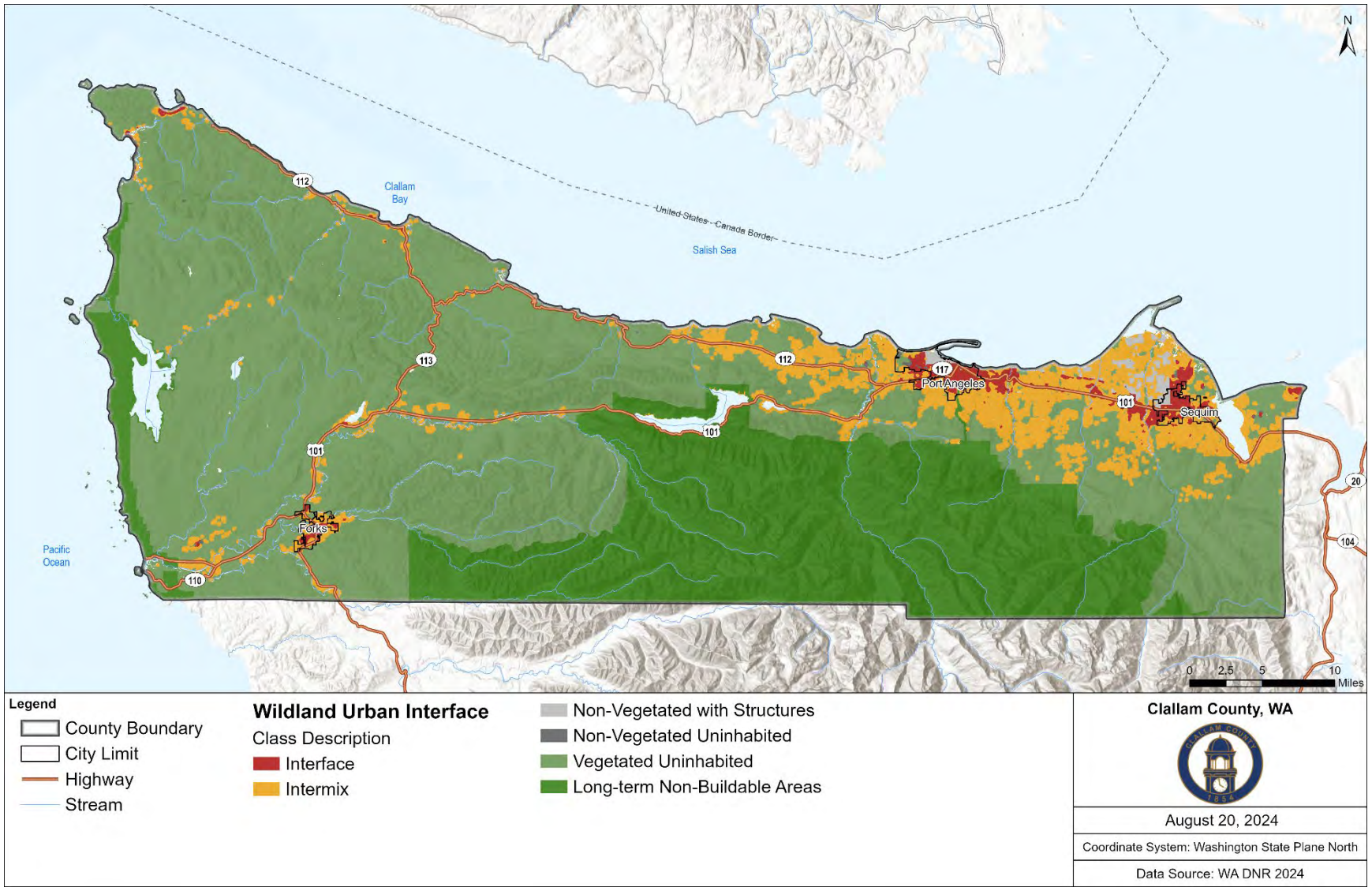

Table 4-19. NFSC Fire Severity Classifications

Classification	Description
Low	A fire that has limited effect on overstory trees (<30% mortality), understory vegetation, and soils.
Moderate	A fire producing variable, moderate effects on overstory trees, averaging 30-80% of the vegetation killed, and/or moderate soil exposure.
High	A fire producing a high percent of overstory tree mortality (>80%) and/or extensive mineral soil exposure.

Source: NFSC, *What is Fire Severity?*, https://www.nwfirescience.org/sites/default/files/publications/Fire%20Severity.pdf, accessed May 13, 2024.

4.15.2.1 Wildfire Smoke [Secondary Impact]

The geographic location of wildfire smoke risk would extend beyond the wildfire, potentially travelling hundreds or thousands of miles. Therefore, the wildfire smoke hazard location includes any areas susceptible to wildfire and potentially extend throughout the County. Additionally, Clallam County may be susceptible to wildfire smoke associated with wildfires that occur outside of the planning area, potentially outside of the state or even the country.

The extent of wildfire smoke would depend heavily on the size and severity of the wildfire as well as weather and wind patterns. Larger wildfires generally create more significant wildfire smoke impacts that extend throughout the County. This may be exacerbated by strong winds which would drive the smoke further throughout the planning area. Various health impacts are associated with wildfire smoke and poor air quality including coughing, phlegm, wheezing, difficulty breathing, eye irritation, heart failure, and death. Impacts would worsen with increased duration of exposure.

The extent of poor air quality due to wildfire smoke is measured by the Air Quality Index (AQI). The AQI focuses on health effects within a few hours or days after breathing polluted air. The EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter),

carbon monoxide, sulfur dioxide, and nitrogen dioxide.[257] The AQI is divided into six categories ranging from good to hazardous (refer to *Table 4-20. Air Quality Index Table*).

Table 4-20. Air Quality Index Table

Air Quality Index	Category	Associated Health Impacts
0 – 50	Good	Air quality is satisfactory and poses little or no risk
51 – 100	Moderate	Sensitive individuals should avoid outdoor activity as they may experience respiratory symptoms
101 – 150	Unhealthy for Sensitive Groups	General public and sensitive individuals in particular are at risk to experience irritation and respiratory problems
151 – 200	Unhealthy	Increased likelihood of adverse effects and aggravation to the heart and lungs among general public
201 – 300	Very Unhealthy	General public will be noticeably affected. Sensitive groups should restrict outdoor activities.
301 – 500	Hazardous	General public at high risk of experiencing strong irritations and adverse health effects. Should avoid outdoor activities.
Source: United States Environmental Protection Agency, Patient Exposure and the Air Quality Index, https://www.epa.gov/ozone-pollution-and-your-patients-health/patient-exposure-and-air-quality-index, accessed September 10, 2024.		

Health effects of wildfire smoke may be relatively minor, such as respiratory irritation, or may be serious and cause significant respiratory problems, heart failure, and death.[258]

[257] National Weather Service NOAA, *Air Quality Index*, https://www.weather.gov/safety/airquality-aqindex, updated 2024, accessed June 19, 2024.

[258] United States Environmental Protection Agency, *Health Effects Attributed to Wildfire Smoke*, https://www.epa.gov/wildfire-smoke-course/health-effects-attributed-wildfire-smoke, accessed April 15, 2024.

Certain groups of people are more susceptible to the effects of wildfire smoke, particularly vulnerable populations include people with pre-existing health conditions (asthma, chronic respiratory conditions, cardiovascular disease), children 18 and younger, people over the age of 65, pregnant people, outdoor workers, people of color, tribal and indigenous people, and people with low income and/or people experiencing homelessness.[259]

4.15.3 Previous Occurrences

Clallam County has a history of both wildfire and urban fires. According to the Community Wildfire Protection Plan (CWPP), major wildfires have burned within the planning area every 200 – 300 years and the pattern of occurrences appears to be linked to long-term variations in climate. Medium-sized, less intense fires occur more frequently, as often as 20 years for any given area. Small fires of a few acres or less occur every year in Clallam County.[260] Wildfires in Clallam County typically occur during the dry summer months of July, August, and early September. Wildfire risk increases in the late summer and early fall when hot, dry east winds occur more frequently and the area has experienced the low point of the annual precipitation cycle.

The most significant historic wildfire within the planning area is the Great Forks Fire of 1951. Following a very dry summer, the Great Forks Fire began in the Olympic National Forest near Lake Crescent on September 20, 1951. High winds caused the fire to spread quickly and travel southwest toward the City of Forks. The fire burned approximately 38,000 acres including privately owned, state land, and national forest land. In the City of Forks, approximately 30 buildings including several homes, businesses, and shops were destroyed.[261]

More recently, Clallam County has experienced minor wildfire impacts which have typically begun as slash and burn fires that grew out of control. Minor wildfires occurred during 2002 in the Clallam Bay area, during 2004 near Joyce at Striped Peak, during

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[259] United States Environmental Protection Agency, *Health Effects Attributed to Wildfire Smoke*, https://www.epa.gov/wildfire-smoke-course/health-effects-attributed-wildfire-smoke, accessed April 15, 2024.

[260] Clallam County, *Community Wildfire Protection Plan*, December 2009.

[261] Olympic Peninsula Community Museum, *The Great Forks Fire of 1951*, https://content.lib.washington.edu/cmpweb/exhibits/forksfire/index.html, accessed April 15, 2024.

2006 near Joyce, and during 2007 near Port Angeles Fairchild Airport. These fires generally burned only a few acres with minimal or highly localized impacts. From January 2008 to August 2009, 38 different wildfire incidents have occurred within Clallam County, outside of Olympic National Park.[262] More recently, the County experienced the Hurricane Ridge Fire that burnt down the Hurricane Ridge Welcome Center on May 7, 2023, as well as the fire on Makah Reservation a month later on June 17, 2023. The City of Forks also experienced a wildfire in July of 2023, as well as the wildfire the same summer near Joyce Access Road off Highway 101. It was estimated that 85 acres burned before helicopters and aircraft were called in to extinguish the fire.[263]

Urban fires have occurred throughout the County, but impacts are often localized. However, 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.

No federally declared disasters relating to wildfire have impacted the planning area within the last five years; refer to *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years*.

One Washington State emergency proclamation over the last five years concerning wildfires impacted the planning area:

- Emergency Proclamation By the Governor (7/6/21) (Wildfires- Burn Ban – prohibiting all outdoor and agricultural burning throughout the State).

4.15.3.1 Wildfire Smoke [Secondary Impact]

During Labor Day weekend of 2020, wildfires occurred across the state moved into the Olympic Peninsula overnight.[264] The atmosphere conditions consisted of reduced moisture levels, low humidity, and warmer weather, with high levels of smoke in the air. The Clallam County Department of Health and Human Services advised County

[262] Peninsula College Center of Excellence, *Clallam County Community Wildfire Protection Plan*, December 2009.

[263] KIRO 7 News, *Helicopters and Aircraft Called in After Clallam County Wildfire Spreads to Estimated 85 Acres*, https://www.kiro7.com/news/local/helicopters-aircrafts-called-after-clallam-county-wildfire-spreads-estimated-85-acres/5H7B2X7NXVCMJKYFS2CTMGWIVQ/, accessed April 15, 2024.

[264] Sequim Gazette, *Smoke, haze on peninsula from state wildfires*, Smoke, haze on peninsula from state wildfires | Sequim Gazette, published September 8, 2020, accessed August 13, 2024.

residents to limit outdoor activity, keeping indoor air clean, increase HVAC filtration, and seeking cleaner and cooler air elsewhere with COVID-19 guidance limitations. The fires also resulted in a campfire ban that continued through September 15, 2020.

On September 18, 2023, the Delabarre Fire in the Delabarre Creek drainage in the south-central portion of the Olympic National Park exploded from 1 acre in size to 1,500 acres resulting in smoke seeping into lowlands.[265] Warm temperatures, low relative humidity, and winds from the south pushed the wildfire smoke into areas including downtown Sequim, Elwha Valley, Port Angeles, and into the Strait of Juan de Fuca. The monitoring stations at the Lower Elwha Klallam reservation and Lower Elwha fish hatchery read over 400 AQI which is considered hazardous for people and animals.[266] The smoke later subsided and showed pollution at 207 AQI near the shore and 288 AQI in the interior which is considered very unhealthy.[267]

4.15.4 Probability of Future Occurrences

Given the history of wildfire events in Clallam County, the probability of wildfire and wildfire smoke occurring in the future is considered likely. A likely probability means a 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years. The combination of fuels, weather, and topography, along with the presence of wildland urban interfaces, creates a risk for personal injury, loss of life, and damage to property. However, the area typically receives enough precipitation to suppress wildfire conditions, making large wildfires an uncommon occurrence in the past. Wildfire smoke as a secondary hazard is also considered to have a likely probability of occurrence in the future for similar reasons.

While the County has a limited history of major wildfire occurrences, there is a likelihood of future wildfire occurrence in surrounding areas. Outbreaks of wildfire may occur during the dry season or following periods of limited rainfall or drought. Large regional

[265] Sequim Gazette, *Wildfire surge in Olympic National Park*, https://www.sequimgazette.com/news/wildfires-surge-in-olympic-national-park, published September 18, 2023, accessed June 17, 2024.

[266] Peninsula Daily News, *Wildfire smoke pools on Elwha Reservation, Port Angeles on Friday,* https://www.peninsuladailynews.com/news/wind-blows-smoke-into-elwha-valley/, published September 23, 2023, accessed June 17, 2024.

[267] Ibid.

fires outside of Clallam County may result in wildfire smoke impacts depending on the severity, location, weather, and wind patterns of the fire.

In June of 2009, the Board of Clallam County Commissioners authorized funding for Peninsula College Center of Excellence to research and develop a Community Wildfire Protection Plan (CWPP) in conjunction with state and federal agencies, fire protection districts, and community organizations throughout the County. The CWPP identifies communities at risk, prioritizes hazardous fuel treatments, and recommends ways to reduce structural ignitability. At the time of this writing, Clallam County is in the process of comprehensively updating the CWPP. Mitigation actions within this MJHMP are complimentary to the CWPP and help to reduce the potential impacts of wildfire events.

4.15.5 Climate Change

Climate change and global warming patterns cause an increase in temperatures, as well as more frequent and intense drought conditions. This is understood to be a contributing factor to more frequent and severe wildfires. As mentioned previously, the severity of a wildfire is dependent on the amount of oxygen, heat, wind, relative humidity, and fuel. Most of these factors have direct or indirect ties to climate change and increased global temperatures.

A 2016 study identified the contribution of climate change to dry vegetation as it doubled the occurrence of large fires from 1984 and 2015 throughout the western United States.[268] As climate change continues to increase global temperatures, drought conditions and excessive heat may become more common.[269] Excessive heat and low humidity during the summer and fall months are likely to occur. This would increase dry vegetation, which could cause wildfires to move more quickly or spread into developed areas. A study conducted by Dr. Zeng and Dr. Harvey also shows that climate change

[268] John, T. Abatzoglou, and A. Park William, "Impact of Anthropogenic Climate Change on Wildfire Across western US Forests," *Proceedings of the National Academy of Sciences*, October 18, 2016. https://www.pnas.org/doi/full/10.1073/pnas.1607171113, accessed April 15, 2024.

[269] National Oceanic and Atmospheric Administration, *Wildfire Climate Connection*, https://www.noaa.gov/noaa-wildfire/wildfire-climate-connection, accessed April 15, 2024.

has cause increased wind speeds since at least 2010 which together with extreme heat and drought make for extremely dangerous fire conditions.[270]

Regional wildfires will likely become an increased threat in Clallam County and surrounding areas. Wildfires release smoke, ash, and other particulate matter that degrade air and water quality. Thus, fires located in various parts of Clallam County and surrounding areas can negatively impact air and water quality throughout the planning area. As such, wildfire mitigation should consider the cumulative impacts associated with climate change.

4.15.5.1 Wildfire Smoke [Secondary Impact]

As climate change increases the intensity and frequency of wildfires, this will inevitably increase the amount of wildfire smoke. According to the Stanford Center for Innovation in Global Health, about one-third of all particulate matter pollution in the United States comes from wildfire smoke – wildfires that are more intense and common because of climate change.[271]

4.15.6 Vulnerability and Risk Assessment

As previously discussed in this hazard profile, the HMCR Steering Committee selected the Washington DNR Wildland-Urban Interface data to assess wildfire risk and vulnerability. DNR stipulates that the Wildland-Urban Interface map is not a wildfire risk map, and therefore should be used as a tool or resource to assist decision making in coordination with other data. In acknowledging the data limitations associated with the DNR Wildland-Urban Interface map, the HMCR Steering Committee evaluated alternative wildfire risk maps and resources for use of understanding vulnerability in Clallam County, and found the following data limitations and gaps:

- USDA and USFS Wildfire Hazard Potential Map significantly underestimates current risk and vulnerability in Clallam County.

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[270] Washington Emergency Management Division, *Washington State Enhanced Hazard Mitigation Plan,* 2023_WA_SEHMP_final_20231004.pdf, approved October 1, 2023, accessed August 13, 2024.

[271] Stanford Center for Innovation in Global Health, *How climate change exacerbates air pollution (and its health impacts)*, https://globalhealth.stanford.edu/planetary-health-fellowship/how-climate-change-exacerbates-air-pollution-and-its-health-impacts.html/, published August 24, 2023, accessed June 19, 2024.

- Washington SEMP Wildfire "hot spots" utilizing data between 1970 – 2020 concluded there was no significant wildfire risk in the majority of Clallam County, and 1/3rd of the planning area was mapped as "cold spots" with 90 to 95 percent confidence indicating a low wildfire hazard risk.
- The 2009 CWPP geographic information system (GIS) mapping data or products were unavailable.

Therefore, the MJHMP Project Management Team determined that the DNR Wildland-Urban Interface map is the most relevant product for vulnerability mapping purposes in this plan. Areas of highest vulnerability for wildfire risk were determined to be the wildland urban interface and the wildland urban intermix zones; populations, development, and critical assets within these zones are summarized below. It is acknowledged that wildfire risk and vulnerability does exist in both the mapped Long-Term Non-Buildable Areas and Vegetated Uninhabited zones; a wildfire that occurs within these mapped areas has the potential to affect or impact populations, development, and systems within the planning area. However, for the purposes of this vulnerability assessment the wildland urban interface and intermix zones were concluded to have the highest levels of vulnerability and risk.

It is noted that the County has procured a USDA grant to prepare an update to the 2009 CWPP in partnership with a consultant and local stakeholders. At the time of future MJHMP update, data specifically tailored to risk and vulnerability in the planning area will be available for use by the HMCR Steering Committee.

Approximately 30,793 residential units are located within the wildfire vulnerability area. Vulnerable residential units multiplied by the average 2.23 persons per household for Clallam County indicates that approximately 68,668 people reside in a wildfire hazard zone. Additionally, over 15.4 billion square feet of non-residential structures are located within the wildfire vulnerability area.

Significant portions of the City of Port Angeles, City of Sequim, and City of Forks are located within mapped Wildland Urban Interface (WUI) areas that are further categorized as Interface WUI or Intermix WUI areas. Interface WUI describes areas of high-density housing development adjacent to undeveloped wildland vegetation, while Intermix WUI describes areas of lower-density housing mingled with undeveloped

wildland vegetation.[272] Vulnerability mapping of Port Angeles, Sequim, and Forks has identified widespread Interface WUI near the central portions of the cities, along with large areas of Intermix WUI outside of city limits. The identified Intermix WUI areas extend from approximately the City of Shadow along Highway 112/101 to the eastern border of the County. Interface WUI has also been identified in the northwestern area of the County near Neah Bay on Makah Tribal lands.

Depending upon the extent and magnitude of a wildfire event, major transportation routes could become severely congested or inaccessible. Highway 101 is the only major transportation route for evacuation during a hazard event, presenting significant evacuation vulnerability for the County. Evacuation efforts may face challenges due to limited exit routes available in the event of a wildfire, especially for socially vulnerable populations. Wildfire smoke may cause emergency medical events that hinder the ability for residents and visitors to exit the hazard area, and smoke may be carried through the air to areas outside of the County, impacting the health of nearby populations. In the event of a major wildfire event, wildfire impacts to critical facilities in the planning area such as local pump stations, reservoirs, water treatment facilities, and other utility stations could result in loss of power, gas, and water supply. Critical facilities that are designated as shelter locations may be damaged or inaccessible during a wildfire event, increasing the vulnerability of the local population to secondary hazards such as smoke inhalation.

[272] NIST, *WUI Definitions*, https://www.nist.gov/el/fire-research-division-73300/wildland-urban-interface-fire-73305/hazard-mitigation-methodology-9#:~:text=The%20WUI%20is%20often%20further,mingled%20with%20undeveloped%20wildland%20vegetation., accessed September 3, 2024.

Wildfire Vulnerability Summary

Population & Development

68,668
People

30,793
Residential Units

15.4 billion +
Non-Residential Square Footage

Systems & Infrastructure

The number of critical facilities categorized by community lifeline type located within the mapped wildfire hazard zone.

130
Food, Hydration, Shelter Facilities

80

71

41
Energy (Power and Fuel) Facilities

20

19

15

9

4

Refer to Appendix D-2: *Vulnerability Summary*, for a detailed assessment of community lifelines and critical facilities.

4.15.6.1 Changes in Vulnerability

Since the 2019 MJHMP, population patterns, development and land use have not substantially changed in the planning area. As discussed in Section 3.5, the County population increased from the 2019 MJHMP by 1,859 individuals, or 2.46 percent. Similarly, the County housing stock also increased to correlate with population growth, representing a net growth of 1,082 units or 2.93 percent increase. Generally, population and housing growth over the past five years is concentrated within the urbanized areas of Clallam County, primarily in the Cities of Port Angeles of Sequim. Because the population and development to accommodate this population increased in the last five years, the overall vulnerability to wildfire increased as well.

At the time of this MJHMP preparation, the County anticipates the majority of population growth, land use changes and development to occur within the designated Urban Growth Areas (UGAs). All mapped UGAs intersect with areas of high wildfire vulnerability, which would ultimately increase wildfire vulnerability over the next five years. The Port Angeles, Sequim, Forks, and Carlsborg show the most significant intersection with wildfire vulnerability with significant portions of each UGA mapped as wildland urban interface and intermix. To a lesser extent, the Joyce and Clallam Bay show an intersection with primarily the wildland urban intermix.

It is acknowledged the Washington Office of Financial Management develops population projections at the County level, and local jurisdiction zoning is required to accommodate this projected growth. However, the exact type, location and timing of projected growth and development is unknown at the time of this writing. While limitations and assumptions with the DNR Wildland Urban Interface are documented in the hazard profile above, it is reasonable to assume that any population growth and development to accommodate that growth would result in increased wildfire vulnerability during the next five years.

4.15.6.2 Socially Vulnerable Populations

Wildfire hazards overlay within Census Tracts 3, 7, 21, 24, and 9400 which consist of Forks, Port Angeles, and Sequim as well areas within the western portion of Clallam County and the Makah Indian Reservation. Additionally, wildfire zones are located throughout Clallam County and may impact SVPs and other high-risk individuals throughout the planning area. Wildfire and wildfire smoke impacts may affect socially

vulnerable populations disproportionally especially in healthcare and access to resources.

For elderly populations, wildfires and exposure to wildfire smoke can further exacerbate health issues such as respiratory and cardiovascular conditions and general health including eye and throat irritation, headaches, and fatigue. Elderly individuals and children may be more susceptible to harmful effects of wildfire smoke due to their developing and weakened immune system. The SVPs throughout Clallam County can be affected by wildfire smoke as this hazard as the potential to reach entirety of the County.

During a wildfire incident, elderly and disabled residents may be unable to evacuate outside of the planning area. Cost-burned households may lack personal vehicles to evacuate outside of the planning area. Individuals who live in remote areas may have restricted evacuation routes making it difficult to leave the planning area. Minorities and tribal populations might experience additional barriers due to language, cultural differences, or historical marginalization. Transient groups like tourists and seasonal visitors may lack local knowledge and resources, complicating evacuation response during a wildfire. Overall, these populations are more likely to suffer from delayed rescue operations, prolonged displacement, and increased health risks due to the compounded effects of wildfire and wildfire smoke.

Lastly, the high concentration of elderly and individuals with disabilities within Census Tract 21 and 24 may prevent households from taking personal wildfire mitigation actions such as vegetation management and clearance. Cost-burdened households or persons living in poverty may lack the financial means to conduct wildfire retrofits that would reduce vulnerability. The County identifies a list of mitigation actions in Section 5.0 pertaining to these issues. Specifically, the HMCR Steering Committee tailored Mitigation Actions #CC26, #CC27, and #CC33, to mitigate wildfire and wildfire smoke impacts on SVPs including issues related to preparedness, evacuations, and access to emergency services.

4.16 Summary of Vulnerability

One of the primary outputs of the vulnerability and risk assessment is the determination of which critical facilities are located within hazard zones. A summary of critical facilities that intersect with hazard areas throughout the planning area is provided in Appendix D-2: *Vulnerability Summary*. This information is valuable as it shows if certain critical facilities are vulnerable to some, many or all hazards.

4.17 Summary of Federally Declared Disasters Affecting the Planning Area

As required by the recent FEMA policy guidelines updated, a summary of federally declared disasters specifically affecting the planning area within is included below as *Table 4-21*. Specific effects are also outlined in the hazard profiles, previous occurrences sections (where applicable) within Sections 4.5 to 4.15, above.

In addition, the HMCR Steering Committee felt it was important to list all hazard disaster declarations on record, dating back to 1979. While not required, this additional context is included below as *Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years* to add further historical detail to this MJHMP.

Table 4-21. Summary of Federally Declared Disasters Affecting the Planning Area within Past Five Years

Declaration Date	Disaster Number	Incident Subcategory	Incident Description	Effect on Planning Area
April 29, 2024	4775	Severe Storm	**Washington Storms, High Tides, Mudslides, Flooding**: On March 29, 2024, President R. Biden approved disaster declaration for Washington for emergency work and the repair or replacement of facilities damaged by the severe winter storms, straight-line winds, flooding, landslides, and mudslides that occurred from January 5- 29, 2024 in Clallam County and 15 other counties and one confederated tribe.	Damages from the extreme weather including straight-line winds, ice, extreme cold temperatures, and heavy rainfall caused an estimated $30 million in damages.[273] The Clallam County experienced much sanding and plowing in Sequim and Port Angeles areas while many schools and municipal buildings also closed due to increment weather. Many vehicles within the planning area ended up in ditches, along roadsides, and in collisions.
January 12, 2023	4682	Severe Storm	**Washington Severe Winter Storm,**	Clallam County experienced flood

[273] NBC, *Governor Inslee issues emergency proclamation after Jan. storms cause $30 million in damage statewide*, https://www.nbcrightnow.com/news/governor-inslee-issues-emergency-proclamation-after-jan-storms-cause-30-million-in-damage-statewide/article_2198218a-e2f9-11ee-a1a5-1f5da5a78c2a.html, published March 15, 2024, accessed September 16, 2024.

Declaration Date	Disaster Number	Incident Subcategory	Incident Description	Effect on Planning Area
			Straight-line Winds, Flooding, Landslides, and Mudslides: On November 15, Governor Inslee declared a severe weather state of emergency. On January 12, 2023, President R. Biden approved disaster declaration for emergency protective measures, including direct federal assistance for emergency work and the repair or replacement of disaster-damaged facilities for Clallam County and 8 other counties during the November 3-8, 2022, severe winter storm, straight-line winds, flooding, landslides, and mudslides.	inundation and evacuations after severe wind and rainstorms lasted several days. Clallam County PUDF reported extensive outages due to multiple power lines downed in several locations. [274] Western Clallam County also experienced a significant landslide on HWY 112 which blocked portions of the highway for several months.

[274] The Seattle Times, *Thrashing winds leave thousands without power in Western Washington,*

Declaration Date	Disaster Number	Incident Subcategory	Incident Description	Effect on Planning Area
March 29, 2022	4650	Flood	**Washington Severe Winter Storms, Snowstorms, Straight-line Winds, Flooding**: December 26, 2021, to January 15, 2022. Total public assistance granted $16,094,227.72.	As of May 17, 2022, Clallam County was included in the public assistance designated areas. The Department of Ecology's Washington Conservation Crops (WCC) responded to help request from Forks and assessed homes in Forks, helped remove damaged materials from homes affected by flood water, and prepared each residence for mold treatment.[275]
January 5, 2022	4635	Flood	**Washington Flooding and Mudslides:** On January 5, 2022, President Joe Biden declared that a major disaster period of November 13, 2021 – December 2, 2021, allowing Hazard	During November 2021, heavy rains resulted in record river flooding in the western portion of the County. Several jurisdictions lost power including Sequim and

[275] Washington State Department of Ecology, *Working to reduce Washington flood risks,* https://ecology.wa.gov/blog/december-2021/working-to-reduce-washington-flood-risks, published December 15, 2021, accessed September 16, 2024.

Declaration Date	Disaster Number	Incident Subcategory	Incident Description	Effect on Planning Area
			Mitigation Grant Program available for hazard mitigation measures statewide. A total number of 932 residences were impacted while the countywide per capita impact indicator was around $4.10.	Carlsborg. Winds in Port Angeles neared 60 mph. City of Forks evacuated the Three Rivers area. Major highway closures and damages due to flooding and mudslides included: Highway 112, 113 and 101. [276]
April 8, 2021	4593	Severe Storm	**Washington Severe Winter Storm, Straight-line Winds, Flooding, Landslides, and Mudslides:** On April 8, 2021, President Joseph R. Biden Jr. approved of federal disaster assistance for emergency work and repair or replacement of facilities damaged by the winter storm in Clallam County and 15 other counties. The total public assistance	During December 2020, a severe winter storm resulted in wind, flood, and landslide damage in Clallam County. Specific impacts to Clallam County were not included in available FEMA press releases.

[276] Peninsula Daily News, *Flooding shuts down Highway 101, cutting off West End,* https://www.peninsuladailynews.com/news/flooding-shuts-down-highway-101-cutting-off-west-end/, accessed September 18, 2024.

Declaration Date	Disaster Number	Incident Subcategory	Incident Description	Effect on Planning Area
			grants dollars obligated equaled $19,126,125.88, with hazard mitigation grant program dollars obligated totaled $3,301,155.39. The countywide per capita impact indicator was estimated at $3.89 with Clallam County estimated $5.11.	
March 22, 2020	4481 and 3427	Biological	**Washington Covid-19 Pandemic:** On March 20, 2020, Governor Jay Inslee requested a major disaster declaration due to the COVID-19 pandemic beginning on January 20, 2020 requesting for Individual Assistance, including the Individuals and Households Program, Crisis Counseling Program, Disaster Unemployment Assistance, Disaster Case Management, and Disaster Legal	Similar to other jurisdictions across Washington state, Clallam County was affected by the COVID-19 pandemic. In April 2020, the County implemented Stay Home - Healthy Order which limited non-essential social gatherings and non-essential business operations across the planning area.

Declaration Date	Disaster Number	Incident Subcategory	Incident Description	Effect on Planning Area
			Services statewide and emergency protective measures (Category B), including direct Federal assistance under the Public Assistance program statewide. The countywide per capita impact indicator equaled $3.84.	
March 4, 2019	4418	Severe Storm	**Washington – Severe Storms, Straight-line Winds, Flooding, Landslides, Mudslides, and a Tornado:** On February 19, 2019, Governor Jay Inslee requested a major disaster declaration due to severe winter storms, straight-line winds, flooding, landslides, mudslides, and a tornado during the period of December 10-24, 2018. The Governor requested a declaration for Public	During December 2018, a severe winter storm resulted in wind, flood, and landslide damage in Clallam County. Specific impacts to Clallam County were not included in available FEMA press releases.

Declaration Date	Disaster Number	Incident Subcategory	Incident Description	Effect on Planning Area
			Assistance for 14 counties. The countywide per capita impact indicator equaled $17.78.	

Table 4-22. Summary of Federally Declared Disasters Affecting the Planning Area

Declaration Date	Disaster Number	Incident Subcategory
February 2, 2016	4253	Flood
January 15, 2016	4249	Severe Storm
October 15, 2015	4242	Severe Storm
March 5, 2012	4056	Severe Storm
January 30, 2009	1825	Flood
December 8, 2007	1734	Severe Storm
February 14, 2007	1682	Severe Storm
May 17, 2006	1641	Severe Storm
September 7, 2005	3227	Coastal Storm
November 7, 2003	1499	Severe Storm
March 1, 2001	1361	Earthquake
April 2, 1997	1172	Flood
January 17, 1997	1159	Severe Storm
August 2, 1994	1037	Fishing Losses
November 26, 1990	883	Flood
February 15, 1986	757	Flood
May 21, 1980	623	Volcanic Eruption
December 31, 1979	612	Flood

Section 5.0: Mitigation Strategy

5.1 General

Section 5 describes the County's hazard mitigation strategy and its climate adaptation planning strategy. These strategies provide Clallam County's blueprint for reducing potential losses identified in Section 4.0: *Hazards Assessment*.

This strategy is made up of three main required components: mitigation goals, mitigation actions, and a mitigation action plan for implementation. These components provide the framework to identify, prioritize, and implement actions to reduce risk from hazards.

Figure 5-1: Mitigation Strategy Process

5.2 Hazard Mitigation Goals & Overview

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.

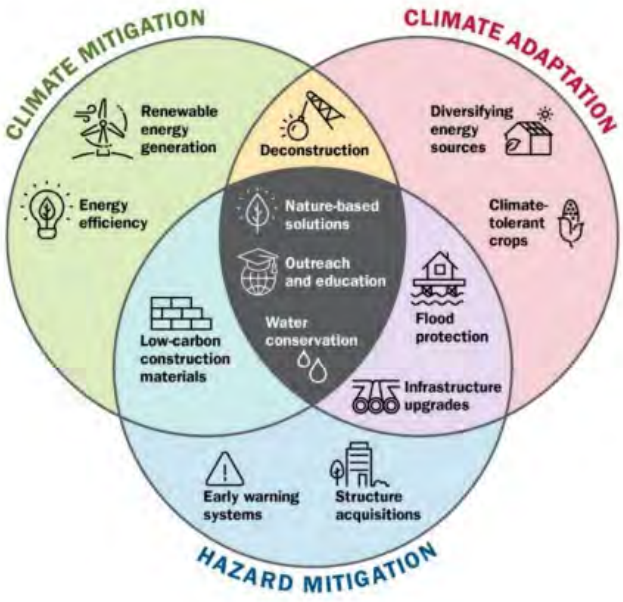
5.2.1 Mitigation Goals

Through collaboration with participating jurisdictions, community engagement and input, the County in consultation with the HMCR Steering Committee has developed the following goals for the 2024 update of the MJHMP:

- **Goal 1**: Reduce the impacts of natural hazards on community lifeline infrastructure and services (including transportation routes, communication systems, utilities, and emergency services) and other critical assets through: resiliency and reliability enhancement efforts, modernization, and redundancy of critical infrastructure.
- **Goal 2**: Emphasize the role of sustainable development and climate adaptation in hazard mitigation in order to minimize risks and vulnerabilities caused in part by climate change.
- **Goal 3**: Increase community capabilities and leverage interagency and public-private coordination to mitigate losses and prepare, respond, and recover from disasters. Prioritize effective long-term partnerships across all levels of government.
- **Goal 4**: Minimize property damage and reduce repetitive losses to property from natural hazards.
- **Goal 5**: Champion and prioritize people-centered mitigation actions in addition to property-centered actions.
- **Goal 6**: Enhance public outreach, education, and preparedness for all hazards, including effective strategies for reaching underserved and vulnerable populations. Empower the public to reduce personal vulnerability and enhance preparedness.

In adopting Goal 2, the County, the participating jurisdictions, and the HMCR Steering Committee consulted FEMA's Climate Adaptation Planning Guidance for Emergency Mangers (Draft – Dec. 2023), which was finalized in April 2024. In adopting Goal 2, the planning participants sought to identify climate adaptation/mitigation actions consistent with Figure 2, depicted as Figure 1 in FEMA's guidance:

Figure 5-2. FEMA Climate Adaptation Planning Guidance



5.2.2 Hazard Mitigation Benefit – Cost Review

FEMA under 44 CFR requires jurisdictions to analyze the benefits and costs of a range of mitigation actions that can reduce the effects of each hazard within their communities as part of the hazard mitigation plan development. Benefit-cost analysis is used in hazard mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit-cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now in order to avoid disaster-related damages later. The analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk.

A hazard mitigation plan must demonstrate that a process was employed which emphasized a review of benefits and costs when prioritizing the mitigation actions. The benefit-cost review must be comprehensive to the extent that it can evaluate the monetary as well as the nonmonetary benefits and costs associated with each action. The benefit-cost review should at least consider the following questions:

- How many people will benefit from the action?
- How large of an area is impacted?

- How critical are the facilities that benefit from the action (e.g., which is more beneficial to protect, the fire station or the administrative building)?
- Environmentally, does it make sense to implement this project for the overall community?

More details regarding specific funding mechanisms (both internal funding and grant resources) are provided within *Table 5-1. 2019 Clallam County MJHMP Completed Mitigation Actions*, below.

5.3 Hazard Mitigation Actions

This section fulfills requirements that the County identify a comprehensive range of mitigation actions that reduce the impacts identified in the County's risk assessment. It describes specific actions, projects, activities and processes that will help achieve the County's hazard mitigation goals, and contribute to the reduction or elimination of long-term risk, from climate impacts to people and property. These actions also aim to reduce vulnerability to the hazards identified in the plan.

5.3.1 Review of 2019 Hazard Mitigation Actions

The previous 2019 Clallam County MJHMP identified 102 mitigation actions for the County and participating jurisdictions. Clallam County, participating jurisdictions and the HMCR Steering Committee reviewed previous mitigation actions and identified which actions had been completed, which actions are ongoing or should be carried over, and which actions should be removed. The HMCR Steering Committee determined that two actions included in the 2019 Clallam County MJHMP were no longer relevant or a priority to the County or participating jurisdictions. These action items are listed below:

- **PUD05**: 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.
- **JSK10:** Storm Ready.

Mitigation action PUD05 was not carried over because an action related to CERT training is now included in the County's policies. Mitigation action JSK10 was

determined to be vague, not sufficiently action oriented, and was not carried over. The HMCR Steering Committee eliminated these action items from the 2024 Clallam County MJHMP.

Since the approval of the 2019 Clallam County MJHMP, the County and participating jurisdictions have taken significant steps to initiate and complete mitigation projects to reduce the risk of natural and man-made hazards to their communities. Clallam County and each participating jurisdiction reviewed their previous mitigation actions and identified mitigation actions from the 2019 Clallam County MJHMP that have since been completed. *Table 5-1. 2019 Clallam County MJHMP Completed Mitigation Actions* lists the mitigation actions included in the 2019 Clallam County MJHMP that have been completed since the approval of the previous plan. Mitigation actions that are incomplete, ongoing, or that have been partially completed have been incorporated into the list of mitigation actions for the 2024 Clallam County MJHMP.

Table 5-1. 2019 Clallam County MJHMP Completed Mitigation Actions

Action ID#	Mitigation Action Description	Hazard(s) Assessed	Jurisdiction/Responsible Department
Adopt 2019 HMP	Adopt the 2019 Hazard Mitigation Plan	All hazards	All participating jurisdictions
CC08	Establish back-up link for OPSCAN in Forks.	All hazards	Clallam County Sheriff's Office
CC11	Setback of USACE dike located in lower reach of Dungeness River.	Flooding	DCD, USACE, Clallam County Public Works
PA07	Tumwater Street Bridge Approach Improvement	Earthquake	City of Port Angeles Public Works
JSK02	Improve communications in Blyn Basin, including building cellular tower and installing fiber internet.	All hazards	Jamestown S'Klallam Tribe

Action ID#	Mitigation Action Description	Hazard(s) Assessed	Jurisdiction/Responsible Department
JSK15	Develop advanced warning systems	Tsunami	Clallam County, Jamestown S'Klallam Tribe
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.	Flooding, Tsunami	Jamestown S'Klallam Tribe
LEK04	Identify Elders and other vulnerable populations to prioritize for mitigation and disaster assistance	All hazards	Lower Elwha Klallam Emergency Management, Tribal Police, Enrollment, Tribal Clinic
LEK06	Acquire properties in low hazard areas in order to locate new development or relocate existing vulnerable structures and critical facilities	Flooding	Lower Elwha Klallam Emergency Management
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	All hazards	Lower Elwha Klallam Emergency Management
LEK14	Implement Vegetation and other natural resource management practices to	Landslide, Erosion	Lower Elwha Klallam Emergency Management

Action ID#	Mitigation Action Description	Hazard(s) Assessed	Jurisdiction/Responsible Department
	reduce landslides and coastal erosion		
PUD06	Develop and/or improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Continuity of Operations Plan etc.	Severe Weather, Winter Storms	Clallam County Public Utility District (PUD)

5.3.2 Identification and Analysis of Mitigation Actions

The County identified a suite of supporting actions to achieve the mitigation goals listed in Section 5.2. Ongoing, not completed, or partially completed mitigation actions from the previous MJHMP were retained in the 2024 Clallam County MJHMP mitigation actions. The County, participating jurisdictions, and the HMCR Steering Committee reviewed those previous mitigation actions and updated the timeframe for implementation, priority level, and funding sources as necessary. The County, Participating Jurisdictions, and the HMCR Steering Committee worked together to identify additional mitigation actions and establish the responsible department, priority level and timeline. The process used is outlined below:

- Review of the Vulnerability and Risk Assessment presented in Section 4.0
- Review of the Capabilities Assessment presented in Section 5.5
- Review of the results of the community survey and feedback received as part of the community outreach; and,
- HMCR Steering Committee's discussion of concerns/issues that need to be addressed to reduce hazards to critical facilities and the community.

Table 5-2. Updated Hazard Mitigation Actions, identifies the mitigation action, hazard(s) addressed, agency and/or department responsible for implementation, potential funding source(s), timeline for implementation, and priority. The timeline for implementation is defined as follows:

- Ongoing: currently in process; or 1-2 years and ongoing thereafter;
- Short-Term: 1 to 2 years;
- Medium-Term: 3 to 4 years; and
- Long-Term: 5+ years.

Mitigation actions below may be funded through County and participating jurisdictions' budget, particularly mitigation actions identified as "ongoing". However, the County and participating jurisdictions will also explore funding for specific mitigation actions through local, State, or federal grant programs. Potential grant programs or funding mechanisms are identified for specific mitigation actions as applicable, below.

All mitigation actions considered for the County were ultimately included in the MJHMP and *Table 5-2. Updated Hazard Mitigation Actions*. In *Table 5-2*, Actions IDs highlighted in green represent climate-related actions, while actions highlighted in red represent fire district-related actions. There were no mitigation actions considered but ultimately excluded from the MJHMP other than previous mitigation actions that were completed or otherwise removed as noted in Section 5.3.1 above. The mitigation action development process is carefully documented in Appendix B: *HMCR Steering Committee Materials* and was a key area of focus during specific HMCR meetings. Appendix F: *Annex Coordination*, documents revisions, comments, and feedback, between the MJHMP Project Management Team, Consultant Team and participating jurisdictions regarding mitigation actions.

Table 5-2. Updated Hazard Mitigation Actions

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
Clallam County									
CC01	Relocate public works, roads, and wastewater infrastructure from tsunami zone.	2019 Mitigation Action	**Internal:** Clallam County EMD, Public Works/Roads	Long-term	All hazards	Capital Funds, FEMA Hazard Mitigation Assistance (HMA) program	17	6	23
CC02	Move EOC from seismically unstable area to new location.	2019 Mitigation Action	**Internal:** Clallam County EMD, PA Fire Department, City Parks, Port of PA	Medium-term	All hazards	FEMA Hazard Mitigation Assistance (HMA) program, Capital Funds, State Appropriations	20	10	30
CC03	Identify and organize County hazard GIS data so that it is readily available in the event of a hazard.	2019 Mitigation Action	**Internal:** Clallam County Information Technology, EMD	Short-term	All hazards	Existing County budget	18	4	22
CC04	Establish a system of real-time hazard mapping and warning to communicate conditions on the ground to staff and public.	2019 Mitigation Action	**Internal:** Clallam County Information Technology, EMD	Short-term	All hazards	Existing County budget	17	6	23
CC05	Reinforce/retrofit Fire District 2 facilities for seismic stability.	2019 Mitigation Action	**Internal:** Clallam Fire District 2, Rescue	Long-term	Earthquake	FEMA Hazard Mitigation Assistance (HMA) program	18	10	28
CC06	Hire a consultant to conduct a wildfire risk assessment profile of Fire District 2 facilities.	2019 Mitigation Action	**Internal:** Clallam Fire District 2 Rescue	Short-term	Wildfire	FEMA Hazard Mitigation Assistance (HMA) program, Bond/Levy	19	6	25

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
CC07	Build new Fire District 4 station that is seismically sound.	2019 Mitigation Action	**Internal:** Clallam Fire District 4	Short-term	Earthquake	FEMA Hazard Mitigation Assistance (HMA) program, 25% match from FD	18	10	28
CC09	Inventory dikes, levees, and flood protection structures on Clallam County Rivers	2019 Mitigation Action	**Internal:** DCD, Public Works **External:** USACE, WDFW, WSDOT	Medium-term	Flooding	FEMA Hazard Mitigation Assistance (HMA) program	21	8	29
CC10	Inventory public utilities including water supplies, sewer systems, and solid-waste handling facilities.	2019 Mitigation Action	**Internal:** Clallam County Public Works Departments, Environmental Health Division **External:** WSDOH, WDOE, Sequim, Forks, Port Angeles	Short-term	All hazards	Grants, Operating budgets	21	8	29
CC12	Seismic study of newer portion of Clallam County Courthouse	2019 Mitigation Action	**Internal:** Clallam County Public Works Maintenance and Facilities	Short-term	Earthquakes	County capital project funds, FEMA Hazard Mitigation Assistance (HMA) program	19	6	25
CC13	Re-locate Fire Station 33, which is currently located in a liquefaction zone.	2019 Mitigation Action	**Internal:** Clallam County Fire District 3	Short-term	Earthquakes	Grant, Bond/Levy	16	8	24
CC14	Re-locate Fire Station 31, which is currently located in a tsunami hazard zone.	2019 Mitigation Action	**Internal:** Clallam County Fire District 3	Short-term	Earthquakes, Flooding, Tsunami	Grant, Bond/Levy	16	8	24

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
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.	2019 Mitigation Action	**Internal:** Clallam County Department of Community Development	Long-term	Drought, Water Shortages	County funds, FEMA Hazard Mitigation Assistance (HMA) program, FEMA BRIC Grant	17	8	25
CC16	Hire contractor to conduct assessment to identify coastal areas vulnerable to sea level rise and hot spot coastal flooding areas. Conduct water quality assessment of wells throughout the County to evaluate saltwater intrusion.	2019 Mitigation Action	**Internal:** Clallam County Department of Community Development	Long-term	Drought, Flooding, Water Shortages	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 the coast to assess saltwater intrusion.	17	8	25
CC17	Investigate alternative water sources and perform water resource planning in areas where water quantity and quality have declined due to climate change, including recommendations summary.	2019 Mitigation Action	**Internal:** Clallam County Department of Community Development	Long-term	Drought, Water Shortages	County, FEMA Hazard Mitigation Assistance (HMA) program, NOAA grants, Ecology grants	17	8	25
CC18	Advocate to Washington EMD and FEMA to construct a FEMA Distribution Center with generator capabilities within Clallam County, to proactively stage emergency supplies and materials within the planning area.	New Mitigation Action	**Internal:** Clallam County EMD **External:** FEMA, Washington EMD	Ongoing	All Hazards	County Budget - ongoing	17	4	21
CC19	Collaborate and promote multi-jurisdictional transportation improvement project amongst plan annexes. Work with WSDOT to advocate for transportation improvement funding for larger scale improvement projects. Continue assessing climate vulnerabilities of the	New Mitigation Action	**Internal:** Clallam County Public Works **External:** WSDOT	Medium-term	All Hazards	County Budget, FEMA Building Resilient Infrastructure and Communities (BRIC), WSDOT grants	17	4	21

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	transportation sector and advocate to expand the WSDOT climate vulnerability assessment to include non-state roads and other transportation systems.								
CC20	Coordinate with public safety agencies to identify staging locations for emergency response equipment and materials, including food, water, deployable shelters, and medical/first aid. Expand training for health and social services providers to address mental and physical health issues following extreme climate events or other emergencies.	New Mitigation Action	**Internal:** Clallam County Department of Community Development, EMD **External:** CERT, American Red Cross	Short-term	All Hazards, Human-caused, Climate Change	County Budget - ongoing	18	4	22
CC21	Promote education on natural hazards and empower community members to form neighborhood plans and preparedness groups. Highlight the importance of self-reliance and planning for a minimum of 30 days, and work with residents to create home emergency kits containing backup medications, food rations, and secondary communication technologies. Partner with local non-profits to help organized neighborhood emergency preparedness events and information.	New Mitigation Action	**Internal:** Clallam County Department of Community Development, EMD	Short-term	All Hazards	County Budget- ongoing	19	4	23
CC22	Seek funding resources and mechanisms for low-income communities and	New Mitigation Action	**Internal:** Clallam County Department of	Short-term	All Hazards	Homeland Security Grants	19	4	23

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	individuals to purchase emergency supplies and equipment.		Community Development, EMD, Finance						
CC23	Through the Comprehensive Plan Update, evaluate zoning regulations and land use controls that reflect projected climate risk and reduce development in known or projected hazard zones. Review land use designations to identify opportunities and barriers for responding to rapid population changes and rebuilding after climate disasters and impacts, and prioritize post-disaster programs in overburdened communities.	New Mitigation Action	**Internal:** Clallam County Department of Community Development	Short-term	Climate Change	County Budget, State Commerce Funding	16	6	22
CC24	Partner with the Washington State University (WSU) Extension – Clallam County and the Clallam Conservation District to promote the Drought Relief Education Outreach Program. Encourage community members to adopt waterwise practices on their property. Coordinate with the Department of Ecology to develop and implement a comprehensive drought resilience strategy that considers projected climate impacts and sets action levels for different drought stages. Incorporate climate projections into drought planning to enhance	New Mitigation Action	**Internal:** Clallam County Department of Community Development **External:** WSU, Clallam Conservation District, WDOE	Medium-term	Drought	County Budget, Washington Department of Ecology Drought Planning and Preparedness Grants	20	2	22

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	preparedness and mitigate the impacts of drought on water resources.								
CC25	Evaluate feasibility for Highway 112 long-term relocation and resilience solutions, including redundant routing solutions, to reduce ongoing landslide and localized flooding issues. Consider projected sea level rise scenarios when considering roadway relocation and elevation. NOAA grant infrastructure to fix portions of 112 – infrastructure improvements for parts of 112 at specific mileposts. Explore additional funding and financing mechanisms for improvements at other weak points on 112.	New Mitigation Action	**Internal:** Clallam County Public Works, EMD, Finance **External:** WSDOT, NOAA	Long-Term	All Hazards	County Budget, FEMA Building Resilient Infrastructure and Communities (BRIC), WSDOT grants, NOAA Coastal Resilience Grants	18	8	26
CC26	Secure grant funding from the United States Department of Agriculture (USDA) to fund a Community Wildfire Protection Plan (CWPP) update, and model wildfire behavior to identify risk reduction solutions. Encourage participation in incentive-based emergency preparedness programs such as Firewise (National Fire Protection Association). Invite local community stakeholders and MJHMP annex jurisdictions to participate in the CWPP planning process.	New Mitigation Action	**Internal:** Clallam County Department of Community Development, EMD **External:** USDA	Short-Term	Wildfire	County Budget, Washington Department of Health Environmental Justice and Climate Change Grants, USDA Community Wildfire Defense Grant (CWDG) Program - ongoing	19	8	27

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
CC27	Conduct an inventory on current medical care and services, including the number of doctors, nurses, and paramedics within the County. Evaluate response during different emergency scenarios, where cities, tribes and unincorporated communities may be isolated from each other due to roadway system failures. Identify opportunities to expand community capacity through partnership through Community Emergency Response Teams (CERT) and American Red Cross training programs. Incorporate climate impacts into the planning and coordination of preparedness, response, and recovery activities among first responders and partners, including public health, law enforcement, fire, school, and EMS personnel. This involves updating communications equipment, enhancing training, regularly assessing emergency facility needs (e.g., home emergency kits, cooling centers and temporary shelters), and improving the adaptive capacity of vulnerable populations such as low-income communities, Elders, or people living in high climate risk areas. Identify opportunities for medical transport that does not rely on roadway transportation	New Mitigation Action	**Internal:** Clallam County Department of Community Development, EMD **External:** Washington Department of Health, CERT, American Red Cross	Long-Term	All Hazards	County Budget, Washington Department of Health Environmental Justice and Climate Change Grants, WA State Foundation/Public Health Funding	18	6	24

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	systems such as boats, helicopters and airplanes.								
CC28	Incorporate consideration for seasonal visitors, tourists and national park visitors as a socially vulnerable population that will require additional response support during emergency scenarios. When procuring emergency supplies and equipment, consider locations where populations increase due to tourism season or special events. Coordinate emergency preparedness and emergency response with the National Park Service and DNR.	New Mitigation Action	**Internal:** County parks and recreation **External:** National Park Service and DNR, Forest Service	Short-term	All Hazards	Homeland Security Grants	18	4	22
CC29	Advocate in the County's Operational Area meetings to encourage local school districts to perform seismic inventory for assets in need of retrofits.	New Mitigation Action	**Internal:** Clallam County EMD	Ongoing	Seismic Hazards	County Budget	18	6	24
CC30	Prepare a detailed Channel Migration Zone (CMZ) delineation analyses and mapping along the Lower Elwha River to inform shoreline management and land use planning for life-safety hazards, critical freshwater and riparian habitat, public infrastructure and private property in Clallam County.	New Mitigation Action	**Internal:** Community Development Department **External:** Washington Department of Ecology	Short-Term	Flood, Severe Weather	County Budget, FEMA Flood Mitigation Assistance (FMA) Program	18	4	22
CC31	Identify community disaster resilience hubs for each of the County's twenty micro-islands, seek funding to make	New Mitigation Action	**Internal:** Clallam County EMD	Short-term	All Hazards	Homeland Security Grants, FEMA BRIC Grants	17	6	23

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	these sites resilient, communicate the locations of these sites for public use during an emergency, and coordinate all plans to serve these hubs effectively in an emergency.								
CC32	Create health and safety messaging on climate change impacts and other hazards, providing residents with guidance to plan and protect themselves, while involving overburdened communities through diverse engagement formats. Collaborate with Clallam County communities, particularly Tribes, to ensure their input on climate and health impacts, and needed emergency resources, focusing on culturally relevant transcreation to reach specific communities.	New Mitigation Action	**Internal:** Clallam County Department of Community Development, EMD	Ongoing	Climate Change	County Budget, FEMA Hazard Mitigation Assistance (HMA) program	19	2	21
CC33	Implement climate-smart building policies and disincentivize construction in areas highly susceptible to climate hazards such as erosion, landslides, and flooding. This may include requiring low-impact development and stormwater runoff mitigation systems, designing buildings for passive survivability in case of extended power loss, adopting fire resilience standards such as venting and features designed to prevent ember	New Mitigation Action	**Internal:** Clallam County Department of Community Development	Medium-term	Climate Change, Sea Level Rise, Landslide, Flooding, Wildfire	County Budget, FEMA Flood Mitigation Assistance (FMA) Program, Hazard Mitigation Assistance (HMA) program	18	6	24

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	ignition, and promoting "green" or "cool" roofs.								
CC34	Coordinate with WSDOT on the comprehensive strategy to map vulnerable transportation infrastructure, including Highways 101, 110, 112 and 113. Incorporate sea level rise and tsunami hazard data into vulnerability mapping for future infrastructure siting. Prioritize identifying or designating alternative routes for critical corridors to enhance transportation redundancy.	New Mitigation Action	**Internal:** Clallam County Department of Community Development, Public Works **External:** WSDOT	Long-term	All Hazards	NOAA grant currently paying for the ongoing study; Capital improvement funding anticipated to include: FEMA HMA, USDOT programs such as RAISE, ROUTES or SMART	17	8	25
CC35	Procure a consultant to utilize green LiDAR technology along the Clallam County coastline to accurately map and document existing coastal conditions. Use data to identify vulnerable areas and develop strategies to enhance coastal resilience against environmental changes, climate change, and natural disasters.	New Mitigation Action	**Internal:** Clallam County Department of Community Development	Long-term	Flood, Tsunami, Sea Level Rise, Climate Change	FEMA Hazard Mitigation Assistance (HMA) program, NOAA Grants, WA Sate Ecology Grants	19	4	23
CC36	Establish a Memorandum of Understanding (MOU) with the Port of Port Angeles, for use to be procured post-disasters. Barges can be used to distribute food and supplies post-disaster in areas where roadways or bridges have failed.	New Mitigation Action	**Internal:** Clallam County Department of Community Development **External:** Port of Port Angeles	Short-term	All Hazards	County Budget	18	4	22

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
CC37	To effectively communicate emergency information to the Guatemalan community, distribute emergency management videos in applicable languages at key public locations such as grocery stores and delis. Focus on communities such as the Guatemalan community, who may be difficult to reach through traditional written formats, ensuring accessibility and understanding during emergencies.	New Mitigation Action	**Internal:** Clallam County Department of Community Development, EMD	Short-term	All Hazards		20	5	25
CC38	Seek grant funding to assess whether the ShakeAlert earthquake early warning system can be incorporated into Clallam County's public early warning system.	New Mitigation Action	**Internal:** Clallam County Information Technology, EMD	Medium-term	Seismic hazards	Grant funding	18	5	23
City of Forks									
FR01	City of Forks Culvert Assessment Study/Report	2019 Mitigation Action	Internal: City of Forks Public Works and Planning Departments	Short-term	Flooding	Grant funding, Street Department funding	20	8	28
FR02	Storm-related Roof Damage Mitigation Assessment	2019 Mitigation Action	Internal: City of Forks Planning Department	Medium-term	Flooding, Winter Storms, Windstorms and Tornado	FEMA Hazard Mitigation Assistance (HMA) program, CDBG, Energy conservation dollars	18	4	22
FR03	Palmer Road Stormwater Detention Pond and Conveyance System	2019 Mitigation Action	Internal: City of Forks Utilities Department	Medium-term	Flooding	City of Forks, Clallam County Public Works, FCAAP (Ecology)	16	4	20

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
FR04	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	New Mitigation Action	Internal: Community Development Department	Short-Term	Wildfire (and wildfire smoke)	Staff time	19	6	25
FR05	Identify and prioritize critical facilities within Forks in need of back-up generators. Establish a procurement plan and seek grant funding.	New Mitigation Action	Internal: Public Works Department	Long-Term	Severe Weather, Seismic, Human-Caused – Utility Failure/Power Outage	FEMA Hazard Mitigation Assistance (HMA) program	19	6	25
FR06	As part of the ongoing Forks Comprehensive Plan update and related climate resilience planning, evaluate policies related to climate change and related hazards. Evaluate housing and other land uses, and consider additional land use/zoning regulations in hazard areas and environmentally sensitive areas. Consider the findings of this MJHMP and the Comprehensive Plan climate resilience planning to develop ongoing policies to mitigate climate impacts. Evaluate land use and critical area requirements in undeveloped areas that are prone to landslides near the Olympic Resources Center.	New Mitigation Action	Internal: Community Development Department	Medium-Term	Wildfire, Drought, Seismic, Severe Weather – Windstorm and Tornado, Extreme Heat, Flood, Climate Change, Landslide	Staff time, existing budget	19	8	27
FR07	Continue to promote a culture of emergency preparedness and hazard mitigation by distributing and promoting	New Mitigation Action	Internal: Community	Ongoing	Wildfire, Drought, Seismic, Severe Weather –	Staff time	19	6	25

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	outreach materials/programs produced by Clallam County Emergency Management Department.		Development Department		Windstorm and Tornado, Extreme Heat, Flood				
FR08	Work with the Washington Department of Natural Resources (DNR) to identify and mitigate wildfire and burn risk on permitted timber harvest and debris storage areas on both DNR and private forest land where it is within the City of Forks' UGA or immediately adjacent. Identify opportunities to educate the public on ways to reduce wildfire risk and vulnerability to the City of Forks and Forks Urban Growth Area.	New Mitigation Action	Internal: Community Development Department	Ongoing	Wildfire (and wildfire smoke)	Staff time	19	8	27
FR09	Conduct periodic assessments and maintenance of drainages, ditches and outfalls to ensure adequate drainage capacity for both current and future use.	New Mitigation Action	Internal: Public Works	Ongoing	Flood	Staff time, City General Fund	19	4	23
FR10	Work with local community groups and NGOs to determine adequate locations throughout the City to serve as both warming and cooling centers. Establish a plan to coordinate services, volunteers and other resources required to facilitate warming and cooling centers.	New Mitigation Action	Internal: Community Development Department	Short-Term	Severe Weather	FEMA Hazard Mitigation Assistance (HMA) program	19	4	23
FR11	Evaluate back-up power capacity for the local potable water system; identify any gaps and establish a method to prioritize	New Mitigation Action	Internal: Public Works	Long-Term	Severe Weather, Seismic, Human-Caused – Utility	FEMA Hazard Mitigation Assistance (HMA) program	18	2	20

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	existing needs. Establish a procurement plan and seek grant funding.				Failure/Power Outage				
FR12	Evaluate microgrid concepts such as solar arrays and battery energy storage systems (BESS) to offer alternative power sources at the Quillayute Airport.	New Mitigation Action	Internal: City of Forks Utilities Department	Long-Term	Severe Weather, Seismic, Human-Caused – Utility Failure/Power Outage	FEMA Hazard Mitigation Assistance (HMA) program	19	2	21
FR13	Quillayute Airport Utility System Upgrade to include new water main from well house, electrical system upgrade, installation of on-site commercial septic system, and development of a site specific energy generating and storage microgrid system.	New Mitigation Action	Internal: City of Forks Planning Department External: Coordination with CC Fire District 6,	Medium-Term	Severe Weather, Coastal Hazards, Wildfire, Earthquake	Potential FAA BIL or AIP, Hazard Mitigation Assistance (HMA) Program, other sources.	17	5	22
City of Port Angeles									
PA01	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	2019 Mitigation Action	Fire Department/Public Works	Short-term	Wildfire	FEMA (Hazard Mitigation Assistance (HMA) program, WADNR Fire District Assistance Programs, State Wildfire Mitigation Funding	18	6	24
PA02	Identify local cooling/warming centers to serve vulnerable populations during extreme weather events. Communicate and educate the public about locations and hours to enhance awareness.	2019 Mitigation Action	Parks and Recreation/GIS/ Fire Department	Short-term	Severe Weather	FEMA Hazard Mitigation Assistance (HMA) Programs, National Telecommunications, and Information Administration Grant	18	6	24
PA03	Identify and prioritize critical facilities within Port Angeles in need of back-up generators. Establish a procurement plan and seek grant funding.	2019 Mitigation Action	Public Works Department	Short-term	Severe Weather – Windstorm and Tornado, Power Outage	FEMA Hazard Mitigation Assistance (HMA) Programs, National Telecommunications, and Information Administration Grant	13	10	23

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
PA04	Develop an Urban Forest Management Plan to assess and monitor forest health including disease, pests, and other signs of decline throughout the forested landscape.	2019 Mitigation Action	Parks and Recreation, Community and Economic Development	Medium-term	Drought, Wildfire	Capital Facilities Plan, WADNR Community Forestry Assistance Program	18	6	24
PA05	Evaluation and implementation of a secondary water source and upgraded water transmission mains.	2019 Mitigation Action	Public Works Department	Medium-term	Drought, Earthquake, Flood, Severe Weather	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	17	6	23
PA06	Assess tsunami warning system and update equipment as needed.	2019 Mitigation Action	Public Works Department	Medium-term	Tsunami	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	15	6	21
PA07	Construct Joint Public Safety Facility (JPSF) between the City of Port Angeles and Clallam County.	2019 Mitigation Action	Police Department, Fire Department	Long-Term	All Hazards	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	19	6	25
PA08	Continue to participate in local and regional hazardous materials spills preparation and response exercises. Maintain coordination between the Port Angeles Police Department, Clallam County Department of Emergency Management and Port of Port Angeles for hazardous materials tabletop exercises.	2019 Mitigation Action	Public Works Department/Police Department	Ongoing	Human Caused – Maritime Disaster/Oil Spill	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	20	4	24
PA09	Continue to seek funding opportunities to assist with environmental cleanup of known hazardous material locations within the City of Port Angeles Industrial Zones, including the Rayonier Mill Site.	2019 Mitigation Action	Public Works Department, Community and Economic Development	Ongoing	Disease, Human Caused Maritime Disaster/ Oil Spill	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	20	4	24

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
PA10	Peabody Creek culvert/stormwater control assessment and improvements, including watershed restoration.	New	Public Works, Community and Economic Development	Medium-term	Flood, Drought	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs, WA Department of Ecology Climate Resiliency Programs	17	4	21
PA11	Valley Creek upstream stormwater control assessment and improvements including watershed restoration.	New	Public Works, Community and Economic Development	Medium-term	Flood, Drought	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs, WA Department of Ecology Climate Resiliency Programs	17	4	21
PA12	Fire Department HVAC, Roof, and Solar Storage Improvements.	New	Fire Department, Public Works Department	Ongoing	All Hazards	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	19	4	23
PA13	Underground Cable Replacements – Grounding of Distribution Lines.	New	Public Works Department	Medium-term	Severe Weather – Windstorm and Tornado, Utility Failure/Power Outage	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	18	4	22
PA14	Stormwater capacity upgrades.	New	Public Works Department	Ongoing	Flood	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	18	4	22
PA15	Water transmission fire flow upgrades.	New	Public Works Department	Ongoing	Wildfire, Earthquake, Severe Weather	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	17	4	21
PA16	Water reservoir and power substation upgrades.	New	Public Works Department	Medium-term	Earthquake, Severe Weather, Drought	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	17	4	21
PA17	Construction of a West Side Fire Station.	New	Fire Department, Public Works Department	Long-term	All Hazards	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	17	6	23

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
PA18	Incorporate a pandemic response plan into the comprehensive plan periodic updates.	New	Fire Department, Police Department, Community and Economic Development	Short-term	All Hazards	FEMA Hazard Mitigation Assistance (HMA) Programs, WA Department of Commerce	17	6	23
PA19	Upgrades to the shoreline, including the Olympic Discovery Trail, and stormwater outfalls. Expected rising sea levels on the Olympic Discovery Trail and the stormwater outfalls along the coast need to be addressed.	New	Public Works Department, Parks and Recreation Department, Community and Economic Development	Medium-term	Landslide, Flood, Sea Level Rise, Severe Weather, Earthquake	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	18	4	22
PA20	Develop a plan for ingress/egress route in response to earthquakes and landslides.	New	Police Department, Fire Department, Public Works	Long-Term	Earthquake, Landslide	FEMA Hazard Mitigation Assistance (HMA) Programs	16	8	24
PA21	Continue to bolster against Cyberattacks.	New	IT	Ongoing	Human-Caused – Terrorism/Cyberattacks	National Telecommunications and Information Administration Grant	16	4	20
PA22	Development of Emergency Management Pods to be equipped with StarLink or Comparable Internet Service.	New	Fire Department, IT	Ongoing	All Hazards	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	16	6	22
PA23	Information Technology data backup systems replacement.	New	IT	Medium-term	All Hazards	Capital Facilities Plan, National Telecommunications and Information Administration Grant	16	4	20

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
PA24	IT Networking Upgrades and Maintenance (Network Security Upgrades and Improvements).	New	IT	Short-term	Utility Failure/Poer Outage, Cyberattacks	Capital Facilities Plan, National Telecommunications and Information Administration Grant	16	4	20
PA25	Increase primary backup storage system.	New	IT	Medium-term	Utility Failure/Power Outage	Capital Facilities Plan, National Telecommunications and Information Administration Grant	16	4	20
PA26	Install an energy storage microgrid to store solar energy for use in the EOC, Senior Center, and Fire Department.	New	Fire Department, IT	Long-term	All Hazards	Capital Facilities Plan, FEMA Hazard Mitigation Assistance (HMA) Programs	17	5	22
PA27	Train city staff to perform seismic assessments of City facilities.	New	Fire Department	Medium-term		FEMA Hazard Mitigation Assistance (HMA) Programs	17	3	20
PA28	Conduct a citywide wildfire risk assessment.	New	Fire Department	Long-term	Earthquake	FEMA Hazard Mitigation Assistance (HMA) Programs	19	6	25
PA29	Conduct emergency management/incident response trainings for City Staff.	New	Fire Department, Police Department	Medium-term	Wildfire	FEMA Hazard Mitigation Assistance (HMA) Programs	18	5	23
PA30	Develop risk assessment and response plan for vulnerable populations in response to extreme weather conditions and wildfire smoke.	New	Fire Department, Police Department	Long-term	All Hazards	FEMA Hazard Mitigation Assistance (HMA) Programs	18	4	22
PA31	Identify temperature-controlled storage needs for emergency supplies and a plan for procurement of both storage and supplies for the essential function of government.	New	Fire Department, Police Department	Long-term	Wildfire, Severe Weather	FEMA Hazard Mitigation Assistance (HMA) Programs	17	2	19
PA32	Enhance building access control and surveillance.	New	IT	Long-term	All Hazards	FEMA Hazard Mitigation Assistance (HMA) Programs	17	4	21

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
PA33	Incorporate the Clallam County Multi-Jurisdictional Hazard Mitigation Plan into the Comprehensive Plan Periodic Updates.	New	Community and Economic Development	Short-Term	Human-caused – Terrorism/Cyberattacks	WA Department of Commerce	18	5	23
PA34	Scoping for reinforcement of Peabody Heights Reservoir Earthen Dam.	2019 Mitigation Action	Public Works Department	Medium-term	Dam Failure	WA Department of Ecology	16	6	22
City of Sequim									
SQ01	Build fuel station at City Public Works Yard to supply fuel to City departments and all emergency responders.	2019 Mitigation Action	**Internal:** City Public Works, Police Department	Short-term	Earthquake, Flood, Utility Failure, Winter Storm, Tsunami, Windstorm	FEMA Hazard Mitigation Assistance (HMA) program	20	6	26
SQ02	Replace 3-mile 12” water main from Ranney Will (infiltration gallery) beginning near the Dungeness River and ending at the Reservoir Road Reservoirs.	2019 Mitigation Action	**Internal:** Public Works Department	Long-term	Floods, Utility Failure, Winter Storm,	FEMA Hazard Mitigation Assistance (HMA) program, Drinking Water State Revolving Fund (DWSRF)	20	4	24
SQ03	Purchase a portable water purification system and small tanks. Prepare multiple sites and equipment to operate water purification	2019 Mitigation Action	**Internal:** Public Works Department	Long-term	Earthquake, flooding, tsunami	Drinking Water State Revolving Fund (DWSRF), FEMA	19	8	27
SQ04	Locate site for new potable water reservoir, purchase property, design and construct.	2019 Mitigation Action	**Internal:** Public Works Department	Long-term	Winter storms, flooding	City of Sequim general fund, property owners, developers, Public Utility District (PUD)	19	4	23
SQ05	Reroute/reconfigure electrical supply to the City of Sequim Water Reclamation Facility at 247 Schmuck Road by bringing new power source into the facility and using existing supply as backup.	2019 Mitigation Action	**Internal:** Public Works Department **External:** PUD	Long-term	Utility Failure	Drinking Water State Revolving Fund (DWSRF), FEMA Hazard Mitigation Assistance (HMA) program	15	4	19

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
SQ06	Construct deep water well (>600 feet) to increase resiliency and reliability within water system.	2019 Mitigation Action	**Internal:** Public Works Department	Long-term	Utility Failure, Drought, Water Shortage	Drinking Water State Revolving Fund (DWSRF), FEMA Hazard Mitigation Assistance (HMA) program	19	4	23
SQ07	Connect and extend City water mains to improve looping, during water main replacements and developer projects.	2019 Mitigation Action	**Internal:** Public Works Department	Long-term	Earthquakes, Excessive Heat, Utility Failure, Water Shortages, Wildfires	Drinking Water State Revolving Fund (DWSRF), Developers	21	4	25
SQ08	Purchase Additional Heavy Equipment for Use during Severe Storms	2019 Mitigation Action	**Internal:** Public Works Department	Medium-term	Winter storms, flooding	City of Sequim general fund	16	6	22
SQ09	Develop Reliable Backup Program for Critical City Data Entry Post-Disaster	2019 Mitigation Action	**Internal:** Finance Department (Information Technology)	Short-term	All hazards	City of Sequim general fund	20	4	24
SQ10	Capture stormwater in the County southwest of Sequim city limits and re-infiltrate using green stormwater infrastructure to benefit the watershed.	2019 Mitigation Action	**Internal:** City of Sequim Public Works **External:** Clallam County Public Works	Short-term	Flooding, Drought, Wildfire	Application submitted to FEMA Hazard Mitigation Program	11	4	15
SQ11	Install an energy storage microgrid for storing solar energy for use in the ECC and Civic Center during power outage emergencies.	2019 Mitigation Action	**Internal:** Public Works Department	Short-term	All hazards	Washington State Department of Commerce	17	6	23
SQ12	Replace mid-1900s AC pipe running through the City with earthquake-resistant pipe.	2019 Mitigation Action	**Internal:** Public Works Department	Medium-term	Earthquake, Utility Failure	City Budget, Grant	19	6	25

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
SQ13	Protect/reinforce Johnson Creek Trestle for the Olympic Discovery Trail west of Whitefeather Way	2019 Mitigation Action	**Internal:** Public Works Department	Medium-term	Earthquake, Flooding, Landslide, Winter Storm	City Budget, Grant	18	4	22
SQ14	Train City staff to perform seismic assessments of City properties post-event	2019 Mitigation Action	**Internal:** Public Works Department	Short-term	Earthquakes	Staff time	17	6	23
SQ15	Conduct wildfire risk assessment for City of Sequim and Fire District 3	2019 Mitigation Action	**Internal:** Public Works Department **External:** Clallam Co. Fire District 3	Short-term	Wildfire	Grant	17	6	23
SQ16	Implement asset management using GIS for all capital facilities	2019 Mitigation Action	**Internal:** Public Works Department	Short-term	All Hazards	Existing Budget	21	4	25
SQ17	Coordinate Emergency Management/Incident Response trainings for North Olympic Peninsula jurisdictions	2019 Mitigation Action	**Internal:** Sequim Police Department	Short-term	All Hazards	Existing Budget	21	8	29
SQ18	Public education of potential hazards, local agency response, and preparedness	2019 Mitigation Action	**Internal:** Sequim Police Department	Short-term	All Hazards	Existing Budget	20	8	28
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	2019 Mitigation Action	**Internal:** Sequim Police Department	Short-term	All Hazards	Existing Budget, Grant	20	8	28
SQ20	Identify and prioritize critical facilities within Sequim in need of back-up generators. Prioritize procurement for a	New Mitigation Action	**Internal:** Public Works Department	Long-term	Severe Weather, Power Outage	City Budget, FEMA Hazard Mitigation Assistance (HMA) program	17	4	21

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	permanent generator at the Emergency Command Center (ECC). Establish a procurement plan and seek grant funding.								
SQ21	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	New Mitigation Action	**Internal:** Community Development Department, Public Works (GIS) **External**: Fire District 3, Clallam Co. Emergency Management	Short-term	Wildfire	City Budget	17	4	21
SQ22	In order to address coastal flooding and sea level rise, fund and construct capital improvement projects on West Sequim Bay Road to serve as an alternative evacuation route for Highway 101. Evaluate solutions for Pitship Bridge to protect the asset from flooding and storm surge.	New Mitigation Action	**Internal:** Public Works **External**: Clallam County	Long-term	Flood, Sea Level Rise	City Budget, Capital Improvement Budget, FEMA Building Resilient Infrastructure and Communities (BRIC), Flood Mitigation Assistance (FMA) Program	17	6	23
SQ23	Update risk assessments, including GIS analysis, for landslides, dam/reservoir failures, tsunamis with substantial changes	New Mitigation Action	**Internal:** Public Works (GIS)	Ongoing	Landslides, Tsunamis, Dam/Reservoir Failure	City Budget, FEMA Hazard Mitigation Assistance (HMA) program	17	4	21
SQ24	Identify temperature-controlled storage needs for emergency supplies and a plan for procurement of both storage and	New Mitigation Action	**Internal:** Police Department	Long-term	Disease, Active Shooter/Terrorism, All Hazards	City Budget	19	4	23

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	supplies for the essential function of government		**External**: Clallam County Emergency Management, Fire District 3, Community Emergency Response Team, Red Cross						
SQ25	Continue to participate in local and regional hazardous materials spills preparation and response exercises. Maintain coordination between the Sequim Police Department and Clallam County Department of Emergency Management for hazardous materials tabletop exercises.	New Mitigation Action	**Internal**: Police Department **External**: Clallam County Emergency Management	Ongoing	Hazardous Materials	City Budget	19	2	21
SQ26	As part of the ongoing Sequim Comprehensive Plan update, consider land use or zoning restrictions on industrial land uses and sources of hazardous materials to reduce risk to surrounding areas.	New Mitigation Action	**Internal:** Department of Community Development	Ongoing	Hazardous Materials	City Budget	17	2	19
SQ27	As part of the ongoing Sequim Comprehensive Plan update and related climate resilience planning, evaluate policies related to climate change and related hazards, including the threat of sea level rise along the coast. Consider	New Mitigation Action	**Internal:** Department of Community Development	Ongoing	Flood, Sea Level Rise, Climate Change	City Budget	19	6	25

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	the findings of this MJHMP and the Comprehensive Plan climate resilience planning to develop ongoing policies to mitigate climate impacts.								
SQ28	As part of the ongoing Sequim Comprehensive Plan update, evaluate housing and other land uses and consider land use/zoning restrictions in hazard areas and environmentally sensitive areas.	New Mitigation Action	**Internal:** Department of Community Development	Ongoing	Wildfire, Seismic Hazards, Flood, Tsunami, Landslide	City Budget	18	6	24
SQ29	Construct wastewater collection system & lift station to serve residential and commercial development in east Sequim to reduce and prevent septic systems in critical areas in order to protect water quality in Sequim Bay	New Mitigation Action	**Internal:** Public Works, Department of Community Development	Short-term	Hazardous Materials	City Budget, FEMA Hazard Mitigation Assistance (HMA) program	20	2	22
Jamestown S'Klallam Tribe									
JSK01	Seismic assessment of Tribal facilities	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe, structural engineer	Ongoing	Tsunami, Seismic Hazards	FEMA Hazard Mitigation Assistance (HMA) program	19	6	25
JKS02	Lower Dungeness River Floodplain Restoration, including 3 Crabs Rd.	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe **External:** Clallam County, Washington	Ongoing	Flooding	WA Floodplains by Design, Construction funding from ACOE	20	8	28

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
			Department of Fish and Wildlife						
JSK03	Structure elevation and/or relocation of Tribal facilities and infrastructure	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe	Medium-term	Flooding, Tsunami, Landslides	HMGP/BIA Climate Resiliency	19	8	27
JSK04	Coordinate with County on the implementation of the NFIP Program	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe **External:** Clallam County, FEMA,	Medium-term	Flooding	Tribe Budget, FEMA Hazard Mitigation Assistance (HMA) program	12	8	20
JSK05	Encourage native vegetation on shorelines and formation of dunes	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe	Medium-term	Flooding	FEMA Hazard Mitigation Assistance (HMA) program, U.S. Department of Agriculture	21	4	25
JSK06	Public education around flood mitigation, floodplain functions, emergency service procedures, and potential hazards.	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe	Medium-term	Flooding	FEMA Hazard Mitigation Assistance (HMA) program	18	6	24
JSK07	Limit removal of vegetation in areas prone to ground failure. Plan ground cover where appropriate.	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe **External:** Clallam County	Medium-term	Landslide	Tribe Budget	18	4	22
JSK08	Encourage residents and landowners to leave natural erosion barriers, such as driftwood logs on the shore, in place to reduce shoreline erosion.	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe	Medium-term	Landslide	Tribe Budget	18	4	22
JSK09	Conduct severe weather awareness activities.	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe	Medium-term	Windstorm, Winter Storm	Tribe Budget	20	6	26

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
			External: Clallam County						
JSK10	Develop alternate water supplies to provide reserve water sources to be used in event of drought or water shortage in Blyn, WA.	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe	Long-term	Windstorm, Winter Storm, Drought	HUD Indian Community Development Grand Program	18	4	22
JSK11	Create and expand water efficiency/conservation programs.	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe	Ongoing	Drought	Tribe Budget, Grants	18	4	22
JSK12	Continue to participate in TsunamiReady with Clallam County	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe **External:** Clallam County	Medium-term	Tsunami	Minimal	20	6	26
JSK13	Develop advanced warning systems	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe	Medium-term	Tsunami	Minimal			
JSK14	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).	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe	Long-term	Earthquake/Tsunami, Flooding	FEMA Hazard Mitigation Assistance (HMA) program	20	10	30
JSK15	Vegetation management, fuel reduction projects and defensible space around structures	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe **External:** Clallam County, PUD	Ongoing	Wildfire, Windstorm, winter storm	U.S. Forest Service Grants	19	10	29

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
JSK16	Promote FireWise building design for construction in the Vision Master Plan and Housing Programs	2019 Mitigation Action	**Internal:** Jamestown S'Klallam Tribe **External:** Clallam County	Medium-term	Wildfire	ICDBG, US Forest Service, BLM	17	6	23
JSK17	Identify which Tribal facilities could serve as a neighborhood cooling/warming center or emergency shelter during extreme weather events or natural disasters.	New Mitigation Action	**Internal:** Jamestown S'Klallam Tribe	Medium-term	Severe Weather, Power Outage, Earthquake	Tribe Budget	19	8	27
JSK18	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	New Mitigation Action	**Internal:** Jamestown S'Klallam Tribe, Resort, or Jamestown Family Health	Short-term	Wildfire	Tribe Budget	21	10	31
JSK19	Identify, plan, and construct redundant routing around the known weakest links on Highway 101 (such as around Jimmycomelately Creek). Where redundancy already exists, publish alternative routes for evacuation and emergency preparedness/awareness. Where redundancy does not exist, identify grant funding resources for alternative	New Mitigation Action	**Internal:** Jamestown S'Klallam Tribe **External:** Clallam County, WSDOT	Long-term	Seismic Hazard, Tsunami, Landslides	Tribe Budget, FEMA Building Resilient Infrastructure and Communities (BRIC), Flood Mitigation Assistance (FMA) Program, WSDOT grants	16	8	24
JSK20	Evaluate and prioritize Jamestown S'Klallam Tribe owned residential properties for weatherization, prioritizing energy efficiency and preventing damage	New Mitigation Action	**Internal:** Jamestown S'Klallam Tribe	Short-term	All Hazards	Tribe Budget, FEMA Hazard Mitigation Assistance (HMA) program	19	8	27

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	from water, moisture, and sunlight. Assess and document needed weatherization improvements required per property, considering insulation, windows/doors, air sealing, heating and cooling systems, and ventilation system improvements. Seek grant funding to fund weatherization improvements.		(Housing Program)						
JSK21	Engage with tribal elders and other socially vulnerable tribal members who may need extra support during an emergency incident. Prioritize communication, awareness, and messaging targeted to encourage preparedness.	New Mitigation Action	**Internal:** Jamestown S'Klallam Tribe (Social and Community Services)	Ongoing	All Hazards, Disease/Pandemic, Climate Change, Human-caused hazards	Tribe Budget	19	8	27
JSK22	Rehab/maintain Howe Truss Railroad Bridge at Dungeness River Nature Center	New Mitigation Action	**Internal:** Jamestown S'Klallam Tribe	Short-term/Ongoing	Seismic Hazard, Windstorm, Winter Storms, Flooding	Tribe Budget, FEMA Building Resilient Infrastructure and Communities (BRIC), Flood Mitigation Assistance (FMA) Program, WSDOT grants	18	8	26
JSK23	Create additional pedestrian crossing on HWY101 in low lying areas to allow trail users to move to higher ground in case of an Earthquake/tsunami	New Mitigation Action	**Internal:** Jamestown S'Klallam Tribe Government	Medium term	Seismic Hazard, Tsunami	Tribe Budget	17	8	25
JSK24	Construct and maintain emergency supplies warehouse to support recovery	New Mitigation Action	**Internal:** Jamestown S'Klallam Tribe **External:** Clallam County EOC	Long-term	All Hazards	Tribe Budget, FEMA Emergency Operations Center Grant Program	19	8	27
Lower Elwha Klallam Tribe									

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
LEK01	Move the tribal center from the tsunami inundation zone where it is currently located.	2019 Mitigation Action	**Internal:** Lower Elwha Police Department, Emergency Management Division	Medium-term	Tsunami	FEMA Hazard Mitigation Assistance (HMA) program	14	10	24
LEK02	Widen and strengthen Lower Elwha Road from Stratton Road to Kacee Way.	2019 Mitigation Action	**Internal:** Lower Elwha Police Department, Emergency Management Division	Medium-term	Earthquake, Flood, Landslide, Severe Weather, Winter Storm, Tsunami, Wildfire	FEMA Building Resilient Infrastructure and Communities (BRIC)	17	6	23
LEK03	Evaluate options to make new hotel in Port Angeles tsunami resistant.	2019 Mitigation Action	**Internal:** Lower Elwha Police Department, Emergency Management Division	Short-term	Earthquake, Flood, Tsunami	FEMA Hazard Mitigation Assistance (HMA) program	20	10	30
LEK04	Create new, and expand existing Evacuation Routes, including better signage	2019 Mitigation Action	**Internal:** Lower Elwha Klallam Emergency Management	Short-term	Tsunami, Earthquake	Tribal Operating Budget	20	6	26
LEK05	Develop and/or improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Continuity of Operations Plan etc.	2019 Mitigation Action	**Internal:** Tribal Council, Lower Elwha Klallam Emergency Management	Medium-term	All hazards (Human-caused Hazards, Disease/Pandemic, Climate Change), Utility Failure, Supply Chain Interruption	Emergency Management Performance Grants, Dept of Health Grants, Regional Homeland Security funds and other sources	19	10	29

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
LEK06	Partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions	2019 Mitigation Action	**Internal:** Lower Elwha Klallam Emergency Management	Medium-term	All hazards	Tribal Operating Budget	18	6	24
LEK07	Develop a system to protect and maintain historical and archival Tribal records	2019 Mitigation Action	**Internal:** Tribal Council	Short-term	All hazards	Tribal Operating Budget	18	6	24
Clallam County PUD									
PUD01	Acquire properties in low hazard areas in order to locate new development or relocate existing vulnerable structures and critical facilities	2019 Mitigation Action	Internal: Clallam PUD	Long-term	Landslide	PUD operating budget	16	6	22
PUD02	Develop and/or improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Continuity of Operations Plan etc.	2019 Mitigation Action	Internal: Clallam PUD	Medium-term	Severe Weather, Windstorms	PUD operating budget	17	6	23
PUD03	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	New Mitigation Action	Internal: Clallam PUD	Short-term	Wildfire	PUD operating budget	20	6	26
PUD04	Deploy generator backup for all critical facilities (Ex. Operational Facilities, Sources of Water Supply, Treatment Plants, Pump Stations, Electric Substations, etc.). Enhance fuel inventory.	New Mitigation Action	Internal: Clallam PUD	Medium-term	Multiple Hazards: Severe Weather-Winter Storm, Windstorm, Utility Failure/Power Failure	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program	19	4	23

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
PUD05	Maintain clearance around critical electrical infrastructure (substation, transmission, and distribution lines) and water storage facilities	New Mitigation Action	Internal: Clallam PUD	Short-term	Severe Weather - Windstorm	PUD operating budget	19	4	23
PUD06	Build and retain mask and other PPE inventory, create work from home protocols, crew rotation policy, testing and quarantine protocols. Address relevant issues in Collective Bargaining Agreement to ensure Continuity of Operations	New Mitigation Action	Internal: Clallam PUD	Medium-tern	Disease and Pandemic	PUD operating budget	18	6	24
PUD07	Upgrade critical facilities to handle increased storage, generators at water sources and pumpstation. Maintain defensible perimeters at critical facilities	New Mitigation Action	Internal: Clallam PUD	Medium-term	Multiple Hazards: Severe Weather-Winter Storm, Windstorm, Utility Failure/Power Failure, Wildfire	PUD operating budget	18	4	22
PUD08	Seismic Retrofitting of Existing Critical Electrical and Water Infrastructure (Ex. Electric Substation, Transmission, Distribution facilities; Water treatment, pumping, storage, transmission, distribution facilities; Operations facilities and Headquarters)	New Mitigation Action	Internal: Clallam PUD	Long-term	Seismic hazards	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program	18	8	26
PUD09	Periodically assess critical facilities location in relation to NOAA/USGS Tsunami Model. Evaluate options for mitigating risk (i.e. Relocation, Redundancy, etc)	New Mitigation Action	Internal: Clallam PUD	Long-term	Tsunami	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program, NOAA Coastal Resilience Grants	19	6	25

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
PUD10	Assess appropriate grid-scale "Behind the Meter" Generation technologies that are sufficient to provide continuous power to all critical services, government functions, healthcare facilities in Clallam County. Construct and commission grid scale generation (Scenario: BPA Dam failure, Wildfire Public Safety Power Shutoff by BPA, BPA Transmission Line failure)	New Mitigation Action	Internal: Clallam PUD/ Electric	Long-term	Multiple Hazards: Dam/Reservoir Failure, Wildfire, Severe Weather, Power Outages	PUD operating budget, FEMA Building Resilient Infrastructure and Communities (BRIC)	18	10	28
PUD11	Study, identify and acquire properties required to serve portions of water service area and electric service area that may be relocated due to sea level rise and coastal erosion	New Mitigation Action	Internal: Clallam PUD	Long-term	Sea Level Rise	PUD operating budget	19	2	21
PUD12	Assess security measures and evacuation protocols in light of active shooter threat. Bolster physical security measures at office locations	New Mitigation Action	Internal: Clallam PUD	Short-term	Active Shooter/ Terrorism	PUD operating budget	19	8	27
PUD13	Assess and improve security measures at electric and water infrastructure	New Mitigation Action	Internal: Clallam PUD	Medium-term	Active Shooter/ Terrorism	PUD operating budget	19	6	25
PUD14	Prepare a water system plan to account for new groundwater sources and identify additional tie-ins with other potable water systems (such as the City of Port Angeles). Enhance access to groundwater sources of supply, aquifer recharge projects	New Mitigation Action	Internal: Clallam PUD/ Water	Short-term	Drought	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program, Washington Department of Ecology Drought Planning and Preparedness Grants	19	2	21

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
PUD15	Maintain minimum quantities of critical inventory. Increase inventory warehousing capacity at all water and electric operations facilities.	New Mitigation Action	Internal: Clallam PUD	Medium-term	Supply Chain Interruption	PUD operating budget	19	2	21
PUD16	Check critical facilities' (Electric Substations, Transmission, Distribution facilities; Water source of supply, treatment plants, pump stations; Operations facilities and headquarters) locations in relation to FEMA flood maps, evaluate and implement options for mitigating risk (i.e. relocation, elevation, armoring, waterproofing, etc.)	New Mitigation Action	Internal: Clallam PUD	Short-term	Flood	PUD operating budget, FEMA Flood Mitigation Assistance (FMA) Program	19	8	27
PUD17	Evaluate long-term opportunities to move and upgrade substations (transformers and breakers) out of known hazard zones as load density increases due to population growth and increased energy needs.	New Mitigation Action	Internal: Clallam PUD/ Electric	Long-term	All Hazards	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program	18	4	22
PUD18	Prepare a Wildland Fire Mitigation Plan and create/assemble/hire/contract a "Wildfire Mitigation Crew"	New Mitigation Action	Internal: Clallam PUD/ Electric	Short-term	Wildfire	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program	21	8	29
PUD19	Identify and execute "Wildfire Targeted projects" (i.e Poles/crossarms upgraded from wood to fiberglass; overhead to underground conversion; evaluate and install wildfire resistant technology and other prevention systems, tree wires, etc)	New Mitigation Action	Internal: Clallam PUD/ Electric	Short-term	Wildfire	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program	20	6	26

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
PUD20	Upgrades/Expansion/Relocations of facilities and other infrastructure to increase resiliency (including resilient construction methods) to better serve customers' energy needs, address inland population shift, minimize power outages, improve power outage restoration times and to facilitate staff support when responding to larger emergencies in conjunction with Clallam County EOC (rest facilities, food storage, etc. for crews responding to large scale outages).	New Mitigation Action	Internal: Clallam PUD/ Electric	Short-term	Multiple Hazards: Wildfire, Seismic, Tsunami, Severe Weather	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program, Building Resilient Infrastructure and Communities (BRIC)	19	6	25
PUD21	Replacement of old, direct-buried conductor with a jacketed cable in schedule 40 or higher conduit	New Mitigation Action	Internal: Clallam PUD/ Electric	Medium-term	Landslide	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program, Building Resilient Infrastructure and Communities (BRIC)	19	4	23
PUD22	Enhance HDD capabilities of Distribution and Transmission facilities	New Mitigation Action	Internal: Clallam PUD/ Water	Long-term	Landslide	PUD Operating Budget	20	4	24
PUD23	Create and promote accessible and affordable programs for vulnerable and low-income populations to enhance whole house heating and cooling capabilities. Seek funding mechanism to expand program to all eligible customers	New Mitigation Action	Internal: Clallam PUD/ Electric	Short-term	All Hazards, Climate Change	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program	19	4	23
PUD24	Increase water storage capabilities to enhance fire protection and standby storage within water service areas to mitigate change in precipitation patterns.	New Mitigation Action	Internal: Clallam PUD/ Water	Long-term	Multiple Hazards: Drought, Flood	PUD operating budget	20	2	22

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
PUD25	Create and promote accessible and affordable programs to provide extended electric backup for medical devices for vulnerable and low-income populations with medical needs. Seek funding mechanism to expand program to additional customers.	New Mitigation Action	Internal: Clallam PUD/ Electric	Short-term	All Hazards	PUD operating budget	20	6	26
PUD26	Evaluate and implement advanced modeling and adaptive protection technologies to predict and avoid outages, wildfire, and expedite restoration efforts (i.e. Advanced Metering Infrastructure, Outage Management Systems, etc.)	New Mitigation Action	Internal: Clallam PUD/ Electric	Short-term	All Hazards	PUD operating budget	18	6	24
PUD27	Promote community awareness on Public Safety Power Shutoffs (PSPS).	New Mitigation Action	Internal: Clallam PUD/ Electric	Short-term	Wildfire	PUD operating budget	19	2	21
PUD28	Participate in regular safety and public awareness campaigns regarding natural and human-caused hazards, and partner with local stakeholders to distribute awareness materials. Consider outreach that engages socially vulnerable populations, such as senior citizens and disabled persons.	New Mitigation Action	Internal: Clallam PUD	Short-term	All Hazards	PUD operating budget	19	4	23
PUD29	Establish a comprehensive vegetation management and fuel reduction program applicable to the entirety of the electric service area. Identify areas with high	New Mitigation Action	Internal: Clallam PUD/ Electric	Short-term	Wildfire	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program	20	8	28

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	wildfire hazard risk as top priority for fuel clearance and reduction. Estimate fuel reduction pricing to apply for grant funding.								
PUD30	Seek and apply for grant funding towards all identified mitigation actions	New Mitigation Action	Internal: Clallam PUD	Short-term	All Hazards	PUD operating budget	20	6	26
PUD31	Enhance resiliency of Hoko water facility to tsunami, flood and drought via relocation or other mitigation measure(s)	New Mitigation Action	Internal: Clallam PUD/Water	Medium-term	Tsunami, flood, drought	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program	20	6	26
PUD32	Identify possible interconnections with other potable water systems (such as the City of Port Angeles and City of Sequim) in order to aid water system resiliency on a regional basis.	New Mitigation Action	Internal: Clallam PUD/Water	Medium-term	Drought	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program	19	2	21
PUD33	Check critical facilities' (Electric Substations, Transmission, Distribution facilities; Water source of supply, treatment plants, pump stations; Operations facilities and headquarters) locations in relation to Geohazard maps, evaluate and implement options for mitigating risk (i.e. relocation, site/structural/geotech improvements, etc.)	New Mitigation Action	Internal: Clallam PUD	Medium-term	Landslide	PUD operating budget, FEMA Hazard Mitigation Assistance (HMA) program	19	8	27
Peninsula College									
PC01	Renovate/Replace Q Building, Main Campus	2019 Mitigation Action	Internal: Finance and Administration	Long-term	All hazards	Capital Funds, FEMA Hazard Mitigation Assistance (HMA) program	17	10	27

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
PC02	Incorporate hazard mitigation into Master Plan	2019 Mitigation Action	Internal: Finance and Administration	Medium-term	All hazards	Capital Funds, FEMA Hazard Mitigation Assistance (HMA) program	17	10	27
PC03	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	New Mitigation Action	Internal: Finance and Administration	Short-term	Wildfire	Capital Funds, FEMA Hazard Mitigation Assistance (HMA) program	19	6	25
PC04	Maintain a culture of preparedness by facilitating ongoing emergency response and security training, allowing staff to evolving human-caused threats and risks. Regularly review and update the Comprehensive Emergency Management Plan (CEMP) to ensure actions, roles and responsibilities remain relevant and current.	New Mitigation Action	Internal: Finance and Administration	Ongoing	Human-Caused Hazards (Hazardous Materials, Cyber-Terrorism, Utility Failure, Active Shooter)	Capital Funds, FEMA Hazard Mitigation Assistance (HMA) program	18	5	23
PC05	Continue to promote the PC Alert notification system as means to communicate campus safety, security and closures to students and staff.	New Mitigation Action	Internal: Finance and Administration	Ongoing	All hazards	Capital Funds, FEMA Hazard Mitigation Assistance (HMA) program	17	6	23
Port of Port Angeles									
POPA01	Strengthen airport runway to facilitate landing of large emergency aircraft.	2019 Mitigation Action	**Internal:** Port of Port Angeles	Long-term	Earthquakes, Tsunami, Water Shortages, Windstorm	FEMA Hazard Mitigation Assistance (HMA) program, Operating Budget (Larger cost savings will be realized by completing this project in conjunction with the 2022 runway rehab project)	20	8	28

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
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.	2019 Mitigation Action	**Internal:** Planning Department	Short-term	Earthquakes, Winter Storm, Tsunami, Windstorm	FEMA Hazard Mitigation Assistance (HMA) program, Operating Budget	19	6	25
POPA03	Purchase fuel tanks and build a fuel transfer station at the Port's newly constructed and located shop outside of the tsunami zone.	2019 Mitigation Action	**Internal:** Facilities Maintenance - Port of Port Angeles	Short-term	Utility Failure, Winter Storm, Tsunami	Operating Budget, Grant	18	8	26
POPA04	Build a portable emergency water supply.	2019 Mitigation Action	**Internal:** Facilities Maintenance - Port of Port Angeles	Short-term	All Hazards	Operating Budget	18	6	24
POPA05	Strengthen airport taxiway to increase weightbearing capacities for emergency aircraft.	2019 Mitigation Action	**Internal:** Port of Port Angeles	Short-term	Earthquakes, Tsunami, Water Shortages, Windstorm	FEMA Hazard Mitigation Assistance (HMA) program, Operating Budget (Larger cost savings will be realized by completing this project in conjunction with the 2022 runway rehab project)	20	8	28
POPA06	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	New Mitigation Action	**Internal:** Environmental	Short-term	Wildfire	Operating Budget	20	6	26
POPA07	Maintain a culture of preparedness by facilitating ongoing emergency response and security training, allowing staff to	New Mitigation Action	**Internal:** Operations	Ongoing	Human-Caused Hazards (Hazardous Materials, Maritime	Operating Budget	19	6	25

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	respond to evolving human-caused threats and risks.				Disaster, Active Shooter/Terrorism, Supply Chain Interruption, Disease/Pandemic)				
POPA08	Procure a consultant to study sea level rise and associated secondary impacts (such as flood, storm surge, king tides) on Port of Port Angeles assets and facilities. Evaluate infrastructure protection systems such as seawalls, levees, floodgates, or pumps to reduce risk to storm surge, flooding, and sea level rise.	New Mitigation Action	**Internal:** Engineering	Long-term	Flood, Sea Level Rise	Operating Budget, FEMA Flood Mitigation Assistance (FMA) Program, NOAA Coastal Resilience Grants	19	8	27
POPA09	Continue to monitor sea level rise projections as related to Port of Port Angeles assets and critical facilities. Integrate considerations for sea level rise projections into capital improvement plans/programs.	New Mitigation Action	**Internal:** Engineering	Ongoing	Sea Level Rise	Operating Budget, FEMA Flood Mitigation Assistance (FMA) Program, NOAA Coastal Resilience Grants	19	6	25
POPA10	Coordinate with Clallam County Emergency Management on preparedness plans for use of Port barges for potential transport of supplies/equipment during significant events where roadway transportation systems fail.	New Mitigation Action	**Internal:** Operations **External:** Clallam County EMD	Ongoing	Seismic, Supply Chain Interruption	Operating Budget	19	6	25
POPA11	Shoreline and bank re-armoring and retrofits at Port facilities at Tumwater	New Mitigation Action	**Internal:** Engineering	Long-term	Severe Weather, Flood, Tsunami, Sea-Level Rise, Seismic	Operating Budget, FEMA Flood Mitigation Assistance (FMA) Program, NOAA Coastal Resilience Grants	18	8	26

Action ID#	Mitigation Action Description	New or Previous Mitigation Action	Jurisdiction/ Lead Department	Timeline	Hazards Addressed	Funding Sources	STAPLEE Score	Mitigation Effectiveness Score	Total Priority Score
	Creek, Port Angeles Harbor and Sequim Bay.								
POPA12	Terminal 1 Warehouse retrofit, reconstruction or relocation.	New Mitigation Action	**Internal:** Engineering	Long-term	Severe Weather, Flood, Tsunami, Sea-Level Rise, Seismic	Operating Budget	19	4	23
POPA13	Emergency Generators for Port Facilities/Community Members: Install, upgrade or replace backup power generators at Port facilities including two airports, industrial parks, and two marinas. Framework and training for emergency shelters for community members at Port facilities locations enhanced with generators, supplies, and communication plans.	New Mitigation Action	**Internal:** Engineering	Medium-term	Severe Weather, Flood, Tsunami, Sea-Level Rise, Seismic	Operating Budget, FEMA Hazard Mitigation Assistance (HMA) program	17	4	21
POPA14	Severe Weather Repairs at Two Marinas: Proactive reinforcements, repairs, and reconstruction to the marina facilities due to weather impacts.	New Mitigation Action	**Internal:** Engineering	Long-term	Severe Weather, Flood, Tsunami, Sea-Level Rise, Seismic	Operating Budget	19	4	23
POPA15	Seek grant funding for an alternative energy project at the airport.	New Mitigation Action	**Internal:** Operations	Medium-term	All Hazards	Operating Budget	19	6	25
POPA16	Seek grant funding for a regional operational and communication center at the airport.	New Mitigation Action	**Internal:** Operations	Medium-term	All Hazards	Operating Budget	19	8	27
Mitigation Actions Applicable to All Jurisdictions									
Adopt the 2024 MJHMP	Adopt the MJHMP after approval.	New Mitigation Action	All Participating Jurisdictions	Short-term	All Hazards	High			

5.4 Hazard Mitigation Evaluation and Prioritization

After the identification of hazard mitigation actions, the County and participating jurisdictions prioritized action using the STAPLE/E and mitigation effectiveness analysis as utilized in the 2019 MJHMP. The HMCR Steering Committee considered the frequency and severity of the hazard; the vulnerability of critical facilities or infrastructure; the impacts the mitigation action would avoid or reduce; the benefits of the action on the community; the critical facilities that would benefit; the environmental benefits of the action; and the capability of the County and participating jurisdictions to implement the action. The HMCR Steering Committee used the STAPLE/E (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) criteria, as described in *Table 5-3. STAPLE/E Review and Selection Criteria*, when considering and prioritizing the most appropriate mitigation alternatives for the County. This methodology, as endorsed by FEMA, requires that social, technical, administrative, political, legal, economic, and environmental considerations be considered when reviewing potential actions. This process was used to help ensure that the most equitable and feasible actions would be undertaken based on the County's unique capabilities.

Table 5-3. STAPLE/E Review and Selection Criteria

Criteria	Evaluation Rating
STAPLE/E Criteria	
Social: is the mitigation action socially acceptable?	Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0
Technical: is the mitigation action technically feasible and potentially successful?	
Administrative: does the responsible agency/department have the administrative capacity to execute the action?	
Political: is the mitigation action politically acceptable?	
Legal: is there legal authority to implement the mitigation action?	
Economic: is the mitigation action economically beneficial?	

Criteria	Evaluation Rating
Environmental: will the mitigation action have either a neutral or positive impact on the environment?	
Will historic structures or key cultural resources be saved or protected?	
Could the mitigation action be implemented quickly?	
Mitigation Effectiveness Criteria	
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?	

5.5 Capabilities Assessment

This capabilities assessment is designed to identify existing local agencies, personnel, planning tools, public policy and programs, technology, and funds that have the capability to support hazard mitigation activities and strategies outlined in this Plan. To create this capability assessment, the HMCR Steering Committee collaborated to identify current local capabilities and mechanisms available to the County for reducing damage from future natural hazard events.

Capabilities and resources, including key mitigation accomplishments since the 2019 Clallam County MJHMP, were reviewed while developing this capabilities assessment. As mitigation actions identified in the County's mitigation strategy are completed, they become new mitigation capabilities.

Participating jurisdictions reviewed and updated their capabilities through direct coordination with the MJHMP Project Management and Consultant Team. Jurisdiction-specific capabilities are included in their respective jurisdictional annexes.

5.5.1 Key Resources

Clallam County has various key resources that serve as a set of tools to increase resilience and implement the MJHMP and specific mitigation actions. The key

resources and capabilities of Clallam County typically belong to one of the following types of mitigation capabilities:

- **Planning and regulatory capabilities** are based on the implementation of ordinances, policies, local laws, and State statutes, and plans and programs that relate to guiding and managing growth and development.
- **Administrative and technical capabilities** refer to the staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. It also refers to the ability to access and coordinate these resources effectively.
- **Financial capabilities** are the resources that a jurisdiction has access to or is eligible to use to fund mitigation actions.
- **Education and outreach capabilities** are programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

Refer to *Table 5-4* through *Table 5-7* below for a summary of County capabilities organized by type. Each capability table includes a description of how capabilities are integrated into the MJHMP or how they contribute to resilience. Additionally, each table includes a summary of how capabilities can be expanded on by identifying the nexus between the type of capability and the mitigation actions of this Plan that expand those capabilities.

5.5.1.1 Planning and Regulatory Resources

Table 5-4 describes the planning and regulatory capabilities, including plans and policies that provide an opportunity to integrate hazard mitigation and increase resilience.

Table 5-4. Planning and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Hazard Mitigated
Plans	2025 Comprehensive Plan Update	The County's Comprehensive Plan provides a roadmap for future growth and development in the County over a 20-year period guided by the Washington State Growth Management Act (GMA). The ongoing 2025 Comprehensive Plan update will review existing conditions and revise goals and policies related to Land Use, Transportation, Public Utilities, Housing, Capital Facilities, Rural Development, Economic Development, Parks and Recreation, and Climate Change and Resiliency.	All
	Climate Element and Resilience Sub-Element	Meets new Washington House Bill 1181 requirements for cities and counties to integrate climate mitigation and/or resilience policies into their periodic comprehensive plan updates. The 2025 Comprehensive Plan Update and Climate Change and Resilience Sub-Element was prepared in coordination with MJHMP to ensure maximum consistency, and at the time of this writing, element drafts are in progress.	All

Capability Type	Capability	Description	Hazard Mitigated
	County Comprehensive Emergency Management Plan (CEMP) Update	The CEMP was updated in 2022 by the Clallam County Sheriff Department. The updated CEMP outlines roles and responsibilities of the County and participating jurisdictions in mitigating potential hazards. The CEMP was referenced as part of the 2024 MJHMP update.	All
	Public Alert and Warning System (PAWS) Plan	The Clallam County PAWS Plan provides government officials with a mechanism to issue emergency warning information to the public through local broadcast and cable networks. The Plan was developed by Clallam County Emergency Management in 2022.	All
	State of Washington Enhanced Hazard Mitigation Plan	Profiles hazards throughout the State, assesses risks, and outlines potential mitigation actions. Collaborative effort between State and County.	All
	Community Wildfire Protection Plan (CWPP)	The County is in the process of preparing an update to the 2009 CWPP. The CWPP update will identify communities at risk utilizing the latest wildfire modeling and technology, establish priority areas for hazardous fuel treatment, and recommend methods to reduce risk to life and property.	Wildfire

Capability Type	Capability	Description	Hazard Mitigated
	Shoreline Master Program (SMP) (Clallam County Code Title 35)	The Clallam County SMP, approved in 2021, is a comprehensive use plan for shoreline areas that includes goals and policies, maps, diagrams and charts, use and development regulations, and administrative procedures for the shoreline permitting process.	Sea Level Rise, Flooding
	Floodplain Management Plan	The County has developed a Dungeness River Comprehensive Flood Hazard Management Plan to study the risk of flooding along the river. The plan was approved by Washington Department of Ecology in 2010	Flooding
	Peabody Heights Dam Emergency Action Plan (EAP)	The Peabody Heights Dam EAP defines responsibilities and provides procedures to reduce the risk of injury or loss of life and minimize property damage during and emergency impacting the dam at the Peabody Heights Reservoir.	Dam/Reservoir Failure
	Capital Improvement Plan	Identifies capital improvement projects to be undertaken by the County over the next five-year period. Hazard mitigation and maintenance projects are also included in the planning effort.	All

Capability Type	Capability	Description	Hazard Mitigated
	Disaster Recovery Plan	Establishes procedures to mitigate cyber and IT disruptions. Improves collaboration between IT and Emergency Management	Cyber security, utility failure
Policies	Local Operating Plan/Agreement with Bureau of Land Management (BLM) and U.S. Forest Service	Increased capability and capacity through partnership.	Wildfire
	Zoning Ordinance	Provides land use regulation in the unincorporated portions of the County.	All
	Subdivision Ordinance	Incorporated into zoning ordinance, establishes regulations around subdivision of properties.	All
	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. Wetland buffers, fish and wildfire conservation areas, and frequently flooded areas have been included in the Ordinance.	Flooding

Capability Type	Capability	Description	Hazard Mitigated
	Stormwater Management Ordinance (Clallam County Code Chapter 27.14)	Clallam County's Stormwater Management Ordinance went into effect on January 1, 2022 and comprehensively addresses stormwater management in unincorporated Clallam County for new development and redevelopment through the use of construction and post-construction best management practices.	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 are currently participating in the NFIP.	Flooding
	Building Codes	Building permits are issued by the Department of Community Development and aligned with the 2021 Washington State and International Existing Building Code (IEBC) which are effective as of March 15, 2024.	All

Capability Type	Capability	Description	Hazard Mitigated

How can these capabilities be expanded upon and improved to reduce risk?

Multiple mitigation measures are priority projects to expand on Clallam County's capabilities, including new plans and programs. Examples of opportunities to expand capabilities include the following mitigation actions:

Planning/Regulatory:

Through the Comprehensive Plan Update, evaluate zoning regulations and land use controls that reflect project climate risk and reduce development in known or projected hazard zones (Mitigation Action CC23); Incorporate climate projections into drought planning to enhance preparedness and mitigate the impacts of drought on water resources (Mitigation Action CC24); Prepare a Community Wildfire Protection Plan (CWPP) update, and model wildfire behavior to identify risk reduction solutions (Mitigation Action CC26); Implement climate-smart building policies and disincentivize construction in areas highly susceptible to climate hazards such as erosion, landslides, and flooding (Mitigation Action CC33); Develop risk assessment and response plan for vulnerable populations regarding excessive heat, cold, smoke inhalation – including loss of power and/or ability to transport (Mitigation Action SQ19); Develop and/or improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Continuity of Operations Plan etc. (Mitigation Action PUD06); and Incorporate hazard mitigation into Master Plan (Mitigation Action PC05).

5.5.1.2 Administrative and Technical Resources

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

Table 5-5. Administrative 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		

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
Emergency Operations Center Team	Emergency Management	Trained group of volunteers activated during disasters to coordinate emergency response efforts.

How can these capabilities be expanded upon and improved to reduce risk?

Multiple mitigation measures are priority projects to expand on Clallam County's capabilities, including new plans and programs. Examples of opportunities to expand capabilities include the following mitigation actions:

Admin/Technical:

Establish a system of real-time hazard mapping to communicate conditions on the ground to staff and public (Mitigation Action CC04); Coordinate with public safety agencies to identify staging locations for emergency response equipment and materials, including food, water, deployable shelters, and medical/first aid (Mitigation Action CC20); Identify opportunities to expand community capacity through partnership through Community Emergency Response Teams (CERT) and American Red Cross training programs (Mitigation Action CC27); Build fuel station at City Public Works Yard to supply fuel to City departments and all emergency responders (Mitigation Action SQ01); and Develop advanced warning systems (Mitigation Action JSK15).

5.5.1.3 Financial Resources

Table 5-6 identifies current and potential sources of funding to implement identified mitigation actions contained within the MJHMP.

Table 5-6. Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Federal		
Hazard Mitigation Assistance (HMA) Programs	FEMA	FEMA's Hazard Mitigation Assistance (HMA) programs provide funding for eligible activities that reduce or eliminate long-term risk to people and property from future disasters. These programs aim to break the cycle of disaster damage and reconstruction by supporting proactive mitigation planning and actions.
Building Resilient Infrastructure and Communities (BRIC) Program	FEMA	The FEMA Building Resilient Infrastructure and Communities (BRIC) program supports states, local governments, tribes, and territories in reducing hazard risks through proactive investments in resilience and capacity building. BRIC aims to shift the focus from reactive disaster spending to innovative, research-supported initiatives that enhance community preparedness and infrastructure resilience.
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.

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

Funding Source	Fund Administrator	Description
		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.
Coastal Resilience Grants Program	National Oceanic and Atmospheric Administration	The NOAA Coastal Resilience Grants program funds projects that enhance the resilience of U.S. coastal communities and ecosystems by protecting lives, property, and infrastructure while benefiting the economy and environment.
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.

Funding Source	Fund Administrator	Description
		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 extension services and 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.
Drought Planning and Preparedness Grants	Washington Department of Ecology (DEC)	The Washington Department of Ecology's Drought Planning and Preparedness Grants provide $1.8 million to support local communities in developing plans to enhance drought resilience and water supply security.
WSDOT Seismic Retrofit Program	WSDOT	WSDOT provides funding and project support to retrofit bridges at risk of failure due to seismic events.
Washington State Department of Agriculture (WSDA) Livestock Inspection Program	WSDA	Dedicated to providing asset protection for the livestock industry by recording brands, licensing feedlots and public livestock markets by conducting surveillance and inspection of livestock at time of sale and upon out of state movement. The program is funded by fees paid by the livestock

Funding Source	Fund Administrator	Description
		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.
Environmental Justice and Climate Change Grants	Washington Department of Health	The Washington State Department of Health offers various grant programs to advance environmental justice and build climate resilience. These programs focus on reducing environmental and health disparities, enhancing community-led decision-making, and supporting climate resilience initiatives.
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

Funding Source	Fund Administrator	Description
		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.
Local Resources		
General Fund/Budget	Clallam County	Primary financial account used to cover essential services of the County, including public safety, health services, and infrastructure maintenance.
Capital Improvement Project Funding	Clallam County	Financial plan that allocates resources for long-term infrastructure projects and physical improvements within Clallam County.

How can these capabilities be expanded upon and improved to reduce risk?

Multiple mitigation measures are priority projects to expand on Clallam County's capabilities, including new plans and programs. Examples of opportunities to expand capabilities include the following mitigation actions:

Financial:

Funding Source	Fund Administrator	Description
Seek funding resources and mechanisms for low-income communities and individuals to purchase emergency supplies and equipment (Mitigation Action CC22); Explore additional funding and financing mechanisms for improvements at other weak points on 112 (Mitigation Action CC25); Secure grant funding from the United States Department of Agriculture (USDA) to fund a Community Wildfire Protection Plan (CWPP) update (Mitigation Action CC26); Capture stormwater in the County southwest of Sequim city limits and re-infiltrate using green stormwater infrastructure to benefit the watershed (Mitigation Action SQ10); Structure elevation and/or relocation of Tribal facilities and infrastructure (Mitigation Action JSK04); and Storm-related Roof Damage Mitigation Assessment (Mitigation Action FR02).		

5.5.1.4 Education and Outreach Resources

Table 5-7 describes the education and outreach capabilities that promote resilience through alerts, preparedness and continued outreach and coordination throughout the County.

Table 5-7. Education and Outreach Integrated with Hazard Mitigation

Resource	Description
Clallam Co. Alert System	Distributes emergency alerting and other community news.
Emergency Kit Information	Provides community members with guides for preparing family emergency kits for 3, 21, and 30 days.
Clallam County Emergency Management Website	The Clallam County Emergency Management Website posts various resources and opportunities for members of the public to participate in preparedness programs and volunteer in emergency preparedness and response groups.
Hazard Mitigation Planning Website	Provides information regarding the MJHMP to residents and stakeholders including education and outreach opportunities related to preparedness and disaster mitigation.
Prepare in a Year	Clallam County Prepare in a Year Project is designed to help households become personally prepared by registering residents and identifying 12 projects (1 per month) to be completed.

Resource	Description
Map your Neighborhood	The Map Your Neighborhood (MYN) program in Clallam County is designed to help residents prepare for disasters by fostering community collaboration and resilience. It encourages neighbors to get to know each other, identify skills and resources, create neighborhood maps, and develop emergency plans together. This program aims to enhance local preparedness and ensure a coordinated response during emergencies.
Disaster Preparedness Guide	The Clallam County Disaster Preparedness Guide provides essential information on how families can prepare for emergencies by creating a plan, assembling a Grab 'N Go kit, and maintaining adequate reserves of food, water, and necessities.
Emergency Operations Center Team Training	The Emergency Operations Center (EOC) is staffed with a trained group of volunteers. Training is provided on the first and third Thursday of every month and while experience is valued, it's not necessary to join our team.
Clallam County Amateur Radio Emergency Services (CCARES)	A network of volunteer amateur radio operators that provides backup emergency radio communications to support the County government and other response agencies during emergencies.
Clallam County Disaster Air Relief Team (CCDART)	A volunteer group of general aviation pilots and support staff who provide airlift resources to transport people and supplies during local disasters.
Community Emergency Response Team (CERT)	The Clallam County Community Emergency Response Team (CERT) educates volunteers about disaster preparedness and trains them in basic disaster response skills, such as fire safety, light search and rescue, and disaster medical operations.
Medical Reserve Corps (MRC)	The Medical Reserve Corps (MRC) in Clallam County is a network of volunteers dedicated to improving community

Resource	Description
	health and safety by providing medical and public health support during emergencies.
American Red Cross Emergency Preparedness Programs	The American Red Cross offers a variety of virtual and in-person programs to help people prepare for emergencies including free disaster training for volunteers, covering topics such as installing smoke alarms, creating disaster preparedness plans, and joining local disaster action teams2
Washington State Cascadia Rising Exercise	This exercise scenario is based on a magnitude 9.0 Cascadia Subduction Zone earthquake, including subsequent aftershocks, tsunamis, liquefaction, and landslides. Participation in this exercise provides preparedness and response guidance focused on critical transportation, mass care services, operational communication/coordination, and logistics/supply chain management.
How can these capabilities be expanded upon and improved to reduce risk? Multiple mitigation measures are priority projects to expand on Clallam County's capabilities, including new plans and programs. Examples of opportunities to expand capabilities include the following mitigation actions: **Education/Outreach:** Promote education on natural hazards and empower community members to form neighborhood plans and preparedness groups (Mitigation Action CC21); Partner with the Washington State University (WSU) Extension – Clallam County and the Clallam Conservation District to promote the Drought Relief Education Outreach Program and encourage community members to adopt waterwise practices on their property (Mitigation Action CC24); Identify opportunities to expand community capacity through partnership through Community Emergency Response Teams (CERT) and American Red Cross training programs (Mitigation Action CC27); Train City staff to perform seismic assessments of City properties (Mitigation Action SQ14); Coordinate Emergency Management/Incident Response trainings for North Olympic Peninsula jurisdictions (Mitigation Action SQ17); Public education of potential hazards, local agency response, and preparedness (Mitigation Action SQ18); and Public education around flood mitigation, floodplain functions, emergency service procedures, and potential hazards (Mitigation Action JSK07).	

5.5.2 FEMA's National Flood Insurance Program

The National Flood Insurance Program (NFIP) provides affordable flood insurance to property owners, renters, and businesses by encouraging communities to adopt and enforce floodplain management regulations. Participation in the NFIP is optional; however, property owners who live in a non-participating community with flood-prone areas are not able to buy flood insurance through the program. Communities with mapped floodplains cannot receive federal grants or loans for development activities in

flood-prone areas and cannot receive federal disaster assistance to repair flood damaged buildings or structures in mapped floodplains if the jurisdiction is not a participant of the NFIP.

Clallam County and the cities of 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.

Clallam County implements the requirements of the NFIP through Clallam County Code (CCC) Title 32, Floodplain Management. This Clallam County Code establishes 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. Frequently flooded areas in unincorporated Clallam County are regulated through County Code, Chapter 27 (Environment).

More specifically, Clallam County Code, Chapter 27.12 (Critical Areas) identifies and protects critical areas, including floodplains, and regulates their use. *Table 5-8* contains a summary of Clallam County's regulation of flood hazard areas in the Clallam County Critical Areas Ordinance (as of November 2016).

Table 5-8. Critical Area Regulation of Flood Hazard Areas

Critical Area	Jurisdiction
Wetlands	Within 200 feet of regulated wetlands
Aquatic habitat conservation areas (Type 1-5 waters, Shorelines of the State)	Type 1/Shorelines of the State: Equivalent to the Clallam County Shoreline Master Program Type 2-5: Within 200 feet
Wildlife habitat conservation areas	Class 1: Within 200 feet or equivalent to critical habitat designations for threatened or endangered species under the federal Endangered Species Act, or Washington State law

Critical Area	Jurisdiction
	Class 2: Within 200 feet
Geologically hazardous areas	Within 200 feet of a landslide, erosion, or seismic hazard area
Frequently flooded areas	Designated special flood hazard areas (floodway and floodplain)
Critical aquifer recharge	Designated critical aquifer recharge areas

Clallam County is currently undergoing a countywide Digital Flood Insurance Rate Map (DFIRM) project, which includes the delineation of several streams using the latest available LiDAR. Several project areas for select streams were in need of new survey and engineering analysis. These are as follows: Jimmycomelately Creek, Lake Creek, Sol Duc River, Ford Creek, Warner Creek, Whiskey Creek Tributary and a tributary to Whiskey Creek Tributary, and Bell Creek. This Clallam County (New Riverine FY20) Physical Map Revision (PMR) will include the completion of field survey, hydrology, and hydraulics in support of flood risk mapping. Thus, finalized FIRM maps for Clallam County are to be determined, and are not expected to become available before 2026. The 2024 Clallam County MJHMP flood map vulnerability assessment relied on the draft RiskMAP data from the ongoing DFIRM project to produce vulnerability results.

The Clallam County Code designates the County's Building Official as the Floodplain Administrator responsible for administering and implementing the provisions of the NFIP. All development, including substantial improvement, within designated special flood hazards must be in full compliance with County Code, Chapter 32.03 and Chapter 27.12. These standards are applicable both at the time of initial improvement and would be applicable after any flood event that constitutes substantial improvement or substantial damage.

Significant flood events resulting repetitive loss and severe repetitive loss are rare within the planning area. To date, there are five repetitive loss properties and one severe repetitive loss property located within the County. These properties are listed in *Table 5-9. Repetitive Loss and Severe Repetitive Loss Properties*.

Table 5-9. Repetitive Loss and Severe Repetitive Loss Properties

Reported City	Zip Code	Flood Zone	Total Losses	Repetitive Loss	Severe Repetitive Loss	Type
Forks	98331	A	3	✓	✓	Residential
Forks	98331	A07	3	✓		Residential
Port Angeles	98362	C	2	✓		Residential
Sequim	98382	B	3	✓		Residential
Sequim	98382	C	2	✓		Residential
Clallam (County)	N/A	N/A	2	✓		Residential
Source: FEMA, *OpenFEMA Dataset: NFIP Multiple Loss Properties - v1*, https://www.fema.gov/openfema-data-page/nfip-multiple-loss-properties-v1, accessed October 1, 2024.						

Section 6.0: Plan Maintenance

This section provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. This section also discusses incorporating the plan into existing planning mechanisms and how to address ongoing public participation.

6.1 Plan Maintenance Responsibility and Authority

The MJHMP Plan Maintenance Team is responsible for coordinating annual review of the MJHMP and making appropriate revisions. On an annual basis, the MJHMP Plan Maintenance Team will convene members of the HMCR Steering Committee to conduct a comprehensive review of the plan to ensure that all information is current. The MJHMP Plan Maintenance Team will take the lead in MJHMP maintenance by coordinating with members of the HMCR Steering Committee, including undertaking the formal review process and updating the plan, facilitating meetings (e.g., Operational Area meetings), and assigning responsibilities to committee members.

MJHMP implementation and evaluation will be a shared responsibility among HMCR Committee members. It is acknowledged that over the course of the next five years, individuals participating on the HMCR Steering Committee may change due to organizational changes and/or staff turnover. The MJHMP Plan Maintenance Team has the responsibility for coordinating with internal County departments, participating jurisdictions and external stakeholders/partners to identify relevant HMCR Steering Committee participants if previously identified individuals are no longer able to participate.

At a minimum, the ongoing annual HMCR Steering Committee meeting will evaluate the progress of the MJHMP and incorporate the actions into other relevant planning documents. This review will include the following:

- Summary of any hazard events that occurred during the prior year and impacts on the community.
- Review of successful mitigation initiatives identified in the MJHMP.

- Brief discussion about why targeted mitigation strategies were not completed.
- Reevaluation of the mitigation actions to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term project due to funding availability).
- Recommendations for new mitigation actions.
- Changes in, or potential for, new funding options/grant opportunities.
- Integration of new GIS data and maps that can be used to inform the MJHMP.
- Evaluation of any other planning programs or initiatives within the County or participating jurisdictions that involve hazard mitigation.

The purpose of the annual evaluation will be to ensure consideration and implementation of the MJHMP and document progress to inform the future update.

6.2 Method and Schedule for Updating the Plan within Five Years

Section 201.6.(d)(3) of Title 44 of the Code of Federal Regulations requires that hazard mitigation plans be reviewed, revised if appropriate, and resubmitted for approval to remain eligible for benefits awarded under the DMA. Monitoring the progress of the mitigation actions will be on-going throughout the five-year period (as discussed the section above) between the adoption of the MJHMP and the next update effort. The HMCR Steering Committee will meet on an annual basis to monitor the status mitigation action implementation and develop updates as necessary.

The County and all participating jurisdictions intend to update the MJHMP on a five-year cycle from the date of its adoption. It is anticipated that this update process will occur one year prior to expiration of the existing Plan. This cycle may be accelerated to less than five years based on the following triggers:

- A presidential disaster declaration that impacts the County or participating jurisdiction.
- A hazard event within the planning area that causes loss of life.

Should either of the above-mentioned thresholds occur, the HMCR Steering Committee will reconvene to review and update the MJHMP, as appropriate. The Clallam County Board of County Commissioners and the governing bodies of participating jurisdictions will adopt written updates to the MJHMP.

6.2.1 Process

The intent of the update process will be to add new planning process methods, community profile data, hazard data and events, vulnerability analyses, mitigation actions, and goals to the adopted MJHMP so content will always be current and up to date. Based on the needs identified by the HMCR Steering Committee, the update will, at a minimum, include the elements below:

1. The update process will be convened through the HMCR Steering Committee, appointed by the MJHMP Plan Maintenance Team. The MJHMP Plan Maintenance Team will include representatives from both the Sheriff's Office and Community Development Department, to ensure MJHMP consistency with other relevant County plans.
2. The hazard risk assessment will be reviewed and updated using best available information and technologies on an annual basis.
3. The evaluation of critical structures and mapping will be updated and improved as new development/growth occurs in the planning area.
4. The mitigation actions will be reviewed and revised to account for any actions completed, deferred, or changed to account for changes in the risk assessment or new policies identified under other planning mechanisms, as appropriate.
5. The draft update will be sent to the HMCR Steering Committee for comment.
6. The public will be given an opportunity to comment prior to adoption.
7. The Clallam County Board of County Commissioners and participating jurisdictions will adopt the updated MJHMP.

The MJHMP Plan Maintenance Team will coordinate with responsible County departments, participating jurisdictions and external agencies/organizations identified for each mitigation action. These responsible departments and agencies/organizations

will monitor and evaluate the progress made on the implementation of mitigation actions and report to the MJHMP Plan Maintenance Team on an annual basis. Working with the HMCR Steering Committee, these responsible departments and agencies/organizations will be asked to assess the effectiveness of the mitigation actions and modify the mitigation actions as appropriate.

Information culminated from the HMCR Steering Committee (including County staff, participating jurisdictions, and external partners) will be used to monitor mitigation actions and annual evaluation of the MJHMP. The following questions will be considered as criteria for evaluating MJHMP effectiveness:

- Has the nature or magnitude of hazards affecting the County or participating jurisdictions changed?
- Are there new hazards that have the potential to impact the County or participating jurisdictions?
- Do the identified goals and actions address current and expected conditions?
- Have mitigation actions been implemented or completed?
- Has the implementation of identified mitigation actions resulted in expected outcomes?
- Are current resources adequate to implement the MJHMP?
- Should additional local resources be committed to address identified hazards?

Future updates to the MJHMP will account for any new hazard vulnerabilities, special circumstances, or new information that becomes available. Issues that arise during monitoring and evaluating the MJHMP, which require changes to the risk assessment, mitigation strategy and other components of the Plan, will be incorporated into the next update of the MJHMP (anticipated to initiate in 2029 with plan approval received by 2030). The questions identified above will remain valid when preparing the next MJHMP update.

6.3 Local Adoption

Washington Emergency Management Division (EMD) and FEMA are responsible for initial review and approval of the MJHMP. After the plan check review process concludes, the Clallam County Board of County Commissioners is responsible for adopting the MJHMP by resolution. In addition, the governing bodies of all participating jurisdictions are responsible for local adoption by resolution of the MJHMP. This formal adoption process should take place every five years.

Once the MJHMP is adopted by the County and all participating jurisdictions, the MJHMP Plan Maintenance Team will submit the MJHMP and all adoption resolutions to FEMA for final approval.

6.4 Implementation through Existing Programs and Planning Mechanisms

The effectiveness of the MJHMP depends on the implementation and incorporation of the outlined mitigation action items into existing County and participating jurisdictions plans, policies, and programs. The MJHMP includes a range of action items that, if implemented, would reduce loss from hazard events in the County and participating jurisdictions. Together, the mitigation actions in the MJHMP provide the framework for activities that the County and participating jurisdictions may choose to implement over the next five years. The County and participating jurisdictions prioritized the Plan's goals and identified actions that will be implemented (resources permitting) through existing plans, policies, and programs.

The MJHMP Plan Maintenance Team, including the Clallam County Sheriff's Office (Emergency Management Director, Emergency Management Coordinators, and Community Development Department (Director and Deputy Director)), have taken on the responsibility for overseeing the MJHMP implementation and maintenance though existing County programs. The MJHMP Plan Maintenance Team, or designated appointee, will assume lead responsibility for facilitating MJHMP implementation and maintenance meetings. Although the MJHMP Plan Maintenance Team will have primary responsibility for review, coordination, and promotion, plan implementation and evaluation will be a shared responsibility among all entities identified in the mitigation

action plans. This responsibility includes internal County departments, participating jurisdictions, and external stakeholders.

By adopting a resolution to approve this MJHMP, the County and participating jurisdictions agree to reference and incorporate the document into planning documents, programs, decisions, processes, and regulations. The MJHMP will be reviewed and considered by internal County departments and participating jurisdictions, as applicable plans or programs are created or updated in the future. Upon creating or updating new plans, programs or policies, County staff will review this MJHMP and consider the following:

- What hazard and/or vulnerability information should be considered and/or integrated into this plan?
- Are there opportunities for this plan to support and/or implement mitigation actions?
- What mitigation actions can and should be integrated into this plan?
- Are there other community mechanisms that mitigation can be integrated?
- Is there information from this plan that can be integrated into the next MJHMP update?

Some of the ways the County and participating jurisdictions will integrate information from this MJHMP into planning mechanisms are described below.

Counties and cities in Washington state are required to adopt a comprehensive plan to articulate a community vision through goals, objectives, policies and actions that guide the day-to-day decisions of elected officials and local government staff. Substitute House Bill (SHB) 2296, Growth Management Comprehensive Plans – Revision Schedule, requires Clallam County and incorporated cities to review and revise their comprehensive plans by December 31, 2025. Comprehensive Plan Updates are required to reflect new population and employment projections, and any related zoning and/or urban growth area changes, updated state law, and new community priorities.

At the time of this writing, Clallam County and three participating jurisdictions (City of Forks, Port Angeles, and Sequim) are in the process of updating the Comprehensive Plans. Each jurisdiction considers the MJHMP and Comprehensive Plan to be

complimentary planning documents that work together to achieve the goal of reducing risk exposure to the citizens. As changing land use patterns and population growth is most likely to occur within designated Urban Growth Areas (UGAs), the intersection of mapped hazard zones, vulnerability and risk is discussed on a hazard-by-hazard basis within Section 4.0. Each jurisdiction aims to regulate and/or reduce development in known hazard zones, and the MJHMP findings are anticipated to be incorporated into each Comprehensive Plan Update. This incorporation is also an identified mitigation action for each of the jurisdictions in Section 5.0. Future visions for land use, growth and development as identified in this comprehensive planning update will be included into the next MJHMP update.

In addition, the County is in the process of preparing an update to the 2009 Community Wildfire Protection Plan (CWPP) in conjunction with several entities that participated as part of the HMCR Steering Committee. The CWPP update will identifies communities at risk utilizing the latest wildfire modeling and technology, establish priority areas for hazardous fuel treatment, and recommend methods to reduce risk to life and property. It is anticipated that MJHMP findings will be incorporated into the CWPP for background information and planning purposes; the CWPP will ultimately build upon these findings to further evaluate vulnerability and risk. This incorporation is also an identified mitigation action included in Section 5.0. The updated CWPP will include data, maps and findings that would be included into the next MJHMP update.

The County and each participating jurisdiction maintains and regularly updates a Capital Improvement Plan (CIP), identifying capital projects and/or major equipment purchases for the entity. The CIP links departmental plans and programs with the annual budget for each entity. Identified CIP projects were integrated into the MJHMP mitigation actions where appropriate, for projects with a nexus to resilience or natural hazards. In addition, as part of CIP annual reviews and updates, mitigation actions identified will be integrated as appropriate.

Other opportunities for integration of this MJHMP include continued education awareness programs in partnership between the County, participating jurisdictions, and other external partners. The County maintains as hazard mitigation planning website that provides information regarding the MJHMP to residents and stakeholders. The County will continue to provide in-person educational events and activities to further inform the community regarding hazard risk and mitigation.

6.5 2019 MJHMP Past Integration Efforts

The County and participating jurisdictions actively integrated the 2019 MJHMP into relevant plans and programs between 2019 and 2024. Examples of past integration efforts are summarized below:

- The Clallam County Emergency Management website posted the 2019 MJHMP along with additional links/resources incorporated into the plan, including hazard specific resources for tsunami, wildfire, and winter weather. Relevant preparedness programs and information including “Prepare in a Year”, “Map your Neighborhood” and “Disaster Preparedness Guide” are posted for use by members of the public. Opportunities to volunteer and participate are advertised here as well, including the Emergency Operations Center Team, Clallam County Amateur Radio Emergency Services (ARES), Clallam County Disaster Air Relief Team (DART), Community Emergency Response Team (CERT) and Medical Reserve Corps (MRC).
    - Between 2019 and 2022, the Clallam County Sheriff Department completed an update to the Comprehensive Emergency Management Plan (CEMP) where the MJHMP was incorporated by reference. Specifically, the hazard assessment and vulnerability assessment informed the CEMP mitigation mission. The CEMP is a complimentary deliverable to the MJHMP; where the MJHMP identifies long-term strategies to reduce or eliminate risk before the disaster occurs, the CEMP is designed to guide response to emergencies as the disaster occurs. The CEMP was referenced as part of the 2024 MJHMP update.
- In 2022, Clallam County Emergency Management participated in the Washington State Cascadia Rising Exercise. The scenario is based on a magnitude 9.0 Cascadia Subduction Zone earthquake, including subsequent aftershocks, tsunamis, liquefaction, and landslides. The exercise primarily focused on critical transportation, mass care services, operational communication/coordination, and logistics/supply chain management. This exercise gathered more than 600 participants from federal, state, local and tribal entities. The 2019 MJHMP risk assessment highlighted the planning area’s high vulnerability to seismic hazards and highlighted critical facilities and transportation systems experiencing the

highest risk, and ultimately integrated into preparedness activities for this specific hazard.

- In 2022, Clallam County Emergency Management prepared the Public Alert and Warning System Plan (PAWS) for the Local Emergency Communications Committee (LECC), which incorporates the MJHMP by reference. The PAWS deliverable notes that hazards identified in the MJHMP may warrant the use of the Emergency Alert System.
- Between 2019 and 2024, the Clallam County Sheriff's Office has hosted and facilitated hazard mitigation and preparedness outreach with members of the public. In addition, many volunteer organizations and individuals across the County promote hazard mitigation and awareness programing. Former State Representative and subject matter expert Jim Buck regularly facilitates hazard mitigation and preparedness programming about the Cascadia earthquake scenario.
- Clallam County Emergency Management participates in many events during the year including Kid's Fest, Home Show, Clallam County Fair, Port Angeles Senior Citizen Safety Fair, Community Wild Fire Presentations, Unity of Effort, Map Your Neighborhood, Clallam Ready, Sequim Safety Fair, and Animal Preparedness.

6.6 Continued Public Involvement

The County is dedicated to involving the public in review and updates to the MJHMP throughout the 5-year planning period. The public, including socially vulnerable populations, will continue to be informed of the MJHMP actions through regular updates throughout the five-year planning period. A primary mechanism to inform the public of MJHMP progress is through annual updates to the County website and integration into ongoing emergency preparedness trainings, meetings and other hazard awareness campaigns. This outreach will focus on the "whole community approach," ensuring that socially vulnerable populations will also receive messaging.

The adopted MJHMP will remain permanently available for review on the County and participating jurisdiction's websites, with contact information for interested parties to

direct comments and concerns. All public feedback will be reviewed and considered for incorporation (if deemed appropriate) into the next MJHMP update.

Upon initiation of the MJHMP update process, a new public involvement strategy will be developed based on guidance from the MJHMP Plan Maintenance Team and HMCR Steering Committee. This strategy will be based on the needs and capabilities of the County and participating jurisdictions at the time of the update. At a minimum, this strategy will continue to include the use of the County and participating jurisdiction websites, integration into standing Operational Meetings, and facilitating outreach at well-attended County events. The community survey as part of the 2024 received high levels of feedback across the County. The community survey should be updated and redistributed to track changes in MJHMP priorities and receive feedback from the public. A multi-pronged approach including both in-person and virtual opportunities to participate will be considered to maximize feedback. As this time, a re-evaluation of local socially vulnerable populations will be conducted for improved understanding of how to reach and engage these groups.

6.7 Point of Contact

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Appendices

Appendix A: Plan Adoption Resolutions

APPENDIX A

Plan Adoption Resolutions

Adoption Resolution Placeholder

Appendix B: HMCR Steering Committee Materials

APPENDIX B

HMCR Steering Committee Materials

APPENDIX B.1

HMCR Steering Committee Organization and Invitation

Clallam County MJHMP and Climate Element

Kick-off Meeting Agenda | February 27, 2024 | 11:00 AM-12:30 PM

Agenda

Time	Agenda Item
11am – 11:15am	Kick-off meeting objectives and project introductions
11:15am – 11:25am	Project goals and measures of success
11:35am – 11:50am	Workplan Discussion
11:50am – 11:55am	Roles and Risks
12:15am – 12:30am	Next steps

Kick-off Meeting Objectives

- Understand Clallam County goals and objectives
- Clarify roles project team roles
- Review project timeline and workplan
- Identify project risks

Project Team Introductions

Clallam County	Role on Project (to be verified at kick-off)
Diane Harvey, Sheriff's Office	Project Lead
Holden Fleming, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
Mary Ann Rozance, Cascadia Consulting Group	Project Manager
Kristina Zeynalova, Cascadia Consulting Group	Deputy Project Manager and Climate Planning Lead
Alyssa Rodrigues, Cascadia Consulting Group	Engagement lead
Mike Chang, Cascadia Consulting Group	Principal in Charge
Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead
Casey Marchese, Michael Baker International	Hazard Mitigation Analyst
Jim Buck	Strategic advisor

Detailed Agenda

Time	Topic	Lead	Notes
11:00 am (15 min)	Objectives & Introduction	Mary Ann	**Introduce project team and walk-through meeting agenda, clarify roles** ✓ Welcome ✓ Meeting purpose and agenda ✓ Introductions and verify roles on project
11:15 am (10 min)	Project objectives & measures of success	Mary Ann	**Review project goals and measures of success** ✓ Review project goals and objectives ✓ *Discussion question: What does success look like to you?*
11:25 am (50 min)	Workplan and timeline	Mary Ann Kristina Alyssa Noelle	**Review detailed timeline and workplan** ✓ Review project timeline by phase with outcomes and deliverables ✓ *Discussion question: Does this timeline make sense? Do we need to adjust anything?*
12:15 pm (10 min)	Roles and Risks	Kristina	**Identify project risks to develop mitigation measures in workplan** ✓ Review and brainstorm potential project risks ✓ *Discussion question: What are potential risks we may encounter and how can we mitigate? How do we decide whose role it is to troubleshoot unanticipated risks?*
12:25 pm (10 min)	Next steps	Mary Ann	**Goal: Summarize next steps** ✓ Review action items and next steps ✓ Timeline and workplan

Project goals and measures of success

- *Discussion Question: What are the project goals?*
    - Form the Hazard Mitigation/Climate Resiliency Steering Committee to help guide and inform the Update and Climate Resilience planning process.
    - Conduct a natural and man-made hazard vulnerability and risk analysis (consistent with both FEMA policy requirements and NOAA's U.S. Climate Resilience Toolkit) and identify critical assets.
    - Achieve equitable outcomes by employing a robust, whole-community engagement approach ensuring a planning process that is inclusive for all stakeholders in our community, including socially vulnerable populations.
    - Update the MJHMP to meet FEMA requirements by November 2024 and present to FEMA for approval.
    - Develop a complete Climate Element Workbook that aligns with Commerce's Climate Element guidance and requirements.
- *Discussion Question: What does success look like and how will it measured?*

Project workplan and timeline

PROJECT TIMELINE

- Detailed Timeline: SmartSheet Workplan
- *Discussion Question: Does this timeline make sense? Do we need to adjust anything?*

Tasks and Deliverables	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Phase 1 (Tasks 1) Project Initiation, Gap Analysis, Coordination, and Initial Recommendations													
	●	●											
Phase 2 (Task 2) Design Updated Hazard Mitigation Plan and Climate Element													
		●	●	●	●								
Phase 3 (Task 3) Public Engagement													
				●	●	●	●	●	●	●	●		
Phase 4 (Task 4) Vulnerability Assessment and Development of Climate Element and HMP													
								●	●				
Phase 5 (Task 5) Adoption													
										●	●	●	●

Phase 6 (Task 6) Project Management													
	•	•	•	•	•	•	•	•	•	•	•	•	•

WORKPLAN BY PHASE

Phase/Task, Objective, & Deliverables	Questions/Comments
Phase 1: Project Initiation, Gap Analysis, Coordination, and Initial Recommendations (Mary Ann) **Objective**: Gain a shared understanding of the project's goals, process, and milestones to start building the engagement strategy and HMCR Committee, identifying climate gaps and opportunities in current planning, and develop initial recommendations for plan update. **Deliverables**: • Kick-off meeting and SmartSheet Workplan • Form Hazard Mitigation/Climate Resilience (HMCR) Committee • Engagement Strategy (survey and website) • Meeting agendas and facilitation for multi-jurisdictional operational area meetings • Climate gaps and opportunities • Summary of initial recommendations for changes, template development, annex development, data transfer, and prior plan update	Do these objectives and outcomes make sense? Anything we need to adjust? Review list of potential HMCR Committee members (status update). Is anyone missing from this list? What is the role of the Steering Committee? What is the decision-making process? (Draft Collaborative Charter) Next steps for recruitment: Doodle poll for first meeting. Timeline for agenda of first meeting. Determine list of audit documents Other information needed?
Phase 2: Design Updated Hazard Mitigation Plan and Climate Element (Noelle) **Objective**: Complete a HAZUS-MH Vulnerability and Risk Analysis to estimate risk from high priority hazards like earthquake and flooding hazards and review and update critical assets and infrastructure. **Deliverables**:	Do these objectives and outcomes make sense? Anything we need to adjust? Will send formal data needs lists following the kick-off

Phase/Task, Objective, & Deliverables	Questions/Comments
• HAZUS-MH Vulnerability and Risk Analysis • Community assets and Climate Element Workbook sheet • Climate change projections and associated maps, charts, graphs • Climate element workbook sheets which (1) explore hazards and changes in climate (2) pairs assets and hazards and describe exposure and consequences and (3) identify priority climate hazards • Next steps in Climate Element workbook	
Phase 3: Public Engagement (Alyssa) **Objective:** Design inclusive and equitable engagement to opportunities to ensure the plan update is grounded in community perspectives and priorities and is well integrated with local and regional planning efforts. **Deliverables:** • Up to 3 hybrid public meetings or focus groups • Communication collateral (e.g. press releases, public notices, and survey) • Website content • MHCR meetings (6 meetings with 10 members)	What does successful engagement look like for us? Who are our audiences, are there specific groups we want to specifically reach? What are some barriers to participation? Update on MJHMP survey and timeline for survey development?
Phase 4: Vulnerability Assessment and Development of Climate Element and HMP (Mary Ann) **Objective**: Using HAZUS-MH Vulnerability and Risk Analysis, public engagement feedback, and other resources (e.g., Commerce Guidance, FEMA policy guidance, and CIG Climate Impacts tool) develop climate element goals and policies and hazard mitigation strategies for the MJHMP. **Deliverables**: • Next steps for Climate Element Workbook • Climate Element Workbook Sheet which (1) assess sensitivity and adaptive capacity to characterize vulnerability and (2) characterize risks and (3) determines course of action • Climate Element Workbook Sheet which, will outline climate goals and policies and identify co-benefits • Draft MJHMP and Climate Element with complete workbook and annex • Climate resilience goal and policy tables that crosswalk the Climate Element and MJHMP	Do these objectives and outcomes make sense? Anything we need to adjust?

Phase/Task, Objective, & Deliverables	Questions/Comments
• FEMA Hazard Mitigation PRT	
Phase 5: Adoption (Kristina) **Objective**: Develop a clear, concise, and visually engaging final MJHMP including a completed Workbook as annex and full Climate Element. **Deliverable**: • Final MJHMP, With Climate Element Workbook as Annex • MJHMP Update Adoption • Completed climate resilience goals and policies via a final Climate Element	Do these objectives and outcomes make sense? Anything we need to adjust? Review MJHMP adoption timeline Review Climate Element adoption timeline
Phase 6: Project Management (Kristina) **Objective**: Proactively manage the project to monitor, anticipate, and navigate issues early and keep project timeline moving forward towards established goals and milestones, ensuring clear and effective communication among project team members. **Deliverable**: • Monthly invoices and progress reports • Bi-weekly calls and action items	Preferred bi-weekly call day/time?

Roles

- Discussion Question: Are there any roles that are missing, need to be revised?

Clallam County	Consultant Team
Provide data and documents as needed by consultant team.	Lead analysis and identify data/documents needed for project development.
Lead recruitment for engagement activities (e.g., advertise via County communications).	Lead engagement activities.
Provide strategic direction/key decisions for advancing project decisions with MJHMP Steering Committee input.	Provide materials and lead facilitation for MJHMP Steering Committee Meetings.

Risks

- Potential risks and our strategies for mitigating them are outlined in the table below.
- Discussion Question: Are there any risks that are missing? How do we mitigate those risks?

Risk	Mitigation Strategy

Next Steps

Tamayo, Audrey

From: Mary Ann Rozance <maryann@cascadiaconsulting.com>
Sent: Monday, February 26, 2024 1:28 PM
To: Harvey, Diane; Emery, Bruce; Fleming, Holden
Cc: Marchese, Casey; Mike Chang; buckdj@olypen.com; Anderson, Noelle; Alyssa Rodriguez; Kristina Zeynalova
Subject: EXTERNAL: Clallam HMP/Climate Element Project Kick-off Meeting- 2/26 11am-12:30pm
Attachments: Clallam MJHMP and Climate Element Kickoff Meeting Agenda_2.26.docx

EXTERNAL EMAIL

Hi Everyone,

We are looking forward to meeting with you all tomorrow to kick-off the Clallam MJHMP and Climate Resilience/Element project! Please find the agenda for our meeting attached. We'll spend time reviewing the overall project timeline and dive into specific questions/comments for each of the project phases. This will allow us to have a complete picture of where we are headed so that we can be clear overall project goals.

Please let me know if you have any questions about this kick-off meeting agenda or anything you'd like us to add to it.

Looking forward to seeing you tomorrow!

Best regards,
Mary Ann

Mary Ann Rozance, PhD
Senior Associate (she, her, hers)
Cascadia Consulting Group
maryann@cascadiaconsulting.com
www.cascadiaconsulting.com
LinkedIn | Facebook | Twitter | Instagram

I am currently working a part-time schedule (Monday-Thursday, 9:00 a.m. to 5:00 p.m. Pacific Time)

Clallam County MJHMP and Climate Element

Kick-off Meeting Agenda | February 27, 2024 | 11:00 AM-12:30 PM

Agenda

Time	Agenda Item
11am – 11:15am	Kick-off meeting objectives and project introductions
11:15am – 11:25am	Project goals and measures of success
11:35am – 11:50am	Workplan Discussion
11:50am – 11:55am	Roles and Risks
12:15am – 12:30am	Next steps

Kick-off Meeting Objectives

- Understand Clallam County goals and objectives
- Clarify roles project team roles
- Review project timeline and workplan
- Identify project risks

Project Team Introductions

Clallam County	Role on Project (to be verified at kick-off)
Diane Harvey, Sheriff's Office	Project Lead
Holden Fleming, Deputy Director, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Director, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
Mary Ann Rozance, Cascadia Consulting Group	Project Manager
Kristina Zeynalova, Cascadia Consulting Group	Deputy Project Manager and Climate Planning Lead
Alyssa Rodriguez, Cascadia Consulting Group	Engagement lead
Mike Chang, Cascadia Consulting Group	Principal in Charge
Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead
Casey Marchese, Michael Baker International	Hazard Mitigation Analyst
Jim Buck	Strategic advisor

Detailed Agenda

Time	Topic	Lead	Notes
11:00 am (15 min)	Objectives & Introduction	Mary Ann	**Introduce project team and walk-through meeting agenda, clarify roles** ✓ Welcome ✓ Meeting purpose and agenda ✓ Introductions and verify roles on project
11:15 am (10 min)	Project objectives & measures of success	Mary Ann	**Review project goals and measures of success** ✓ Review project goals and objectives ✓ *Discussion question: What does success look like to you?*
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12:25 pm (10 min)	Next steps	Mary Ann	**Goal: Summarize next steps** ✓ Review action items and next steps ✓ Timeline and workplan

Project goals and measures of success

- *Discussion Question: What are the project goals?*
    - Form the Hazard Mitigation/Climate Resiliency Steering Committee to help guide and inform the Update and Climate Resilience planning process.
    - Conduct a natural and man-made hazard vulnerability and risk analysis (consistent with both FEMA policy requirements and NOAA's U.S. Climate Resilience Toolkit) and identify critical assets.
    - Achieve equitable outcomes by employing a robust, whole-community engagement approach ensuring a planning process that is inclusive for all stakeholders in our community, including socially vulnerable populations.
    - Update the MJHMP to meet FEMA requirements by November 2024 and present to FEMA for approval.
    - Develop a complete Climate Element Workbook that aligns with Commerce's Climate Element guidance and requirements.
        - Achieve Department of Commerce (DoC) requirements
        - Reflect and integrate climate resilience goals throughout comp plan, where appropriate
        - CCG to connect with Comp Planning consultant team handling adoption of Comp Plan Update
            - Action item: Holden to make introductions
        - Align goals between county jurisdictions (cities and tribes); county staff to liaison with these entities.
        - Climate Element: Standalone vs. dispersed approach?
            - " Yes and" approach– disperse where makes sense and include standalone where appropriate
        - HMP goals/strategies to be included as annex with climate element (via DoC workbook)
- *Discussion Question: What does success look like and how will it measured?*
    - Ensure compliance with FEMA regulations – Use compliance tool to achieve this
    - Final approval from FEMA
    - Public feedback reflected in final product – want a collaborative product that reflects community perspectives
    - Final approval from Board of Commissioners (BoC and DoC)
    - Identify and list mitigation projects to get funding and achieve resilience
- *Would county consider any potential alignment with Clallam's CAP or other climate mitigation plans with other jurisdictions in the County? E.g. previous emissions reduction work?*
    - Where it makes sense, yes, can be included into policy measures and recommendations
    - Can exist in plan as a summary of previous work (e.g., appendix)
- Use CA HMP goals to model goals; Diane prefers broad

Project workplan and timeline

PROJECT TIMELINE

- Detailed Timeline: SmartSheet Workplan
- *Discussion Question: Does this timeline make sense? Do we need to adjust anything?*

Tasks and Deliverables	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Phase 1 (Tasks 1) Project Initiation, Gap Analysis, Coordination, and Initial Recommendations													
	●	●											
Phase 2 (Task 2) Design Updated Hazard Mitigation Plan and Climate Element													
		●	●	●	●								
Phase 3 (Task 3) Public Engagement													
				●	●	●	●	●	●	●	●		
Phase 4 (Task 4) Vulnerability Assessment and Development of Climate Element and HMP													
								●	●				
Phase 5 (Task 5) Adoption													
										●	●	●	●
Phase 6 (Task 6) Project Management													
	●	●	●	●	●	●	●	●	●	●	●	●	●

WORKPLAN BY PHASE

Phase/Task, Objective, & Deliverables	Questions/Comments
Phase 1: Project Initiation, Gap Analysis, Coordination, and Initial Recommendations (Mary Ann) **Objective**: Gain a shared understanding of the project's goals, process, and milestones to start building the engagement strategy and HMCR Committee, identifying climate gaps	Do these objectives and outcomes make sense? Anything we need to adjust? Review list of potential HMCR Committee members (status update). Is anyone missing from this list?

Commented [MAR1]: FEMA wants us to document what's already been done. Need to document the process that we asked cities/counties.

(Commerce needs something similar re: audit)

Commented [KZ2]: 1.Data collection; FEMA wants to see whats already been done; need to document this. Document process of doing the data collection.
2. Outreach - need a plan to submit to HMCR to provide input. Could be slides or written plan

Commented [KZ3R2]: Alyssa to meet with Diane and possibly Holden to discuss engagement plan

Phase/Task, Objective, & Deliverables	Questions/Comments
and opportunities in current planning, and develop initial recommendations for plan update. **Deliverables**: • Kick-off meeting and SmartSheet Workplan • Form Hazard Mitigation/Climate Resilience (HMCR) Committee • Engagement Strategy (survey and website) • Meeting agendas and facilitation for multi-jurisdictional operational area meetings • Climate gaps and opportunities • Summary of initial recommendations for changes, template development, annex development, data transfer, and prior plan update	• Action item: MA to send Diane excel tracker • Diane to update; need to include county people (public works, EM staff). Current tally 28 (w/o client/consultant team) What is the role of the Steering Committee? And what is the decision-making process? (Draft Collaborative Charter) • Action item: Noelle to send example Role of HMCR committee: • consult, inform, involve; • provide input and own on what is included in the Plan pertaining to their jurisdiction; • can also provide input on county pieces but do not have authority for final decision making for county. Who has ultimate decision-making authority for county? • BoC with county staff input • ensure BoC are updated on project/plan Next steps for recruitment: Doodle poll for first meeting. Timeline for agenda of first meeting. • Action Item: CCG will send out Doodle poll early next week once list is updated. Determine list of audit documents (for MJHMP + Climate Element)

Phase/Task, Objective, & Deliverables	Questions/Comments
	• Action Item: CCG to draft list for Diane to review in advance of first HMCR meeting Other information needed? FEMA wants us to document what's already been done. Need to document the process that we asked cities/counties. (Commerce needs something similar re: audit) Need a plan to submit to HMCR to provide input. Could be slides or written plan. • Will be achieved through engagement plan
Phase 2: Design Updated Hazard Mitigation Plan and Climate Element (Noelle) **Objective**: Complete a HAZUS-MH Vulnerability and Risk Analysis to estimate risk from high priority hazards like earthquake and flooding hazards and review and update critical assets and infrastructure. **Deliverables**: • HAZUS-MH Vulnerability and Risk Analysis • Community assets and Climate Element Workbook sheet • Climate change projections and associated maps, charts, graphs • Climate element workbook sheets which (1) explore hazards and changes in climate (2) pairs assets and hazards and describe exposure and consequences and (3) identify priority climate hazards • Next steps in Climate Element workbook	Do these objectives and outcomes make sense? Anything we need to adjust? Action Item: Noelle will send formal data needs lists following the kick-off Will track audit via workbook Diane to continue to CC Noelle on emails pertaining to HMP for easy tracking ALL hazard mitigation plan –including natural and man-made (e.g. active shooter) • Action Item: remove active shooter from survey • Action Item: Diane to confirm with Kevin re: active shooter hazard • Include: Maritime disaster, epidemic, tsunami, earthquake, hazardous materials

Phase/Task, Objective, & Deliverables	Questions/Comments
	JB: County has detailed maps; publicly available Sequencing: HMP first will make filling out climate element worksheets more streamlined; however, want to ID climate measures early on to align with Comp Plan process • Action Item: Holden will forward comp plan timeline so we can align climate element pieces. 2019 hazard assessment (best practice in WA) – includes all cap facilities – needs to be updated (JB)
Phase 3: Public Engagement (Alyssa) **Objective:** Design inclusive and equitable engagement to opportunities to ensure the plan update is grounded in community perspectives and priorities and is well integrated with local and regional planning efforts. **Deliverables:** • Up to 3 hybrid public meetings or focus groups • Communication collateral (e.g. press releases, public notices, and survey) • Website content • MHCR meetings (6 meetings with 10 members)	What does successful engagement look like for us? Who are our audiences, are there specific groups we want to specifically reach? • Want to merge engagement efforts with comp planning process • Social/vuln populations (ID'ed through engagement plan process) Tribes (most tribes have already agreed to participate in HMCR, Makah TBD) • Health and Human Services Dept (Rep for HMCR) • Housing and Social Services (Rep for HMCR) • Existing committees (Behavioral Health, Housing Solutions, County Climate Action Committee, which will be active in April) • Clallam County Fair in August (no-in person but prep materials for engagement) • Jamestown S'Klallam Hall available for meeting • Will also have meetings in PA, Sequim

Phase/Task, Objective, & Deliverables	Questions/Comments
	What are some barriers to participation? Update on MJHMP survey and timeline for survey development? - Steering committee to provide input on the engagement plan (can be slides or a plan) - Action Item: Remove active shooter from survey
Phase 4: Vulnerability Assessment and Development of Climate Element and HMP (Mary Ann) **Objective**: Using HAZUS-MH Vulnerability and Risk Analysis, public engagement feedback, and other resources (e.g., Commerce Guidance, FEMA policy guidance, and CIG Climate Impacts tool) develop climate element goals and policies and hazard mitigation strategies for the MJHMP. **Deliverables**: • Next steps for Climate Element Workbook • Climate Element Workbook Sheet which (1) assess sensitivity and adaptive capacity to characterize vulnerability and (2) characterize risks and (3) determines course of action • Climate Element Workbook Sheet which, will outline climate goals and policies and identify co-benefits • Draft MJHMP and Climate Element with complete workbook and annex • Climate resilience goal and policy tables that crosswalk the Climate Element and MJHMP • FEMA Hazard Mitigation PRT	Do these objectives and outcomes make sense? Anything we need to adjust? Need to identify future mitigation projects; need at least one mitigation action/project per hazard
Phase 5: Adoption (Kristina) **Objective**: Develop a clear, concise, and visually engaging final MJHMP including a completed Workbook as annex and full Climate Element.	Do these objectives and outcomes make sense? Anything we need to adjust? Style guide and format?

Phase/Task, Objective, & Deliverables	Questions/Comments
Deliverable: • Final MJHMP, With Climate Element Workbook as Annex • MJHMP Update Adoption • Completed climate resilience goals and policies via a final Climate Element	- Already have Clallam template; need refresh? - Circle back to format of plan at a later time - Action Item: Alyssa to share with Holden for review Review MJHMP adoption timeline Timeline: • BoC adoption not needed for FEMA approval (Diane confirmed) • Mid-Nov (after 10th / before Thanksgiving): Send to EMD and FEMA at the same time; Diane working to ensure this is okay • 45 days to review (FEMA/EMD) • CCG to revise and crosswalk and collate with Climate Element • Final submission Feb 27 • State EMD Coordinator is offering office hours every Friday. If we have questions, we can go on the call (need to have Consultant WITH Client) • State EMD Coordinator can also come to the first steering committee meeting (Optional) • Action Item: CCG to update SmartSheet Climate Element Adoption timeline: • Action Item: CCG to connect with Comp Plan team to discuss alignment
Phase 6: Project Management (Kristina)	Preferred bi-weekly call day/time? Weekly 30 min calls on Thurs, 9-9:30

Phase/Task, Objective, & Deliverables	Questions/Comments
Objective: Proactively manage the project to monitor, anticipate, and navigate issues early and keep project timeline moving forward towards established goals and milestones, ensuring clear and effective communication among project team members. **Deliverable**: • Monthly invoices and progress reports • Bi-weekly calls and action items	Action item: KZ to set up; include all Clallam folks; loop in JB as needed SharePoint for file sharing Invoicing and progress reports: show alignment between goals/objectives and deliverables for DoC reporting

Roles

- Discussion Question: Are there any roles that are missing, need to be revised?

Clallam County	Consultant Team
Provide data and documents as needed by consultant team.	Lead analysis and identify data/documents needed for project development.
Lead recruitment for engagement activities (e.g., advertise via County communications).	Lead engagement activities.
Provide strategic direction/key decisions for advancing project decisions with MJHMP Steering Committee input.	Provide materials and lead facilitation for MJHMP Steering Committee Meetings.

Risks

- Potential risks and our strategies for mitigating them are outlined in the table below.
- Discussion Question: Are there any risks that are missing? How do we mitigate those risks?

Risk	Mitigation Strategy
Aligning the two different planning processes between Climate Element and overall Comp Plan Update	Early connection between teams; open communication lines; intentional alignment
Lead time for smaller jurisdictions who have capacity constraints	Involving from day one; give clear asks with ample lead time
Inventing the wheel with Climate Element development and using DoC Guidance	CCG knows DoC staff and have direct lines of communication; can reach out as needed

Risk	Mitigation Strategy
Election season; may impact public engagement capacity Some community members looking for different avenues to engage/express dissatisfaction with government transparency	Meet people where they are; highlight co-benefits of climate measures and make connection to hazard mitigation clear and digestible Ensure process is transparent and offer multiple, accessible engagement opportunities Employ conflict resolution and de-escalation techniques if public meetings become contentious

Next Steps

CCG:

- Action item: KZ to set up; include all Clallam folks; loop in JB as needed
- Action item: MA to send Diane excel tracker of potential HMCR members and Diane to review/add
- Action Item: Remove active shooter from survey
- Action Item: CCG to update SmartSheet
- Action Item: CCG will send out Doodle poll to HMCR Committee early next week once list is updated.
- Action Item: CCG to draft list of audit docs for Diane to review in advance of first HMCR meeting
- Action Item: Alyssa send style template to Holden to review

Noelle:

- Action Item: Noelle will send formal data needs list to Diane (cc Mary Ann/KZ)
- Action Item: Send draft charter language to Mary Ann/KZ

County:

- Action item: Holden to make introductions between Comp Planning team and this project team
- Action Item: Diane to confirm with Kevin re: active shooter hazard

Tamayo, Audrey

From: Harvey, Diane <diane.harvey@clallamcountywa.gov>
Sent: Tuesday, February 20, 2024 12:13 PM
To: rodf@forkswashington.org; Charisse Deschenes; Scartmel@cityofpa.us; rknapp@jamestowntribe.org; Luke Strong-Cvetich; glen.roggenbuck@elwha.org; paulj@portofpa.com; sshere@clallampud.net; mmartinez@pencol.edu
Cc: Mary Ann Rozance; Anderson, Noelle
Subject: EXTERNAL: Response Requested - Invitation to be a member of the Clallam County Multi-Jurisdictional Hazard Mitigation/Climate Resilience Steering Committee (the "Steering Committee")

Follow Up Flag: Follow up
Flag Status: Flagged

EXTERNAL EMAIL

Hi Everyone,

For months at our operational area meetings, I have given progress reports on our plans to update our 2019 Multi-Jurisdictional Hazard Mitigation Plan and add an additional comprehensive planning component that WA State has required called the climate resiliency sub element. We have hired consultants (Cascadia Consulting Group, Michael Baker Int'l and Jim Buck) and are now ready to organize the Steering Committee. Our Hazard Mitigation Planning involves updating all of your agencies/Tribal governments/jurisdictions' annexed hazard mitigation plans. FEMA requires that each of your agencies/Tribal governments/jurisdictions demonstrate that a representative has actively engaged in this planning process.

Please let me know by **February 29th**, who you have identified to sit on the Steering Committee.

The details:

- *The Steering Committee will be the core group responsible for providing input/updates, guiding the planning process, and agreeing upon the final contents of the plan.*
- *A total of six (6) meetings will be hosted over the course of this year.*
    - *We understand the importance of your time – meetings will be structured to maximize results and minimize "homework" outside of the meeting block. Your attendance at these meetings will be greatly appreciated. These meetings will be held online.*
- *Members of the Steering Committee will include representatives from Operational Area members as well as other external partners, such as public safety agencies, utilities, and NGOs per updated guidance from FEMA*. I will be sending out other invitations apart from this group to solicit whole community involvement on our Steering Committee.

Next Steps:

- *Please respond directly to this email indicating who you would like to participate on the Steering Committee from your agency/Tribal government/jurisdiction. Please respond by **February 29th.***
    - *The first Steering Committee meeting will be in mid to late March. We will send a scheduling poll to Steering Committee members to schedule.*

Please reach out to me if you have any questions regarding the Steering Committee or the update process. Thank you all in advance.

Best regards,

Diane

Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff
360 417-2520

Tamayo, Audrey

From: Harvey, Diane <diane.harvey@clallamcountywa.gov>
Sent: Tuesday, February 20, 2024 12:55 PM
To: karen@noprcd.org; Lauren Lesser
Cc: Mary Ann Rozance; Anderson, Noelle
Subject: EXTERNAL: Response Requested - Invitation to join the Clallam County Multi-Jurisdictional Hazard Mitigation/ Climate Resilience Steering Committee (the "Steering Committee")

EXTERNAL EMAIL

Hi Karen, Hi Lauren,

*We are beginning the process of updating the **Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) at Clallam County**. The MJHMP is a key, County-wide document that evaluates risk from natural and human-caused hazards, and identifies mitigation actions to reduce vulnerability from those hazards. The previous Clallam County MJHMP is linked here: 2019 MJHMP.* We have hired consultants (Cascadia Consulting Group, Michael Baker Int'l and Jim Buck) and are now ready to organize the Steering Committee.

***I would like to invite NODC to be a member of the Steering Committee.** Your participation and feedback will be critical to the development and success of the MJHMP. The MJHMP will be developed alongside a Climate Resilience Element for the Comprehensive Plan Update. The Steering Committee will also have the opportunity to provide input into the Climate Resilience plan development.*

The details:

- *The Steering Committee will be the core group responsible for providing MJHMP input/updates, guiding the planning process, and agreeing upon the final contents of the plan.*
- *A total of six (6) meetings will be hosted over the course of this year.*
    - *We understand the importance of your time – meetings will be structured to maximize results and minimize "homework" outside of the meeting block. Your attendance at one or all of these meetings will be greatly appreciated. These meetings will be held online.*
- *Members of the steering committee will include representatives from Operational Area members as well as other external partners, such as public safety agencies, utilities, and NGOs per updated guidance from FEMA.*

Next Steps:

- *Please respond directly to this email indicating whether you would like to participate. Please respond by **February 29.***
    - *The first Steering Committee meeting will be in mid to late March. We will send a scheduling poll to Steering Committee members to schedule.*
    - *If you are unable to participate, this invitation to participate may be forwarded to another representative within your organization.*

Thank you for your consideration! Participation and involvement from partner agencies like you will ensure a comprehensive and robust MJHMP update that meets FEMA requirements. Please reach out if you have any questions regarding the MJHMP or the update process.

Best,

Diane

Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff
360 417-2520

Tamayo, Audrey

From: Harvey, Diane <diane.harvey@clallamcountywa.gov>
Sent: Tuesday, February 20, 2024 1:29 PM
To: Willie Bence; Cindy Jayne; crystie@finnriver.com
Cc: Mary Ann Rozance; Anderson, Noelle
Subject: EXTERNAL: Response Requested - Invitation to Join Clallam County's Hazard Mitigation/ Climate Resilience Steering Committee (the "Steering Committee")

EXTERNAL EMAIL

Hi Jefferson County Located Partners,

We are beginning the process of updating the ***Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) at Clallam County****. The MJHMP is a key, County-wide document that evaluates risk from natural and human-caused hazards, and identifies mitigation actions to reduce vulnerability from those hazards. The previous Clallam County MJHMP is linked here: 2019 MJHMP.* We have hired consultants (Cascadia Consulting Group, Michael Baker Int'l and Jim Buck) and are now ready to organize the Steering Committee.

I would like to invite you to be a member of the Steering Committee. *Your participation and feedback will be beneficial to the development of the MJHMP, especially the project mitigation component that can positively impact the communities in Jefferson County. The MJHMP will be developed alongside a Climate Resilience Element for the Comprehensive Plan Update. The Steering Committee will also have the opportunity to provide input into the Climate Resilience plan development.*

The details:

- *The Steering Committee will be the core group responsible for providing MJHMP input/updates, guiding the planning process, and agreeing upon the final contents of the plan.*
- *A total of six (6) meetings will be hosted over the course of this year.*
    - *We understand the importance of your time – meetings will be structured to maximize results and minimize "homework" outside of the meeting block. Your attendance at one or all of these meetings will be greatly appreciated. These meetings will be held online.*
- *Members of the steering committee will include representatives from Operational Area members as well as other external partners, such as public safety agencies, utilities, and NGOs per updated guidance from FEMA.*

Next Steps:

- *Please respond directly to this email indicating whether you would like to participate. Please respond by* ***February 29.***
    - *The first Steering Committee meeting will be in mid to late March. We will send a scheduling poll to Steering Committee members to schedule.*
    - *If you are unable to participate, this invitation to participate may be forwarded to another representative within your organization.*

Thank you for your consideration! Participation and involvement from partner agencies like you will ensure a comprehensive and robust MJHMP update that meets FEMA requirements. Please reach out if you have any questions regarding the MJHMP or the update process.

Best,

Diane

Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff
360 417-2520

Tamayo, Audrey

From: Harvey, Diane <diane.harvey@clallamcountywa.gov>
Sent: Wednesday, February 21, 2024 8:21 AM
To: colleen@habitatclallam.org; KMorgan@olycap.org; prehealfam@olypen.com; smartinez@peninsulapha.org; sharon.maggard@serenityhouseclallam.org; shawnw@olypen.com; wendys@peninsulabehavioral.org
Cc: Mary Ann Rozance; Anderson, Noelle
Subject: EXTERNAL: Response Requested - Invitation to join Clallam County Multi-Jurisdictional Hazard Mitigation/ Climate Resilience Steering Committee (the "Steering Committee")

EXTERNAL EMAIL

Hi Everyone,

Tim Dalton provided your contact information to me. We are beginning the process of updating the ***Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) at Clallam County****. The MJHMP is a key, County-wide document that evaluates risk from natural and human-caused hazards, and identifies mitigation actions to reduce vulnerability from those hazards. The previous Clallam County MJHMP is linked here: 2019 MJHMP.* We have hired consultants (Cascadia Consulting Group, Michael Baker Int'l and Jim Buck) and are now ready to organize the Steering Committee. It would be wonderful to have members on the Steering Committee who have insight into addressing the needs of vulnerable populations as we plan for hazard mitigation efforts in our County.

I would like to invite each of you to be a member of the Steering Committee. *Your participation and feedback will be beneficial to the development and success of the MJHMP. The MJHMP will be developed alongside a Climate Resilience Element for the Comprehensive Plan Update. The Steering Committee will also have the opportunity to provide input into the Climate Resilience plan development.*

The details:

- *The Steering Committee will be the core group responsible for providing MJHMP input/updates, guiding the planning process, and agreeing upon the final contents of the plan.*
- *A total of six (6) meetings will be hosted over the course of this year.*
    - *We understand the importance of your time – meetings will be structured to maximize results and minimize "homework" outside of the meeting block. Your attendance at one or all of these meetings will be greatly appreciated. These meetings will be held online.*
- *Members of the Steering Committee will include representatives from Operational Area members as well as other external partners, such as public safety agencies, utilities, and NGOs per updated guidance from FEMA.*

Next Steps:

- *Please respond directly to this email indicating whether you would like to participate. Please respond by* ***February 29.***
    - *The first Steering Committee meeting will be in mid to late March. We will send a scheduling poll to Steering Committee members to schedule.*
    - *If you are unable to participate, this invitation to participate may be forwarded to another representative within your organization.*

Thank you for your consideration! Participation and involvement from partners like you will ensure a comprehensive and robust MJHMP update that meets FEMA requirements. Please reach out if you have any questions regarding the MJHMP or the update process.

Best regards,

Diane

Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff
360 417-2520

Tamayo, Audrey

From: Harvey, Diane <diane.harvey@clallamcountywa.gov>
Sent: Wednesday, February 21, 2024 9:04 AM
To: tinker.lucas2@makah.com
Cc: Mary Ann Rozance; Anderson, Noelle
Subject: EXTERNAL: Response Requested - Invitation to Join Clallam County's Multi-Jurisdictional Hazard Mitigation/Climate Resilience Steering Committee (the

Follow Up Flag: Follow up
Flag Status: Completed

EXTERNAL EMAIL

Hi Tinker,

For months at our operational area meetings, I have given progress reports on our plans to update the Clallam County 2019 Multi-Jurisdictional Hazard Mitigation Plan and add an additional comprehensive planning component that WA State has required called the climate resiliency sub element. We have hired consultants (Cascadia Consulting Group, Michael Baker Int'l and Jim Buck) and are now ready to organize the Steering Committee. I would like to invite a representative from the Makah Tribe to serve on the Steering Committee.

Please let me know by **February 29th**, if the Makah Tribe would like to have a representative on the Steering Committee.

The details:

- *The Steering Committee will be the core group responsible for providing input/updates, guiding the planning process, and agreeing upon the final contents of the plan.*
- *A total of six (6) meetings will be hosted over the course of this year.*
    - *We understand the importance of your time – meetings will be structured to maximize results and minimize "homework" outside of the meeting block. Your attendance at these meetings will be greatly appreciated. These meetings will be held online.*
- *Members of the Steering Committee will include representatives from Operational Area members as well as other external partners, such as public safety agencies, utilities, and NGOs per updated guidance from FEMA*. I will be sending out other invitations apart from this group to solicit whole community involvement on our Steering Committee.

Next Steps:

- *Please respond directly to this email indicating who you would like to participate on the Steering Committee from your agency/Tribal government/jurisdiction. Please respond by* ***February 29th.***
    - *The first Steering Committee meeting will be in mid to late March. We will send a scheduling poll to Steering Committee members to schedule.*

Please reach out to me if you have any questions regarding the Steering Committee or the update process.

Best regards,

Diane

Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff
360 417-2520

Tamayo, Audrey

From: Harvey, Diane <diane.harvey@clallamcountywa.gov>
Sent: Wednesday, February 21, 2024 9:45 AM
To: chief@clallamfire1.org; dsharp@cityofpa.us; jpatterson@clallamfire2.org; Chief@Clallamfire4.org; thudson@ccfd3.org; chief@clallamfire5.org; cclallam@centurytel.net; chief@3riversfire.org; Chip Keen (ckeen@3riversfire.org)
Cc: Mary Ann Rozance; Anderson, Noelle
Subject: EXTERNAL: Response Requested - Invitation to Join Clallam County Multi-Jurisdictional Hazard Mitigation/Climate Resilience Steering Committee (the "Steering Committee")

Follow Up Flag: Follow up
Flag Status: Flagged

EXTERNAL EMAIL

Good morning Fire Chiefs/Fire District Leaders,

For months at our operational area meetings, I have given progress reports on our plans to update the Clallam County 2019 Multi-Jurisdictional Hazard Mitigation Plan and add an additional comprehensive planning component that WA State has required called the climate resiliency sub element. We have hired consultants (Cascadia Consulting Group, Michael Baker Int'l and Jim Buck) and are now ready to organize the Steering Committee. I would like to have at least one senior Fire Department representative on the Steering Committee. Of course, more than one would be outstanding, but I know you are all very busy, so I will leave it up to your judgement.

Please let me know by **February 29th**, if you would like to be on the Steering Committee.

The details:

- *The Steering Committee will be the core group responsible for providing input/updates, guiding the planning process, and agreeing upon the final contents of the plan.*
- *A total of six (6) meetings will be hosted over the course of this year.*
    - *We understand the importance of your time – meetings will be structured to maximize results and minimize "homework" outside of the meeting block. Your attendance at these meetings will be greatly appreciated. These meetings will be held online.*
- *Members of the Steering Committee will include representatives from Operational Area members as well as other external partners, such as public safety agencies, utilities, and NGOs per updated guidance from FEMA*. I will be sending out other invitations apart from this group to solicit whole community involvement on our Steering Committee.

Next Steps:

- *Please respond directly to this email indicating who you would like to participate on the Steering Committee from your agency/Tribal government/jurisdiction. Please respond by **February 29th.***
    - *The first Steering Committee meeting will be in mid to late March. We will send a scheduling poll to Steering Committee members to schedule.*

Please reach out to me if you have any questions regarding the Steering Committee or the update process.

Best regards,

Diane

Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff
360 417-2520

Tamayo, Audrey

From: Harvey, Diane <diane.harvey@clallamcountywa.gov>
Sent: Wednesday, February 21, 2024 10:43 AM
To: Miller, Elizabeth C LTJG USCG AIRSTA PORT ANGELE (USA); Julie A. Black; Heidi Anderson; lyork@lifeflight.org; jimf@clallamtransit.com; mlyke@sequimschools.org; timw@forkshospital.org; Emily Dexter; Andra Smith; immiller@uw.edu; Noah Glaude; Bill Wheeler - American Red Cross (bill.wheeler@redcross.org); lhinkle@ophumanesociety.org
Cc: Mary Ann Rozance; Anderson, Noelle
Subject: EXTERNAL: Response Requested - invitation to Join Clallam County's Multi-Jurisdictional Hazard Mitigation/Climate Resilience Steering Committee (the "Steering Committee")

Follow Up Flag: Follow up
Flag Status: Completed

EXTERNAL EMAIL

Hi Operational Area Stakeholders,

For months at our operational area meetings, I have given progress reports on our plans to update the Clallam County 2019 Multi-Jurisdictional Hazard Mitigation Plan and add an additional comprehensive planning component that WA State has required called the climate resiliency sub element. We have hired consultants (Cascadia Consulting Group, Michael Baker Int'l and Jim Buck) and are now ready to organize the Steering Committee. I would like to invite you to join the Steering Committee.

Please let me know by **February 29th**, if you would like to be on the Steering Committee.

The details:

- *The Steering Committee will be the core group responsible for providing input/updates, guiding the planning process, and agreeing upon the final contents of the plan.*
- *A total of six (6) meetings will be hosted over the course of this year.*
    - *We understand the importance of your time – meetings will be structured to maximize results and minimize "homework" outside of the meeting block. Your attendance at these meetings will be greatly appreciated. These meetings will be held online.*
- *Members of the Steering Committee will include representatives from Operational Area members as well as other external partners, such as public safety agencies, utilities, and NGOs per updated guidance from FEMA*. I will be sending out other invitations apart from this group to solicit whole community involvement on our Steering Committee.

Next Steps:

- *Please respond directly to this email indicating who you would like to participate on the Steering Committee from your agency/Tribal government/jurisdiction. Please respond by **February 29th.***
    - *The first Steering Committee meeting will be in mid to late March. We will send a scheduling poll to Steering Committee members to schedule.*

Please reach out to me if you have any questions regarding the Steering Committee or the update process.

Best regards,

Diane

Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff
360 417-2520

Tamayo, Audrey

From: Mary Ann Rozance <maryann@cascadiaconsulting.com>
Sent: Monday, March 4, 2024 8:20 AM
To: rodf@forkswashington.org; cdeschenes@sequimwa.gov; Whabel@cityofpa.us; Robert Knapp; lstrong@jamestowntribe.org; glen.roggenbuck@elwha.org; Jesse Waknitz; sshere@clallampud.net; mmartinez@pencol.edu; Lauren Lesser; Karen Affeld; Cindy Jayne; crystie@finnriver.com; smartinez@peninsulapha.org; sharon.maggard@serenityhouseclallam.org; tinker.lucas2@makah.com; qnr.planner@quileutetribe.com; dsharp@cityofpa.us; jpatterson@clallamfire2.org; thudson@ccfd3.org; cclallam@centurytel.net; ckeen@3riversfire.org; Elizabeth.C.Miller@uscg.mil; adriaw@forkshospital.org; Ian Miller; Noah Glaude; julie.koehlinger@hohtribe-nsn.org; bzechenelly@ccfd3.org; rkeithkoehler@outlook.com; steve.gray@clallamcountywa.gov; joe.donisi@clallamcountywa.gov; Emery, Bruce; jennifer.garcelon@clallamcountywa.gov; Fleming, Holden; lorraine.shore@clallamcountywa.gov; anne.chastain@clallamcountywa.gov; justine.chorley@clallamcountywa.gov; mark.doten@clallamcountywa.gov
Cc: diane.harvey@clallamcountywa.gov; Anderson, Noelle; Kristina Zeynalova
Subject: EXTERNAL: Please Respond- Scheduling kick-off meeting for Clallam County's Multi-Jurisdictional Hazard Mitigation/Climate Resilience Steering Committee

EXTERNAL EMAIL

Dear Steering Committee Member,

Thank you for confirming your participation on the Multi-Jurisdictional Hazard Mitigation/Climate Resilience Steering Committee with Diane Harvey. I am part of the consultant team, and we will be working together as we facilitate the planning process for both the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) and the Climate Resilience Sub-element for the Comprehensive Plan update (Climate Resilience).

Our first Steering Committee meeting will be 90 minutes long with an optional 30 minutes for additional Q&A and discussion. We will cover project background and timeline, role of the Steering Committee, and kick-off content development for the MJHMP and Climate Resilience planning.

Please fill out this Doodle Poll with your availability for: **Thursday, March 21 between 9am-1pm, March 25 between 9am-1:30pm, or March 26 between 9am-12:30pm.** Please respond to the poll by COB Thursday March 7th at the latest!

Please reach out if you have any questions about this Steering Committee or the planning process. I included information about the Steering Committee that you received from Diane Harvey Below.

Thanks so much and I look forward to working with you!

Best regards,
Mary Ann Rozance

The details:

- *The Steering Committee will be the core group responsible for providing input/updates, guiding the planning process, and agreeing upon the final contents of the plan.*
- *A total of six (6) meetings will be hosted over the course of this year.*
    - *We understand the importance of your time – meetings will be structured to maximize results and minimize "homework" outside of the meeting block. Your attendance at these meetings will be greatly appreciated. These meetings will be held online.*
- *Members of the Steering Committee will include representatives from Operational Area members as well as other external partners, such as public safety agencies, utilities, and NGOs per updated guidance from FEMA*. I will be sending out other invitations apart from this group to solicit whole community involvement on our Steering Committee.

Mary Ann Rozance, PhD
Senior Associate (she, her, hers)
Cascadia Consulting Group
maryann@cascadiaconsulting.com
www.cascadiaconsulting.com
LinkedIn | Facebook | Twitter | Instagram

I am currently working a part-time schedule (Monday-Thursday, 9:00 a.m. to 5:00 p.m. Pacific Time)

Tamayo, Audrey

From: Mary Ann Rozance <maryann@cascadiaconsulting.com>
Sent: Monday, March 4, 2024 8:26 AM
To: Willie Bence; colleen@habitatclallam.org; KMorgan@olycap.org; prehealfam@olypen.com; shawnw@olypen.com; wendys@peninsulabehavioral.org; chief@clallamfire1.org; Chief@Clallamfire4.org; jablack@olympicmedical.org; lyork@lifeflight.org; jimf@clallamtransit.com; mlyke@sequimschools.org; edexter@portangelesfoodbank.org; sequimfoodbank@olypen.com; lhinkle@ophumanesociety.org
Cc: Harvey, Diane; Kristina Zeynalova; Anderson, Noelle
Subject: EXTERNAL: RE: Response Requested - Invitation to Join Clallam County's Multi-Jurisdictional Hazard Mitigation/Climate Resilience Steering Committee (the "Steering Committee")

EXTERNAL EMAIL

Dear Clallam County Community Member,

I am writing in response to the invitation that you received from Diane Harvey to join Clallam County's Multi-Jurisdictional Hazard Mitigation/Climate Resilience Steering Committee (invitation paraphrased below). We are getting ready to kick-off the Steering Committee process. If you would like to participate on the Steering Committee, please respond to this email and compete the Doodle Poll below to share your availability for our kick-off meeting. Alternatively, if you are unable to participate on the Steering Committee but would like to be kept informed of the planning process and engagement opportunities, please reply to this email and we will make sure you receive engagement updates.

The first Steering Committee meeting will be 90 minutes long with an optional 30 minutes to stay on longer for additional Q&A and discussion. We will cover planning timeline, role of the Steering Committee, and kick-off content development for the MJHMP and Climate Resilience planning.

If you would like to participate on the Steering Committee, please fill out this Doodle Poll with your availability for: **Thursday, March 21 between 9am-1pm, March 25 between 9am-1:30pm, or March 26 between 9am-12:30pm.** Please respond to the poll by COB Thursday March 7th at the latest!

Please reach out if you have any questions about this Steering Committee and/or the planning process. I included information about the Steering Committee that you received from Diane Harvey below.

Best regards,
Mary Ann Rozance

Clallam County is updating the Clallam County 2019 Multi-Jurisdictional Hazard Mitigation Plan and developing an additional comprehensive planning component that WA State has required called the climate resiliency sub element. The County has hired consultants (Cascadia Consulting Group, Michael Baker Int'l and Jim Buck) and are now ready to organize the Steering Committee. You received an invitation to join the Steering Committee.

The details:

- *The Steering Committee will be the core group responsible for providing input/updates, guiding the planning process, and agreeing upon the final contents of the plan.*

- *A total of six (6) meetings will be hosted over the course of this year.*
    - *We understand the importance of your time – meetings will be structured to maximize results and minimize "homework" outside of the meeting block. Your attendance at these meetings will be greatly appreciated. These meetings will be held online.*
- *Members of the Steering Committee will include representatives from Operational Area members as well as other external partners, such as public safety agencies, utilities, and NGOs per updated guidance from FEMA*. I will be sending out other invitations apart from this group to solicit whole community involvement on our Steering Committee.

Mary Ann Rozance, PhD
Senior Associate (she, her, hers)
Cascadia Consulting Group
maryann@cascadiaconsulting.com
www.cascadiaconsulting.com
LinkedIn | Facebook | Twitter | Instagram

I am currently working a part-time schedule (Monday-Thursday, 9:00 a.m. to 5:00 p.m. Pacific Time)

Tamayo, Audrey

From: Harvey, Diane <diane.harvey@clallamcountywa.gov>
Sent: Monday, March 4, 2024 3:09 PM
To: debstin@live.com
Cc: Mary Ann Rozance; Anderson, Noelle
Subject: EXTERNAL: Invitation to Clallam County's Multi-Jurisdictional Hazard Mitigation/Climate Resilience Steering Committee (the Steering Committee)

EXTERNAL EMAIL

Hi Deb,

Cindy Jayne provided your contact information to me. We are beginning the process of updating the **Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) at Clallam County**. The MJHMP is a key, County-wide document that evaluates risk from natural and human-caused hazards *and* identifies mitigation actions to reduce vulnerability from those hazards. The previous Clallam County MJHMP *is linked here: 2019 MJHMP*. We have hired consultants (Cascadia Consulting Group, Michael Baker Int'l and Jim Buck) and are now ready to organize the Steering Committee. It would be wonderful to have members on the Steering Committee who have insight into our neighboring communities in Jefferson County.

I would like to invite you to be a member of the Steering Committee. Your participation and feedback will be beneficial to the development and success of the MJHMP. The MJHMP will be developed alongside a Climate Resilience Element for the Comprehensive Plan Update. The Steering Committee will also have the opportunity to provide input into the Climate Resilience plan development.

The details:

- The Steering Committee will be the core group responsible for providing MJHMP input/updates, guiding the planning process, and agreeing upon the final contents of the plan.
- A total of six (6) meetings will be hosted over the course of this year.
    - We understand the importance of your time – meetings will be structured to maximize results and minimize "homework" outside of the meeting block. Your attendance at one or all of these meetings will be greatly appreciated. These meetings will be held online.
- Members of the Steering Committee will include representatives from Operational Area members as well as other external partners, such as public safety agencies, utilities, and NGOs per updated guidance from FEMA.

If you wish to join the Steering Committee please (1) send me a response email and (2) fill out this Doodle Poll with your availability for: **Thursday, March 21 between 9am-1pm, March 25 between 9am-1:30pm, or March 26 between 9am-12:30pm.** Please respond to the poll by COB Thursday March 7th at the latest!

We hope you can be a part of this planning process.

Best regards,

Diane

Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff
360 417-2520

APPENDIX B.2

HMCR Steering Committee Meeting #1

Hazard Mitigation and Climate Resilience Steering Committee

Steering Committee Meeting #1 Agenda | March 25th, 2024 | 10:00-11:30 AM | Zoom link

Agenda

Time	Agenda Item
10-10:15am	Introduction
10:15-10:30am	Project Background & Goals
10:30-10:45am	Committee Role and Expectations
10:45-11:00am	Purpose and Requirements of MJHMP and Climate Element
11:00-11:20am	Hazard Identification and Prioritization
11:20-11:30am	Next Steps
11:30-12pm	Questions and Additional Discussion

Meeting #1 Objectives

- Introduce project purpose and build collective goals
- Review project background, tasks, and timeline
- Discuss Steering Committee roles, expectations, and operating procedures
- Kick off hazard identification and prioritization
- Summarize next steps

Project Team

Clallam County	Role on Project
Diane Harvey, Sheriff's Office	Project Lead
Holden Fleming, Deputy Director, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Director, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
Mary Ann Rozance, Cascadia Consulting Group	Project Manager
Kristina Zeynalova, Cascadia Consulting Group	Deputy Project Manager and Climate Planning Lead
Alyssa Rodriguez, Cascadia Consulting Group	Engagement lead
Mike Chang, Cascadia Consulting Group	Principal in Charge

Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead
Casey Marchese, Michael Baker International	Hazard Mitigation Analyst
Jim Buck	Strategic advisor

Detailed Agenda

Time	Topic	Lead	Notes
10:00am-10:15am	Introduction	Mary Ann	**Introduce project team and walk through meeting agenda** ✓ Welcome ✓ Meeting purpose and agenda ✓ Introductions in chat ○ Icebreaker: What is one item that you have in your 30-day emergency preparedness kit?
10:15am-10:30am	Project Background and Goals	Kristina Mary Ann Facilitates Discussion	**Introduce project purpose, background, and goals** ✓ Project background and goal ✓ Project Phases ✓ Visioning Discussion: ○ What should we know about the communities you work with for this planning process? (e.g., specific hazards and/or climate impacts and effects on communities)
10:30am-10:45am	Committee Role and Expectations	Mary Ann	**Review role and expectations of Steering Committee** ✓ Review Committee's role in the development of MJHMP and Climate Element ✓ Discuss expectations for meetings, level of involvement, and decision-making processes ✓ Discuss draft Committee Charter and answer clarifying questions
10:45am-11:00am	Purpose and Requirements of MJHMP and Climate Element	Noelle & Kristina Mary Ann Facilitates Discussion	**Review purpose and requirements of MJHMP and Climate Element** ✓ Review MJHMP purpose and requirements ✓ Review climate impacts summary, Climate Element purpose, and requirements ✓ Discuss alignment between efforts ✓ Discussion Question:

			○ What do we need to consider to ensure that the MJHMP and the Climate Element are actionable?
11:00am-11:20am	Hazard Identification and Prioritization	Noelle Mary Ann Facilitates Discussion	**Discuss hazards and impacts for Clallam County** ✓ Review previously assessed hazards ✓ Review hazard prioritization exercise for next meeting ✓ Discussion Question: ○ Are the listed hazards representative of your understanding and experience in Clallam County? ▪ Any missing hazards? ▪ Any organizational changes?
11:20am-11:30am	Next Steps	Mary Ann	**Summarize next steps** ✓ Discuss data needs and capabilities ✓ Review timeline and workplan ✓ Doodle Poll April meeting ✓ Community Survey
11:30am-12pm	Questions and Additional Discussion	Mary Ann	**Questions and Discussion** ✓ Answer any final questions

Tamayo, Audrey

Subject:	EXTERNAL: Clallam County Hazard Mitigation and Climate Resilience Steering Committee Meeting
Location:	https://us02web.zoom.us/j/85020237846?pwd=ZUJqdXlGQnBzdUdHdEovYTJ6bkpNUT09
Start:	Mon 3/25/2024 10:00 AM
End:	Mon 3/25/2024 11:30 AM
Show Time As:	Tentative
Recurrence:	(none)
Meeting Status:	Not yet responded
Organizer:	Abigail Lambert

-----Original Appointment-----
From: Abigail Lambert <abigail@cascadiaconsulting.com>
Sent: Thursday, March 14, 2024 2:33 PM
To: Abigail Lambert; Anderson, Noelle; Marchese, Casey; Tamayo, Audrey; Mary Ann Rozance; Kristina Zeynalova; Alicia Fennell; Alyssa Rodriguez; rodf@forkswashington.org; cdeschenes@sequimwa.gov; Scartmel@cityofpa.us; Whabel@cityofpa.us; rknapp@jamestowntribe.org; lstrong@jamestowntribe.org; glen.roggenbuck@elwha.org; paulj@portofpa.com; jessew@portofpa.com; sshere@clallampud.net; mmartinez@pencol.edu; lauren@noprcd.org; Karen Affeld; WBence@co.jefferson.wa.us; cindyjaynept@gmail.com; crystie@finnriver.com; colleen@habitatclallam.org; KMorgan@olycap.org; prehealfam@olypen.com; shawnw@olypen.com; smartinez@peninsulapha.org; sharon.maggard@serenityhouseclallam.org; wendys@peninsulabehavioral.org; tinker.lucas2@makah.com; qnr.planner@quileutetribe.com; diane.harvey@clallamcountywa.gov; chief@clallamfire1.org; dsharp@cityofpa.us; jpatterson@clallamfire2.org; Chief@Clallamfire4.org; thudson@ccfd3.org; cclallam@centurytel.net; chief@3riversfire.org; ckeen@3riversfire.org; Elizabeth.C.Miller@uscg.mil; jablack@olympicmedical.org; heidia@forkshospital.org; adriaw@forkshospital.org; lyork@lifeflight.org; jimf@clallamtransit.com; mlyke@sequimschools.org; timw@forkshospital.org; edexter@portangelesfoodbank.org; sequimfoodbank@olypen.com; lhinkle@ophumanesociety.org; immiller@uw.edu; NGlaude@nols.org; bill.wheeler@redcross.org; julie.koehlinger@hohtribe-nsn.org; bzechenelly@ccfd3.org; rkeithkoehler@outlook.com; steve.gray@clallamcountywa.gov; joe.donisi@clallamcountywa.gov; bruce.emery@clallamcountywa.gov; jennifer.garcelon@clallamcountywa.gov; holden.fleming@clallamcountywa.gov; lorraine.shore@clallamcountywa.gov; anne.chastain@clallamcountywa.gov; justine.chorley@clallamcountywa.gov; mark.doten@clallamcountywa.gov; debstin@live.com; culley@cascadiawater.com
Cc: chip@qriverresort.com; buckdj@olypen.com
Subject: EXTERNAL: Clallam County Hazard Mitigation and Climate Resilience Steering Committee Meeting
When: Monday, March 25, 2024 1:00 PM-2:30 PM (UTC-05:00) Eastern Time (US & Canada).
Where:
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EXTERNAL EMAIL

Meeting #1 of the Clallam County Hazard Mitigation and Climate Resilience (HMCR) Steering Committee. Meeting materials will be provided in advance of this meeting.

Zoom Cascadia is inviting you to a scheduled Zoom meeting.

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* +1 312 626 6799 US (Chicago)
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Hazard Mitigation and Climate Resilience Steering Committee

Steering Committee Meeting #1 Agenda | March 25th, 2024 | 10:00-11:30 AM | Zoom link

Agenda

Time	Agenda Item
10-10:15am	Introduction
10:15-10:30am	Project Background & Goals
10:30-10:45am	Committee Role and Expectations
10:45-11:00am	Purpose and Requirements of MJHMP and Climate Element
11:00-11:20am	Hazard Identification and Prioritization
11:20-11:30am	Next Steps
11:30-12pm	Questions and Additional Discussion

Meeting #1 Objectives

- Introduce project purpose and build collective goals
- Review project background, tasks, and timeline
- Discuss Steering Committee roles, expectations, and operating procedures
- Kick off hazard identification and prioritization
- Summarize next steps

Project Team

Clallam County	Role on Project
Diane Harvey, Sheriff's Office	Project Lead
Holden Fleming, Deputy Director, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Director, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
Mary Ann Rozance, Cascadia Consulting Group	Project Manager
Kristina Zeynalova, Cascadia Consulting Group	Deputy Project Manager and Climate Planning Lead
Alyssa Rodriguez, Cascadia Consulting Group	Engagement lead
Mike Chang, Cascadia Consulting Group	Principal in Charge

Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead
Casey Marchese, Michael Baker International	Hazard Mitigation Analyst
Jim Buck	Strategic advisor

Detailed Agenda

Time	Topic	Lead	Notes
10:00am-10:15am	Introduction	Mary Ann	**Introduce project team and walk through meeting agenda** ✓ Welcome ✓ Meeting purpose and agenda ✓ Introductions in chat ○ Icebreaker: What is one item that you have in your 30-day emergency preparedness kit?
10:15am-10:30am	Project Background and Goals	Kristina Mary Ann Facilitates Discussion	**Introduce project purpose, background, and goals** ✓ Project background and goal ✓ Project Phases ✓ Visioning Discussion: ○ What should we know about the communities you work with for this planning process? (e.g., specific hazards and/or climate impacts and effects on communities)
10:30am-10:45am	Committee Role and Expectations	Mary Ann	**Review role and expectations of Steering Committee** ✓ Review Committee's role in the development of MJHMP and Climate Element ✓ Discuss expectations for meetings, level of involvement, and decision-making processes ✓ Discuss draft Committee Charter and answer clarifying questions
10:45am-11:00am	Purpose and Requirements of MJHMP and Climate Element	Noelle & Kristina Mary Ann Facilitates Discussion	**Review purpose and requirements of MJHMP and Climate Element** ✓ Review MJHMP purpose and requirements ✓ Review climate impacts summary, Climate Element purpose, and requirements ✓ Discuss alignment between efforts ✓ Discussion Question:

			○ What do we need to consider to ensure that the MJHMP and the Climate Element are actionable?
11:00am-11:20am	Hazard Identification and Prioritization	Noelle Mary Ann Facilitates Discussion	**Discuss hazards and impacts for Clallam County** ✓ Review previously assessed hazards ✓ Review hazard prioritization exercise for next meeting ✓ Discussion Question: ○ Are the listed hazards representative of your understanding and experience in Clallam County? ▪ Any missing hazards? ▪ Any organizational changes?
11:20am-11:30am	Next Steps	Mary Ann	**Summarize next steps** ✓ Discuss data needs and capabilities ✓ Review timeline and workplan ✓ Doodle Poll April meeting ✓ Community Survey
11:30am-12pm	Questions and Additional Discussion	Mary Ann	**Questions and Discussion** ✓ Answer any final questions

Detailed Meeting Notes

Project Phases:

- Question from Ian Miller (Washington Sea Grant): Two questions:
  1) Looking at the phases, you have public engagement before the vulnerability assessment?
  2) Are there 2 separate products for the Climate Element and the Comp Plan and HMP?
  - Answer from Mary Ann Rozance (Cascadia, Project Manager): Public engagement has already begun and will continue throughout the process including during and after the vulnerability assessment. The HMP and the Climate Resilience Sub-Element are separate deliverables.

Visioning Discussion

- Question from Mary Ann Rozance (Cascadia, Project Manager): What should we know about the communities you work with for this planning process?
  - Matthew Huish(City of Sequim, City Manager): City of Sequim enjoys a very collaborative relationship with FD#3 on a lot of things, including our local Emergency Plan.

- Chip Keen (Clallam County Fire District 6): My district is part of the "micro-island" that also includes La Push. It also includes the Quillayute Airport, which is a former Naval Air Station. Key climate risks include wildfires, wind, floods, and landslides.
- Will Habel (City of Port Angeles): Close interagency collaboration between the County and City will be important for us, especially when it comes to issues relating to the City's water supply.
- Crystie Kisler (Finnriver/Jeff Co Climate Action Committee/Roots of Resilience and CWP non profits): I work on the ground level in Jefferson County food system as a farmer and community organizer. I am curious how our counties are set up for regional coordination in the face of a disaster, but also what the longer term regional resilience strategies are, particularly as it relates to both immediate food access needs in an emergency but also longer term food system issues in the face of climate change.
- Marty Martinez (Peninsula College): vulnerable populations: elderly, disabled, limited English, people vacationing in the area.
- Jen Garcelon (Clallam County Health): Community is diverse by age and race, so look at all demographics. Specific Hazards wildfire smoke, flooding, sea level rise.
- Tom Sanford (North Olympic Land Trust): I'm hearing concerns about the impact on infrastructure of increased climate migrants to the Olympic Peninsula.
- Sarah Martinez (Peninsula Housing Authority): Aging infrastructure, vulnerable populations (low income, elderly, disabled)
- Shailesh Shere (Clallam County PUD): Planning for wildfire mitigation and its impact on power lines, safety shut offs, etc. is a concern related climate change for the PUD.
- Tinker Lucas (Makah Tribe): Makah Tribe's water comes from a reservoir, and we continually have issues with this water (water is continually "muddy", and our water has continual contamination level of Haloacetic Acids (HAA5))! We also have huge issues with landslides due to severe weather (i.e., heavy rains). This also causes a supply chain cut off issue as we have one road in and out of Neah Bay.
- Anne Chastain (Clallam Emergency Management): Diverse and isolated communities that may be cut off from external resources.
- Jen Garcelon (Clallam County Health): Drought and lack of snowpack will affect drinking water supply.
- Luke Strong-Cvetich (Jamestown S'Klallam Tribe): Jamestown does not have a significant based reservation-based population, the Tribe works

closely with CCSO, CCFD#3 and City of Sequim to provide meaningful services to Tribal members and the greater community of the Olympic Peninsula.
    - Julie (Olympic Medical Center): We are concerned about the possible influx of patients needing medical or mental health care during an incident and the fact we may not be able to develop a safe discharge plan so that weighs on our ability when we reach capacity.

Steering Committee Roles and Committee Goals

- Question from Luke Strong-Cvetich (Jamestown S'Klallam Tribe): Can you spell out what we need to get you at the tribal level, deadlines and so on?
    - Mary Ann Rozance (Cascadia, Project Manager): We can be specific in what we need from you. Noting that we will make deadlines for information requests and so on.
- Question from Chip Keen (Clallam County Fire District 6): What do you suggest we do now in preparation for the next meeting?
    - Mary Ann Rozance (Cascadia, Project Manager): We will follow-up about this in advance of the April meeting. We will send a pre-meeting packet 1-week in advance for your review and identify specific needs for you to prepare for the next meeting.

Purpose and Requirements of the MJHMP and Climate Element

- Question from Mary Ann Rozance (Cascadia, Project Manager): What do we need to consider to ensure that the MJHMP and Climate Element are actionable?
    - Question from Jim Buck (Strategic Advisor): Can you please address the issue of what a plan area is?
        - Answer from Noelle Anderson (Michael Baker, MJHMP Consultant): Our participation annexes are those that participated in the previous MJHMP. We will be working with each of those jurisdictions to determine the planning area for those annexes. The overall planning area for the County includes all areas within the county.
    - Question from Chip Keen (Clallam County Fire District 6): How do you define “actionable”?
        - Answer from Mary Ann Rozance (Cascadia, Project Manager): We want to make sure that these plans do not sit on the shelf and the outcomes of these plans are recognized.
    - Tom Sanford (North Olympic Land Trust): As a generalization, I find that the Clallam County Comprehensive Plan is very aspirational while low on strategies and actions. This seems different in other County plans I've reviewed. I hope we can make the Climate Element actionable by creating specific strategies, timelines, and responsible parties. I also think including quality maps in both plans help make them more tangible.

    - Tom Sanford (North Olympic Land Trust): Also need a vision of where we are going, coupled with benchmarks that we re-evaluate as we implement to make sure we are on the right path. Plan should be designed to be adaptive as our situation changes, a living document.
    - Megan Uecker (City of Sequim): MJHMP results in recommendations/projects that have some flexibility to meet future needs, variable funding opportunities, partnership opportunities
    - Karen Affeld (North Olympic Development Council): We walk a line between having a detailed plan that is action-oriented but also a plan that is able to be passed and funded, how do we navigate that?
        - Answer from Diane Harvey (Sheriff's Office, Project Lead): We have a Comprehensive Plan update that is occurring, which is aspirational for over the next 10 years. The MJHMP is more detailed with actionable items that are real projects that can be funded. Then we have another aspect which is policy guidance associated with the Climate Element of the Comp Plan.
- Question from Tinker Lucas (Makah Tribe): After listening to your introduction to this steering committee, I am thinking of another person here at Neah Bay that would be a good resource on this committee, can we add other members?
    - Mary Ann Rozance (Cascadia, Project Manager): We can get in touch and add members.
- Question from Ian Miller (Washington Sea Grant): Curious whether the MJHMP VA includes the VA for the Climate Element?
    - Answer from Mary Ann Rozance Cascadia, Project Manager): We are scoped for another Climate-specific VA, but it will be informed by the MJHMP VA.
- Question from Ian Miller: Is there a way that we will capture hazards in the VA that are not well addressed by HAZUS, which typically only captures quantitative hazards.
    - Answer from Noelle Anderson (Michael Baker, MJHMP Consultant): We will rely on other data resources outside of HAZUS for more qualitative hazards and hazards that are not included in HAZUS.
    - Diane Harvey (Sheriff's Office, Project Lead): With that said, if anyone has information on hazards and vulnerability feel free to provide that and we will use it.

Hazard Identification and Prioritization

- Question from Noelle Anderson – Michael Baker: Any questions or any hazards that should be included, organizational changes, etc.?
    - Anne Chastain (Clallam Emergency Management): We have had an increase in Tornado activity.
    - Jim Buck (Strategic Advisor): I don't see dam failure as an issue in Clallam County, there may be a risk of reservoir failure but not dam failure. We

need to have a serious conversation about sea level rise, considering the tectonics that may exacerbate that risk.
    - Anne Chastain (Clallam Emergency Management): Dam failure will most likely be a secondary hazard.
    - Diane Harvey (Sheriff's Office, Project Lead): We have looked at current resources and noted multiple high-hazard dams in the area.
    - Noelle Anderson (Michael Baker, MJHMP Consultant): We can also profile dam and reservoir failure together and that may not be a high priority hazard but we should include it. Also, I agree that sea level rise will need to be looked at in conjunction with the tectonic concerns.
    - Keith and Blaine (Clallam County Fire District #3): Subsidence issues are subcategory of Seismic hazards specifically due to a Cascadia event.
- Ian Miller (Washington Sea Grant): What about coastal erosion, bluff erosion, etc.?
    - Noelle Anderson (Michael Baker, MJHMP Consultant): We can include those into our hazard profiles.
- Tom Sanford (North Olympic Land Trust): Do storm surges fall under flooding?
    - Anne Chastain (Clallam Emergency Management): I would see that as Severe Weather.
- Brian Weekes (Forks Planning Committee): I was also wondering about the absence of coastal storm is that under windstorm? Coastal seems a bit more extreme.
    - Justine Chorley (Clallam County Emergency Management): Sea level rise exacerbates coastal flooding
- Tom Sanford (North Olympic Land Trust): Does the increased pressures on Port Angeles's combined sewer/stormwater system tie to flooding?
- Luke Strong-Cvetich (Jamestown S'Klallam Tribe): We may want to consider transportation issues or bridge failure to tie-in supply chain issues. That may help with funding.
    - Noelle Anderson (Michael Baker, MJHMP Consultant): We want to keep the evaluation on the hazard that will cause impacts. So funding would also be tied to those hazards.
- Anne Chastain (Clallam Emergency Management): I'm not sure that Human-caused is the right place for Supply Chain. So many things can effect that. Supply chain vulnerability is related to Severe Weather, Pandemic, Terrorist events, Landslide, flood Seismic etc.
- Shailesh Shere (Clallam County PUD): What is the basis for considering power outage as a secondary hazard under human-caused hazards? As I see it, it is a secondary hazard for multiple hazards.

- Noelle Anderson (Michael Baker, MJHMP Consultant): In order to address these concerns with both utility failure and supply chain interruptions that makes the most sense. It is not to say that they are not also linked to other hazards. Those intersections will be identified in each hazard and the mitigation actions would also consider the secondary hazards that are connected.

Q&A

- Question from Ian Miller (Washington Sea Grant): Can you clarify for me if there is a certain time frame specified for the estimation of risk in the HMP? Are we considering the likelihood of impacts within a certain time period?
  - Noelle Anderson (Michael Baker, MJHMP Consultant): We are considering the 5 year planning period of the MJHMP as the time frame for risks.

Action Items:

- Consultant Team to prepare a pre-meeting packet before April meeting.
- Consultant Team to include deadlines and specific needs from participating jurisdictions.
- Consultant Team coordinate with Tinker Lucas (Makah Tribe) on adding representative from Neah Bay to the HMCR Steering Committee.
- MBI to include Tornado as a sub-hazard along with high winds associated with Severe Weather.
- MBI to consider Cascadia Subduction Zone in conjunction with sea level rise and other associated hazards.
- MBI to include coastal erosion, bluff erosion, etc. under sea level rise hazard profile
- MBI to include considerations for related hazards (e.g., storm surges, coastal storms) in appropriate hazard profiles.

Hazard Mitigation and Climate Resilience (HMCR) Steering Committee

Meeting #1

March 25th, 2024 | 10:00-11:30 AM | Zoom link

Meeting purpose

Establish Steering Committee operating procedures, gain important background context, build a collective vision and goals for the Climate Element and MJHMP.

Type in the chat: Name, organization

Icebreaker: What is one item that you have in your 30-day emergency preparedness kit?

Please rename yourself with your first name, your organization, and preferred pronouns.

Project Team

Clallam County

- Diane Harvey, Sheriff's Office
- Bruce Emery, Director, Dept. of Community Development
- Holden Fleming, Deputy Director, Dept. of Community Development

Cascadia Consulting Group

- Mary Ann Rozance, Project Manager & Climate Resilience Lead
- Kristina Zeynalova, Deputy Project Manager & Climate Element Policy Lead
- Alyssa Rodriguez, Engagement Lead
- Abigail Lambert, Climate & Policy Analyst
- Mike Chang, Principal in Charge

Michael Baker International

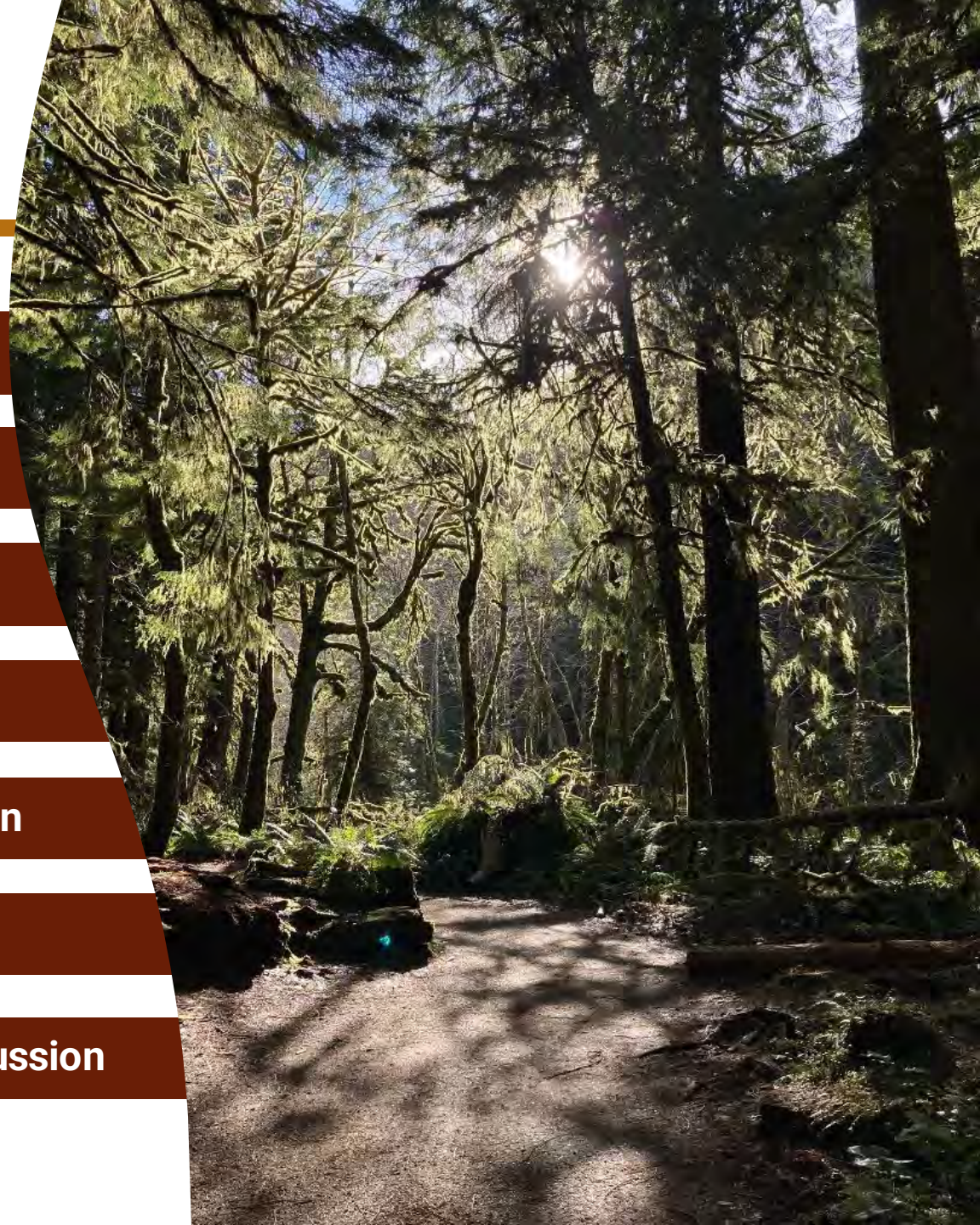
- Noelle Anderson, Hazard Mitigation Plan Lead
- Casey Marchese, Hazard Mitigation Plan Analyst

Strategic Advisor

- Jim Buck

Meeting Agenda

- Welcome and Introductions
- Project Background and Goals
- Committee Role and Expectations
- Purpose of MJHMP and Climate Element
- Hazard Identification and Prioritization
- Next Steps
- Questions and Additional Discussion



Meeting Objectives

- Introduce project purpose and build collective goals
- Review project background, tasks, and timeline
- Discuss Steering Committee roles, expectations, and operating procedures
- Kick off hazard identification and prioritization
- Summarize next steps

Project Background and Goals

Project Background and Goal

- County is updating the **MJHMP** in collaboration with the same 2019 participating jurisdictions, agencies, and Tribes.
- Concurrently developing a Comprehensive Plan **Climate Element.**

Goal: Elevate key **climate and hazard issues** facing the community and ensure that there is **alignment between the plans** while addressing **state and federal requirements**.

Project Phases

Phase 1
- Project Initiation, Gap Analysis, Coordination, and Initial Recommendations

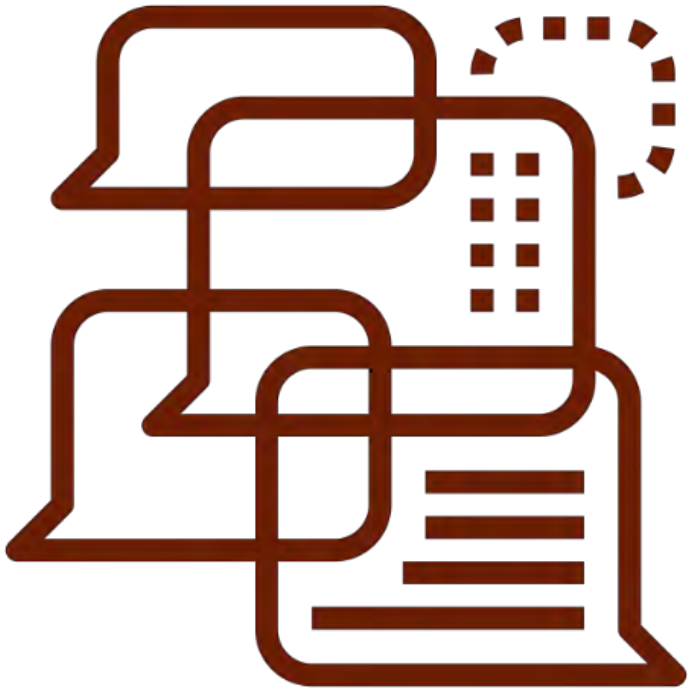
Phase 2
- Design Updated Hazard Mitigation Plan and Climate Element

Phase 3
- Public Engagement

Phase 4
- Vulnerability Assessment and Development of Climate Element and HMP

Phase 5
- Adoption

Visioning Discussion



- What should we know about the communities you work with for this planning process? (e.g., specific hazards and/or climate impacts and effects on communities)

Type your comment or question into the Zoom chat

OR

Raise your virtual hand to comment or ask verbally

Committee Role and Expectations

Role of Steering Committee

The primary role of the HMCR Steering Committee will be to:

- Work collaboratively with the project team to **identify key climate risks** and engage in the **development of mitigation measures** that respond to these risks.
- Provide **community perspectives** on **local hazards** and **hazard mitigation projects** to assist in updating the MJHMP and County Climate Element
- Support the integration of the MJHMP and County Climate Element to ensure **successful implementation** and alignment with existing county efforts and plans.

Role of Steering Committee

Clallam County	HMCR Steering Committee
Lead jurisdiction	Participating jurisdictions
Responsible for coordinating across all participants, Washington EMD and FEMA	Responsible for assessing jurisdiction-specific risks
Decision-making authority over the content in the overall HMP and County Climate Element	Decision-making authority over the content in jurisdictional annex for the HMP, and each jurisdiction's own Climate Element resilience goals and supportive policies (if applicable)
Preparation of meeting materials, agendas, and follow-up actions	Consultation for content included in the overall HMP and County Climate Element

Role of Steering Committee

Phase 1: Discovery & Visioning

March 2024

Meeting 1

Objective: Establish operating procedures, gain important background context, build a collective vision and goals for the Climate Element and MJHMP.

Phase 2: Risk Identification & Prioritization

April/May 2024

Meetings 2 & 3

Objective: Identify key climate risks, relevant agencies and partners that these changes will affect, and prioritize these risks to inform climate policies and hazard mitigation options.

Phase 3: Measures & Strategies

June/September 2024

Meetings 4 & 5

Objective: Identify, vet, and prioritize measures and strategies to include in the MJHMP and the Climate Element.

Phase 4: Final Review & Implementation

October 2024

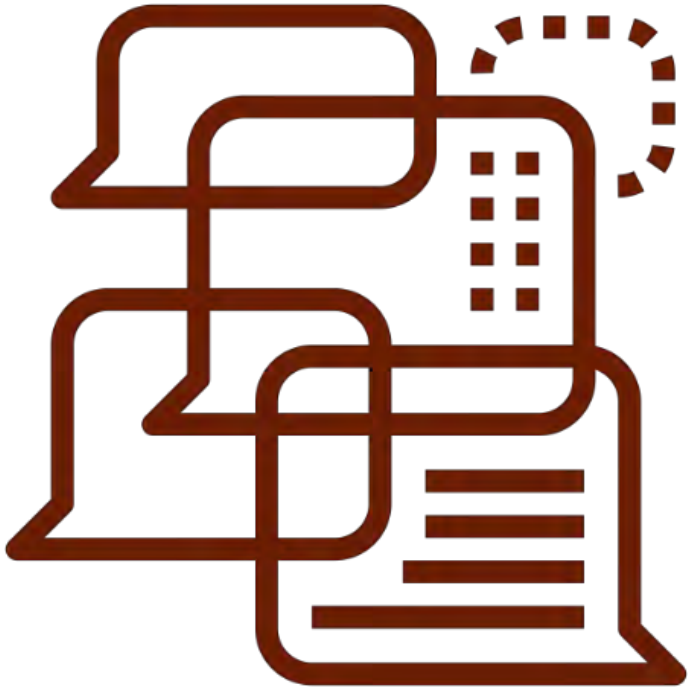
Meeting 6

Objective: Support the integration of the MJHMP and the Climate Element for seamless implementation following the adoption of these plans.

Committee Goals

- Facilitate deep and thorough understanding of perspectives that address gaps and barriers in current plans.
- Lead key practitioners and project proponents through exercises to identify, vet, and prioritize climate and hazard mitigation strategies.
- Discuss how the County can best address community needs and key trends, develop potential strategies, identify monitoring and evaluation criteria, and integrate specific elements such as equity, inclusion, and environmental justice.

Questions?



Type your comment or question into the Zoom chat

OR

Raise your virtual hand to comment or ask verbally

Purpose and Requirements of MJHMP and Climate Element

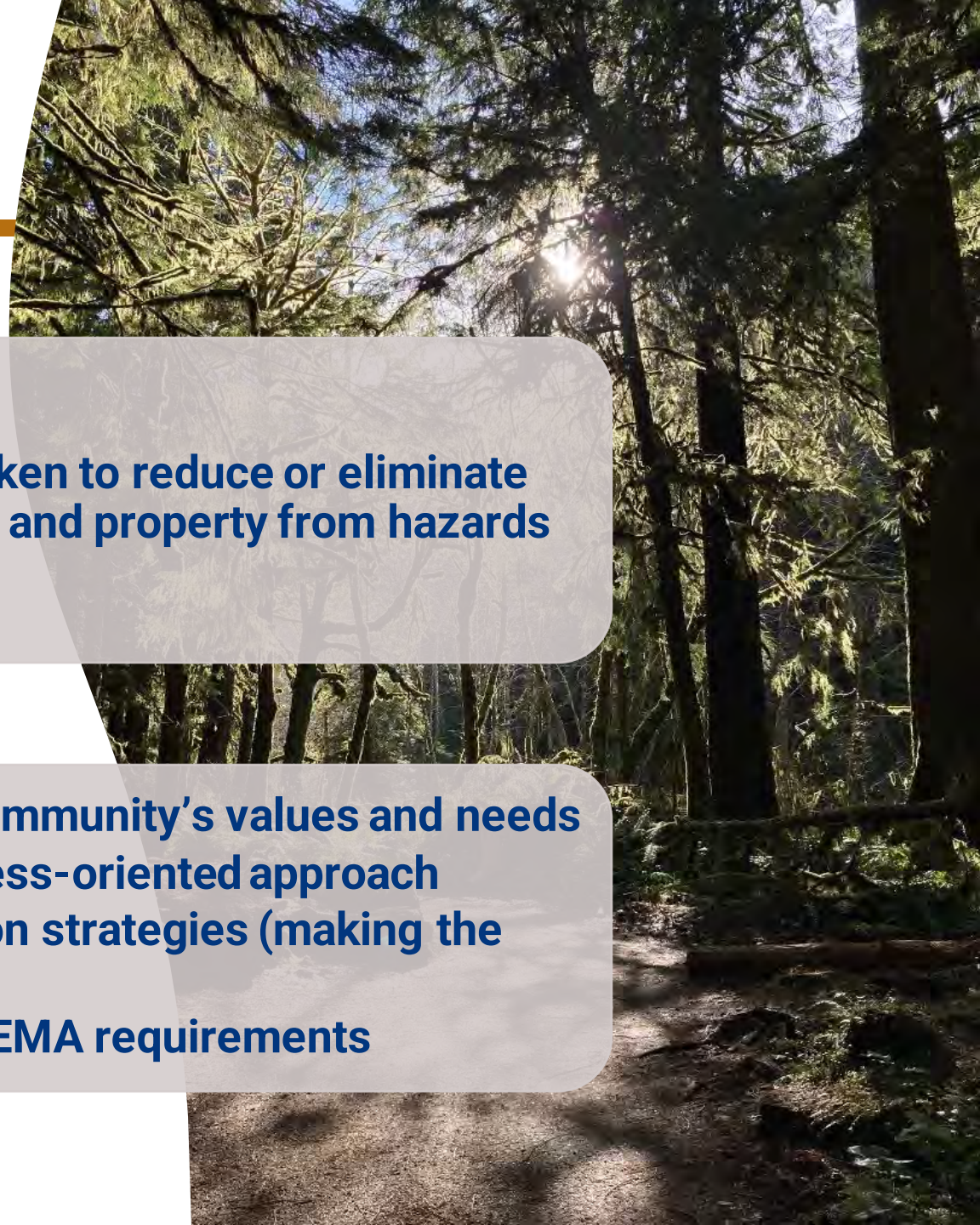
MJHMP Purpose

What is Hazard Mitigation?

- Sustained actions taken to reduce or eliminate long-term risk to life and property from hazards

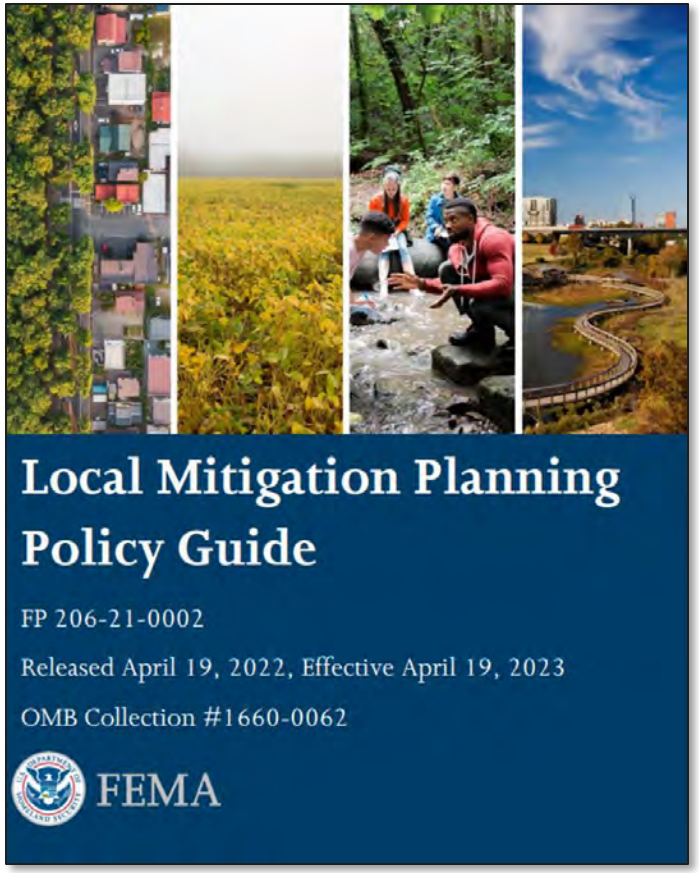
What is a Hazard Mitigation Plan?

- A plan based on a community's values and needs
- Results from a process-oriented approach
- Focuses on mitigation strategies (making the future safer)
- Must meet certain FEMA requirements



MJHMP Requirements

- ✓ Provide and **document** opportunities for stakeholder and public involvement
- ✓ Review and **incorporate** existing plans, studies, reports, and technical information
- ✓ **Document how** the plan was prepared and **who** was involved
- ✓ **Identify how** the plan will be monitored, evaluated, and updated within a five-year cycle
  - Provide for continued public participation in plan maintenance



MJHMP Development

HMP Development

- Hazard profiles
- Vulnerability assessment
- Mitigation strategies

Plan Adoption

- Plan submitted to Washington EMD/FEMA for Review
- The County and Participating Jurisdictions individually adopt the HMP
- FEMA issues approval letter

HMP Development

Hazard Profiles

- Type, location, extent
- Previous occurrences
- Probability of future events

Vulnerability Assessment

- Impacts of hazard
- Vulnerability to each hazard
- Repetitive loss
- Potential dollar losses

Mitigation Strategies

- Overarching goals
- Specific actions
- Prioritize actions
- Who, what, when, how much

Summarize and Document Risk Assessment

Hazard Mitigation Strategy

- **Comprehensive range of mitigation actions and projects**
  - Emphasize existing and new infrastructure
- **Types of mitigation actions**
  - Local plans and regulations
  - Structure and infrastructure projects
  - Natural systems protection
  - Education and awareness programs
- **Action Plan**
  - Incorporate into existing plans and policies
  - Identify who is responsible, funding mechanism, other resources, when completed and how purchased

HMP Adoption

- Plan submitted to Washington EMD/FEMA for Review
  - Receive “Approval Pending Adoption” status
- The County and Participating Jurisdictions individually adopt the HMP
  - Must be adopted within one calendar year
  - Documentation of adoption (resolution) provided to FEMA
- FEMA issues approval letter

Climate Element Purpose

The GMA was amended in 2023 under Washington House Bill 1181, requiring cities and counties to **integrate climate mitigation and resilience policies into comprehensive plan updates**.

These required policy changes will **address emissions and climate impacts**, while considering **co-benefits** and integration with other planning documents around **housing**, **transportation**, and **land use.**

Climate Element Requirements

Climate resilience goals and policies, at a minimum, must include…

Requirement 1: Address natural hazards created or aggravated by climate change (SLR, landslides, flooding, drought, heat, smoke, wildfire, etc.)

Requirement 2: Identify, protect, and enhance natural areas to foster climate resilience, as well as areas of vital habitat for safe species migration.

Requirement 3: Identify, protect, and enhance community resilience to climate impacts, including social, economic, and built-environment factors, consistent with environmental justice.

Climate Element Requirements

Additional Requirements

- Include at least one climate resilience goal and supportive policy:
  - For each **Climate-exacerbated hazard** that is relevant to Clallam County
  - Within each of the 11 of **Commerce-identified priority sectors**

Priority Sectors

Agriculture

Buildings & Energy

Cultural Resources & Practices

Economic Development

Emergency Management

Human Health

Ecosystems

Transportation

Waste Management

Water Resources

Zoning & Development

Climate Impacts in Clallam County

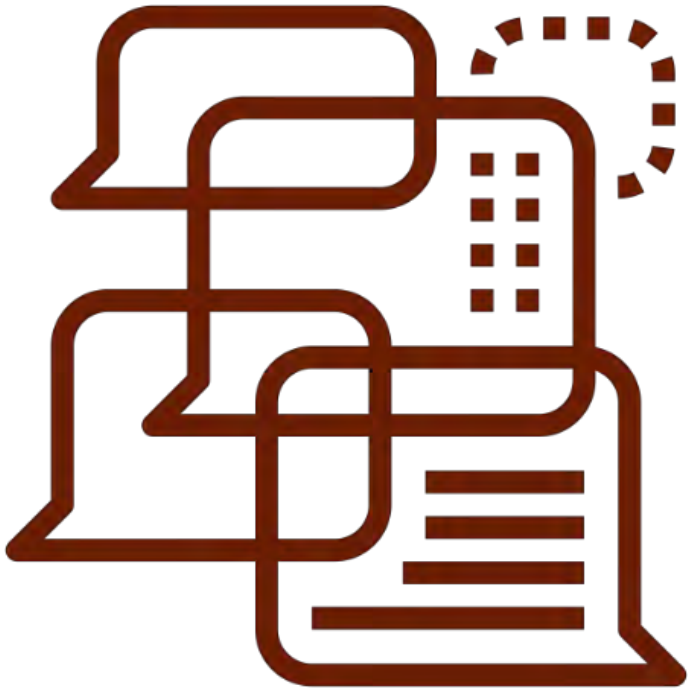
Increased Heat
Warmer summers with longer and more intense heat waves.

Heavy Rains, Flooding, and Sea Level Rise
Increased riverine flooding from more winter precipitation, along with more precipitation falling as rain rather than snow.

Snowpack and Water Quality
Reduced snowpack, resulting in less water availability for streams during the late summer months, affecting salmon habitat, water quality, and streamflow.

Summer Drought and Wildfire
Increased risk of drought, leading to greater wildfire risk and severity.

Discussion Question



- What do we need to consider to ensure that the MJHMP and the Climate Element are actionable?

Type your comment or question into the Zoom chat

OR

Raise your virtual hand to comment or ask verbally

Hazard Identification and Prioritization

Hazards in Clallam County

- FEMA and State suggested hazards
- Previously used hazards
- MJHMP update potential hazards
- Proposed hazards list
- Hazard ranking methodology proposed
- Explanation of hazard ranking exercise and survey for next meeting

Hazards in Clallam County

FEMA Suggested Hazards

Avalanche	Flood	Sea level rise
Climate change	Geological hazards	Seismic hazards
Coastal erosion	Hailstorm	Severe winter storm
Coastal storm	Hazardous materials	Tornado
Dam failure	Human-caused hazards	Tsunami
Disease/pest management	Hurricane	Volcano
Drought	Land subsidence	Wildfire
Earthquake fault rupture	Landslide and mudflow	Wind
Expansive soils	Lightning	Windstorm
Extreme heat	Liquefaction	

Hazards in Clallam County

Washington State Suggested Hazards

Avalanche	Flood	Sea level rise
Climate change	Geological hazards	Seismic hazards
Coastal erosion	Hailstorm	Severe winter storm
Coastal storm	Hazardous materials	Tornado
Dam failure	Human-Caused hazards	Tsunami
Disease/pest management	Hurricane	Volcano
Drought	Land subsidence	Wildfire
Earthquake fault rupture	Landslide	Wind
Expansive soils	Lightning	Windstorm
Extreme heat	Liquefaction	

Hazards in Clallam County

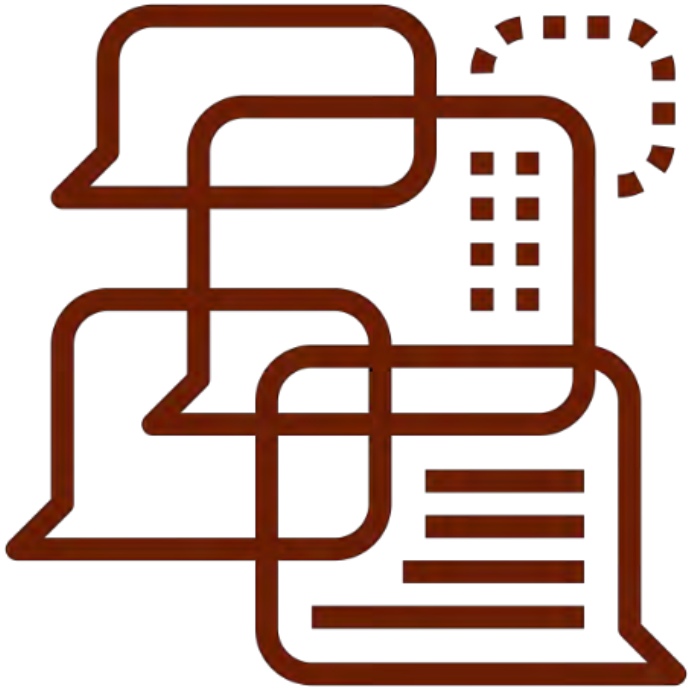
Previous Clallam County Hazards (2018 MJHMP)

Avalanche	Flood	Sea level rise
Climate change	Geological hazards	Seismic hazards
Coastal erosion	Hailstorm	Severe winter storm
Coastal storm	Hazardous materials	Tornado
Dam failure	Human-Caused hazards	Tsunami
Disease/pest management	Hurricane	Volcano
Drought	Land subsidence	Wildfire
Earthquake fault rupture	Landslide	Wind
Expansive soils	Lightning	Windstorm
Extreme heat	Liquefaction	

Proposed – Updated Hazards

- **Dam Failure**
- Disease (Infectious/Vector) and **Pandemic**
- Drought
- Flood
- Human-Caused Hazards
  - Hazardous Materials Spill
  - **Maritime Disasters**
  - Active Shooter
  - Terrorism
  - Utility Failure/Power Outage [secondary hazard]
  - **Supply Chain Interruption [secondary hazard]**
- Landslide
- **Sea Level Rise**
- Seismic Hazards
  - Cascadia Subduction Earthquake
  - Earthquake, ~7.0 Design Level
- **Severe Weather**
  - **Windstorm**
  - Winter Storm (rain, freezing rain, ice, snow, cold temperature)
  - **Extreme Heat**
- Tsunami
- Wildfire
  - **Wildfire Smoke [secondary hazard]**

Discussion Questions



- Are the listed hazards representative of your understanding and experience in Clallam County?
  - Any missing hazards?
  - Any organizational changes?

Type your comment or question into the Zoom chat

OR

Raise your virtual hand to comment or ask verbally

Hazard Prioritization Exercise

Coming up: Meeting #2

- Four Criteria
  - Probability (likelihood of occurrence)
  - Location (size of potentially affected area)
  - Maximum Probable Extent (intensity of damage)
  - Secondary Impacts (severity of impacts to community)
- A value of 1 – 4 is assigned for each criteria

- Every criteria has an Importance Score
  - Can be used to weigh the influence of an individual criterion
  - Criteria and importance values are combined to calculate a Total Score

Score Example: Tsunami

Probability

Importance score: 2.0

Unlikely (1)	Occasional (2)	**Likely (3)**	Highly Likely (4)

Probability score: 2.0 x 3 = 6

Location

Importance score: 0.8

Negligible (1)	Limited (2)	Significant (3)	**Extensive (4)**

Affected Area score: 0.8 x 4 = 3.2

Score Example: Tsunami

Primary Impact

Importance score: 0.7

Weak (1)	**Moderate (2)**	Severe (3)	Extreme (4)

Primary Impact score: 0.7 x 2 = 1.4

Secondary Impacts

Importance score: 0.5

Negligible (1)	Limited (2)	Moderate (3)	High (4)

Secondary Impacts score: 0.5 x 4 = 0.5

Score Example: Tsunami

Impact

Affected Area Score (3.2)	Primary Impact Score (1.4)	Secondary Impact Score (0.5)

Impact score: 3.2 + 1.4 + 0.5 = 5.1

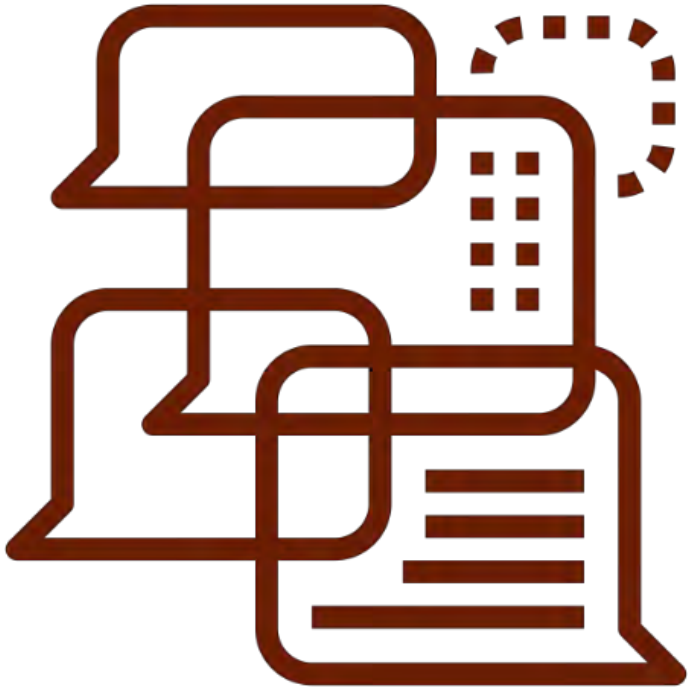
Total Score

Impact Score (5.1)	Probability Score (6)

Total Score: 5.1 x 6 = 30.6 (Medium)

Low:	Medium:	High:
0-12	12.1-42	42.1 and up

Presentation Q & A



- Do you have questions or comments about the hazard prioritization exercise coming up at the next meeting?

Type your comment or question into the Zoom chat

OR

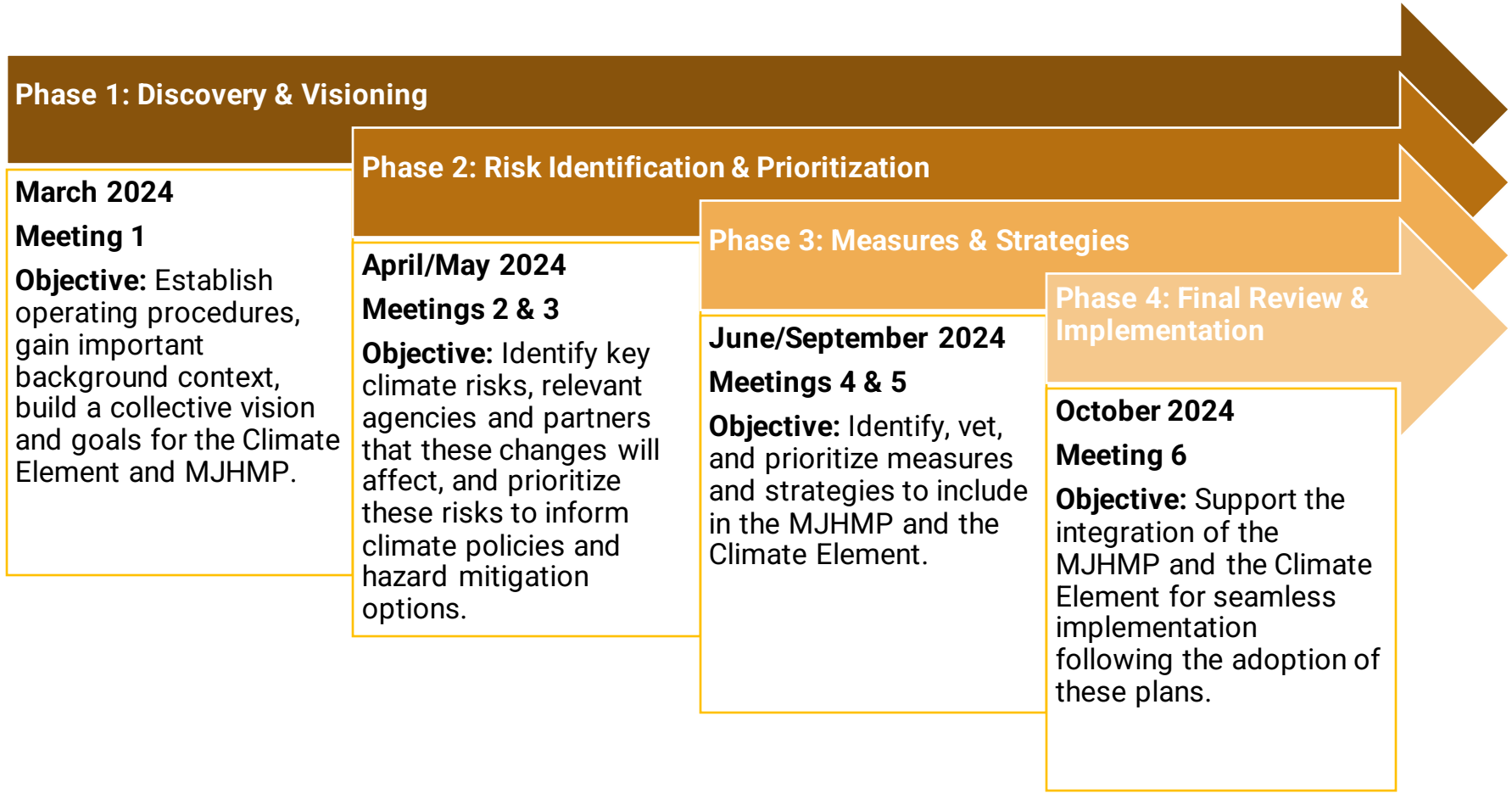
Raise your virtual hand to comment or ask verbally

Next Steps

Next Steps: Data Needs and Capabilities

- ✓ Plans/studies
- ✓ Policies/programs (Audit)
- ✓ Technical and GIS data
- ✓ Intrinsic/historic knowledge
- ✓ Photos
- ✓ Asset inventory for loss estimations

Next Steps: Committee Timeline

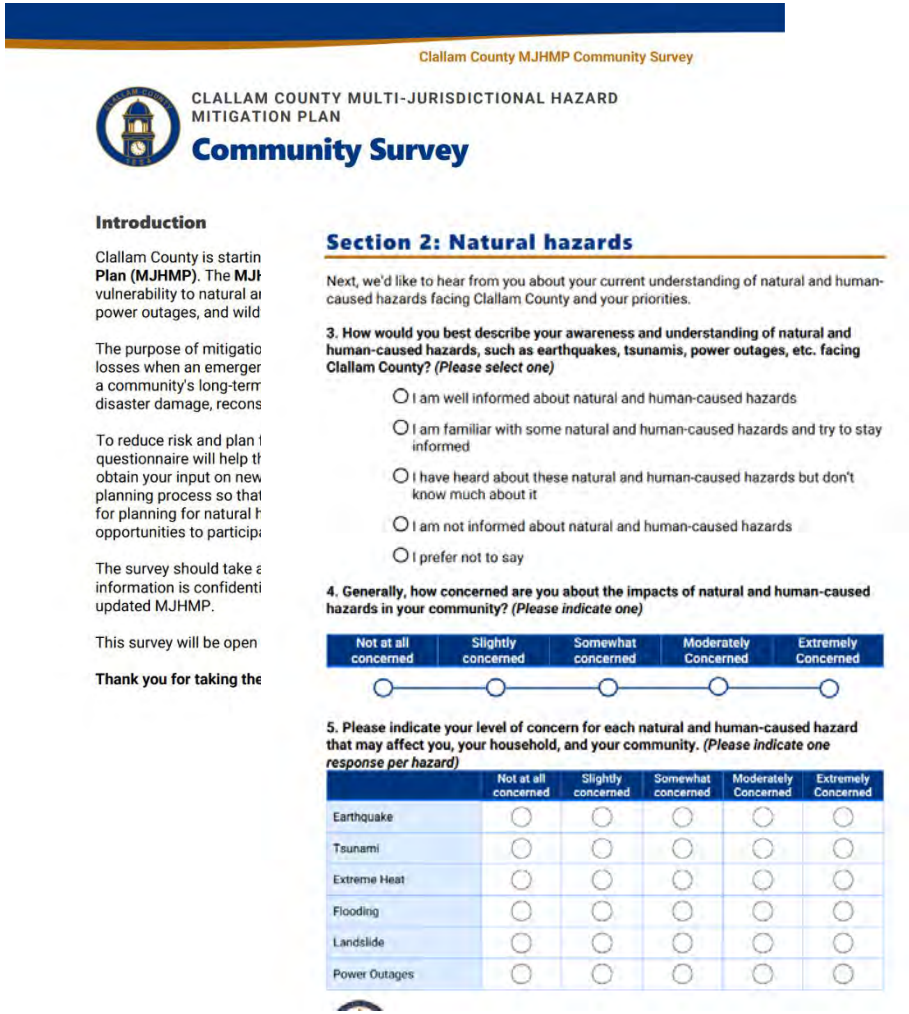


Next Meeting

- Vision and goal refinement
- Share results of policy audit
- Hazard and Climate Impacts Assessment
- Hazard prioritization exercise

Community Survey is Live!

- Focused on understanding prior experience with natural disasters, and to obtain on new opportunities to reduce risk.
- **Open March 6 – May 10**



Clallam County MJHMP Community Survey

CLALLAM COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

Community Survey

Introduction

Clallam County is startin
Plan (MJHMP). The **MJ**
vulnerability to natural a
power outages, and wild

The purpose of mitigatio
losses when an emerger
a community's long-term
disaster damage, recons

To reduce risk and plan
questionnaire will help th
obtain your input on new
planning process so that
for planning for natural h
opportunities to participa

The survey should take a
information is confidenti
updated MJHMP.

This survey will be open

Thank you for taking the

Section 2: Natural hazards

Next, we'd like to hear from you about your current understanding of natural and human-caused hazards facing Clallam County and your priorities.

3. How would you best describe your awareness and understanding of natural and human-caused hazards, such as earthquakes, tsunamis, power outages, etc. facing Clallam County? *(Please select one)*

- ○ I am well informed about natural and human-caused hazards
- ○ I am familiar with some natural and human-caused hazards and try to stay informed
- ○ I have heard about these natural and human-caused hazards but don't know much about it
- ○ I am not informed about natural and human-caused hazards
- ○ I prefer not to say

4. Generally, how concerned are you about the impacts of natural and human-caused hazards in your community? *(Please indicate one)*

Not at all concerned	Slightly concerned	Somewhat concerned	Moderately Concerned	Extremely Concerned

5. Please indicate your level of concern for each natural and human-caused hazard that may affect you, your household, and your community. *(Please indicate one response per hazard)*

	Not at all concerned	Slightly concerned	Somewhat concerned	Moderately Concerned	Extremely Concerned
Earthquake	○	○	○	○	○
Tsunami	○	○	○	○	○
Extreme Heat	○	○	○	○	○
Flooding	○	○	○	○	○
Landslide	○	○	○	○	○
Power Outages	○	○	○	○	○

Doodle Poll: April Meeting

- April 17, 18, or 29
- 2 hours, virtual meeting
  - https://doodle.com/meeting/participate/id/avmWzz5e

Questions and Additional Discussion

Questions and Additional Discussion

Are there any additional questions or comments?

Name (Original Name)	User Email	Join Time	Leave Time	Duration (M	Guest	Recording Discla	In Waiting Room
13605659192		3/25/2024 10:01	3/25/2024 11:31	90	Yes	No Response	No
Alyssa Rodriguez (she/her) Cascadia (Zoom Cascadia)	zoom@cascadia	3/25/2024 10:01	3/25/2024 11:43	103	No	OK	No
Anne Chastain - Clallam Emergency Management		3/25/2024 10:00	3/25/2024 11:31	91	Yes	OK	No
Brian Weekes# Forks (brian weekes)		3/25/2024 9:59	3/25/2024 11:31	93	Yes	OK	No
Casey.Marchese		3/25/2024 10:00	3/25/2024 11:43	104	Yes	OK	No
Charisse (she/her/hers)# City of Sequim (cdeschenes@sequimwa.gov)		3/25/2024 9:59	3/25/2024 11:43	105	Yes	Leave Meeting	No
Chip Keen 3 Rivers Fire CCFD6 (Chip Keen)		3/25/2024 9:59	3/25/2024 11:31	93	Yes	OK	No
Crystie Kisler (crystie)		3/25/2024 9:59	3/25/2024 11:28	89	Yes	OK	No
Culley Lehman, Cascadia Water		3/25/2024 10:00	3/25/2024 10:30	30	Yes	OK	No
Derrell Sharp Port Angeles Fire		3/25/2024 10:00	3/25/2024 11:31	92	Yes	OK	No
Diane Harvey, Clallam County		3/25/2024 9:58	3/25/2024 11:43	105	Yes	OK	No
Holden A. Fleming, AICP		3/25/2024 9:59	3/25/2024 11:43	104	Yes	OK	No
Ian Miller (he/him; Washington Sea Grant)		3/25/2024 10:06	3/25/2024 11:32	87	Yes	OK	No
J. Black		3/25/2024 10:01	3/25/2024 10:01	1	Yes	No Response	Yes
James Roubal (Quileute Tribe)		3/25/2024 10:01	3/25/2024 11:35	95	Yes	OK	No
Jen Garcelon# Clallam County Health (she/her) (Jen Garcelon, Clallam County Health)		3/25/2024 10:00	3/25/2024 11:31	91	Yes	OK	No
Jesse Goodman		3/25/2024 10:00	3/25/2024 11:32	92	Yes	OK	No
Jesse Waknitz - Port of Port Angeles		3/25/2024 10:43	3/25/2024 11:31	49	Yes	OK	No
Jim Buck		3/25/2024 10:01	3/25/2024 11:43	103	Yes	OK	No
Jim Fetzer		3/25/2024 10:02	3/25/2024 11:31	90	Yes	OK	No
Julie# Olympic Medical Center (J. Black)		3/25/2024 10:01	3/25/2024 11:31	91	Yes	OK	No
Justine Chorley Clallam County		3/25/2024 9:59	3/25/2024 11:31	93	Yes	No Response	No
Karen Affeld - North Olympic Development Council		3/25/2024 10:04	3/25/2024 11:33	90	Yes	OK	No
Keith & Blaine CCFD#3 (Koehler & Zechenelly CCFD#3)		3/25/2024 9:59	3/25/2024 11:31	93	Yes	OK	No
Koehler & Zechenelly CCFD#3		3/25/2024 9:54	3/25/2024 9:59	6	Yes	No Response	Yes
Kristina Zeynalova (she/her)# Cascadia Consulting Group (Kristina Zeynalova (she/her))		3/25/2024 9:53	3/25/2024 11:44	111	Yes	No Response	No
Luke Strong-Cvetich		3/25/2024 10:01	3/25/2024 11:31	91	Yes	OK	No
Mark Doten (he/him)# IT Director (Mark Doten)		3/25/2024 10:00	3/25/2024 11:31	91	Yes	OK	No
Marty Martinez - Peninsula College (Marty Martinez)		3/25/2024 9:59	3/25/2024 11:32	93	Yes	OK	No
Mary Ann Rozance (she/her)# Cascadia Consulting Group (Zoom Cascadia)	zoom@cascadia	3/25/2024 9:53	3/25/2024 11:44	111	No	OK	No
Matthew Huish# City of Sequim (Matthew Huish)		3/25/2024 10:08	3/25/2024 11:31	83	Yes	OK	No
Meggan Uecker# City of Sequim# she/her (Meggan Uecker)		3/25/2024 10:03	3/25/2024 11:31	89	Yes	OK	No
Noelle Anderson - Michael Baker Intl (Noelle Anderson)		3/25/2024 10:00	3/25/2024 11:43	103	Yes	OK	No
Peninsula Housing Authority		3/25/2024 9:55	3/25/2024 9:59	4	Yes	No Response	Yes
Robert Knapp- Jamestown S'Klallam Tribe (Robert Knapp)		3/25/2024 10:01	3/25/2024 11:23	82	Yes	OK	No
Sarah - Peninsula Housing Authority (Peninsula Housing Authority)		3/25/2024 9:59	3/25/2024 11:31	93	Yes	OK	No
Shailesh Shere# Clallam County PUD (Shailesh Shere)		3/25/2024 10:04	3/25/2024 11:32	89	Yes	OK	No
Tinker Lucas - Makah Tribe EM (she/her) (Tinker Lucas - Makah Tribe EM)		3/25/2024 10:09	3/25/2024 11:33	84	Yes	OK	No
Tom Sanford - North Olympic Land Trust (he/him) (Tom Sanford)		3/25/2024 9:59	3/25/2024 11:33	94	Yes	OK	No
Tony Hudson - Clallam Fire 3 (Tony Hudson)		3/25/2024 10:05	3/25/2024 11:32	88	Yes	OK	No

Will Habel; City of Port Angeles (William Habel)	3/25/2024 9:59	3/25/2024 11:31	93	Yes	OK	No

Zoom Meeting
You are viewing Zoom Cascadia's screen
View Options
Recording
Mary Ann Rozance (she/her), Cascadia Consulting Group is talking...
Sign in
View
Hazard Mitigation and Climate Resilience (HMCR) Steering Committee
Meeting #1
March 25th, 2024 | 10:00-11:30 AM | Zoom link
Mark Doten
Mark Doten
Anne Chastain -...
Anne Chastain - Clalla...
Jen Garcelon, Cl...
Jen Garcelon, Clallam ...
Jesse Goodman
Jesse Goodman
Culley Lehman,...
Culley Lehman, Cascad...
J. Black
J. Black
Unmute
Stop Video
Participants
31
Q&A
Chat
Share Screen
Summary
AI Companion
Record
Show Captions
Reactions
Apps
Whiteboards
Notes
Leave
10:03 AM
3/25/2024

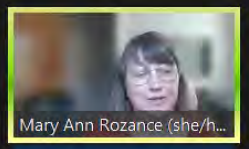
Zoom Meeting

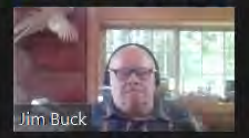
Recording

Sign in

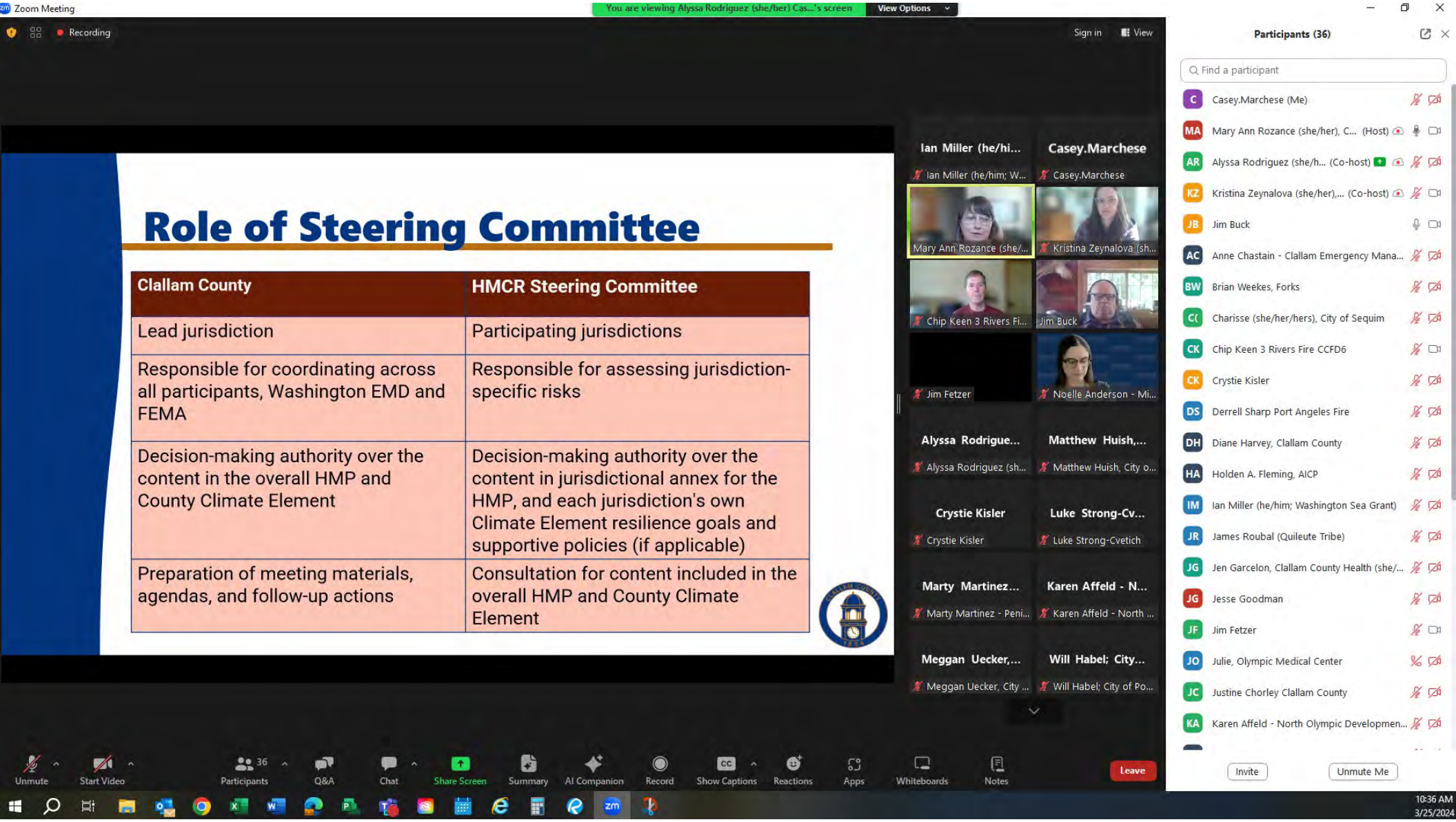
Meeting Agenda

- Welcome and Introductions
- Project Background and Goals
- Committee Role and Expectations
- Purpose of MJHMP and Climate Element
- Hazard Identification and Prioritization
- Next Steps
- Questions and Additional Discussion





10:13 AM
3/25/2024


Zoom Meeting
You are viewing Alyssa Rodriguez (she/her) Cas...'s screen
View Options
Recording
Sign in
View
Role of Steering Committee
Clallam County
HMCR Steering Committee
Lead jurisdiction
Participating jurisdictions
Responsible for coordinating across all participants, Washington EMD and FEMA
Responsible for assessing jurisdiction-specific risks
Decision-making authority over the content in the overall HMP and County Climate Element
Decision-making authority over the content in jurisdictional annex for the HMP, and each jurisdiction's own Climate Element resilience goals and supportive policies (if applicable)
Preparation of meeting materials, agendas, and follow-up actions
Consultation for content included in the overall HMP and County Climate Element
Ian Miller (he/hi...
Casey.Marchese
Mary Ann Rozance (she/...
Kristina Zeynalova (sh...
Chip Keen 3 Rivers Fi...
Jim Buck
Jim Fetzer
Noelle Anderson - Mi...
Alyssa Rodrigue...
Matthew Huish,...
Crystie Kisler
Luke Strong-Cv...
Marty Martinez...
Karen Affeld - N...
Meggan Uecker,...
Will Habel; City...
Participants (36)
Find a participant
Casey.Marchese (Me)
Mary Ann Rozance (she/her), C... (Host)
Alyssa Rodriguez (she/h... (Co-host)
Kristina Zeynalova (she/her),... (Co-host)
Jim Buck
Anne Chastain - Clallam Emergency Mana...
Brian Weekes, Forks
Charisse (she/her/hers), City of Sequim
Chip Keen 3 Rivers Fire CCFD6
Crystie Kisler
Derrell Sharp Port Angeles Fire
Diane Harvey, Clallam County
Holden A. Fleming, AICP
Ian Miller (he/him; Washington Sea Grant)
James Roubal (Quileute Tribe)
Jen Garcelon, Clallam County Health (she/...
Jesse Goodman
Jim Fetzer
Julie, Olympic Medical Center
Justine Chorley Clallam County
Karen Affeld - North Olympic Developmen...
Invite
Unmute Me
Unmute
Start Video
Participants
Q&A
Chat
Share Screen
Summary
AI Companion
Record
Show Captions
Reactions
Apps
Whiteboards
Notes
Leave
10:36 AM
3/25/2024

Zoom Meeting

Recording

Sign in

HMP Development

Hazard Profiles

- Type, location, extent
- Previous occurrences
- Probability of future events

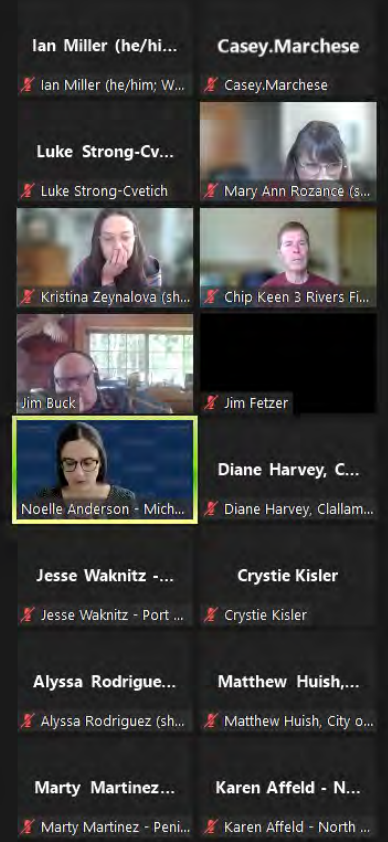
Vulnerability Assessment

- Impacts of hazard
- Vulnerability to each hazard
- Repetitive loss
- Potential dollar losses

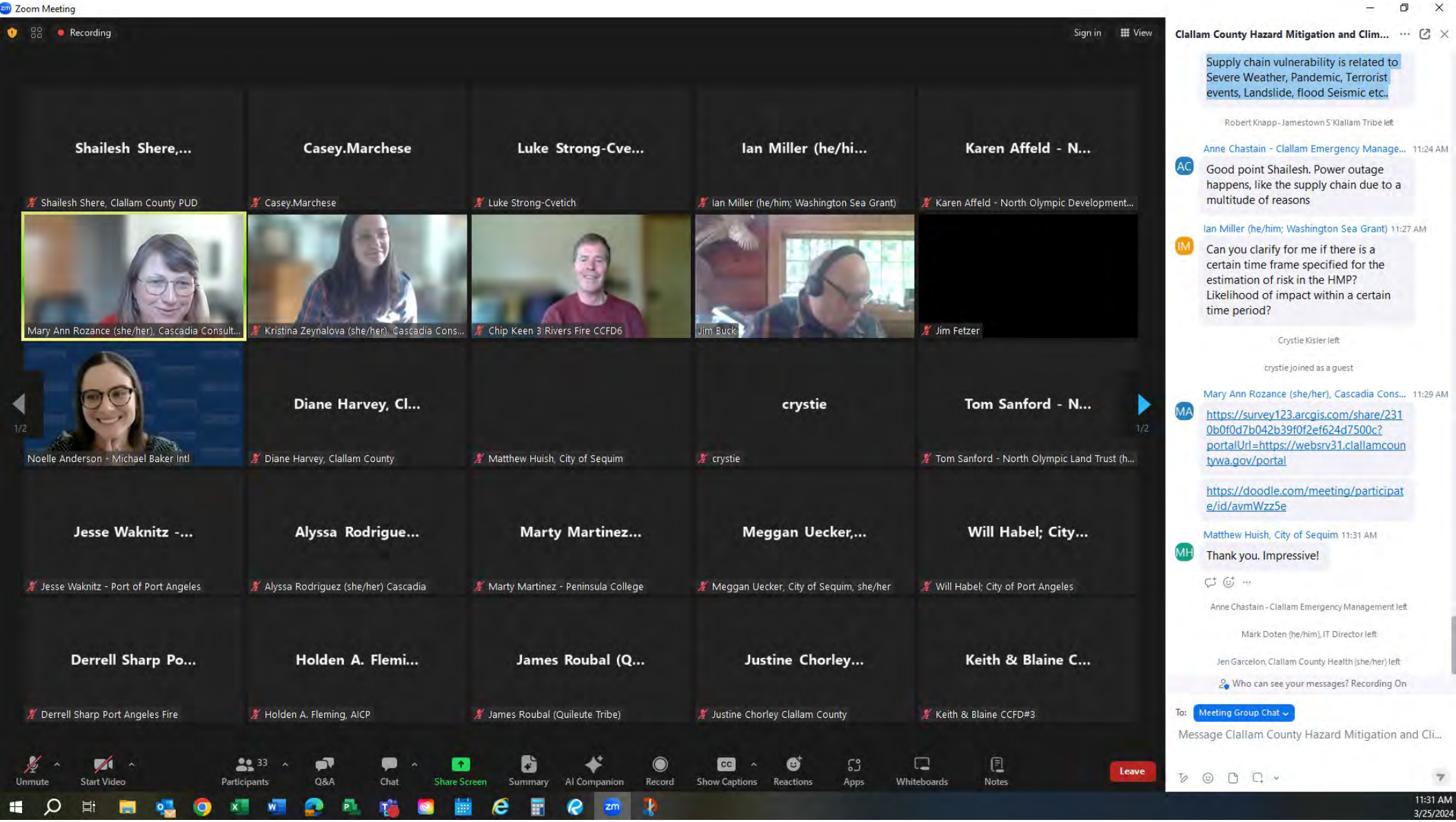
Mitigation Strategies

- Overarching goals
- Specific actions
- Prioritize actions
- Who, what, when, how much

Summarize and Document Risk Assessment



10:47 AM
3/25/2024


Zoom Meeting
Recording
Sign in
View
Shailesh Shere,...
Shailesh Shere, Clallam County PUD
Casey.Marchese
Casey.Marchese
Luke Strong-Cve...
Luke Strong-Cvetich
Ian Miller (he/hi...
Ian Miller (he/him; Washington Sea Grant)
Karen Affeld - N...
Karen Affeld - North Olympic Development...
Mary Ann Rozance (she/her), Cascadia Consult...
Kristina Zeynalova (she/her), Cascadia Cons...
Chip Keen 3 Rivers Fire CCFD6
Jim Buck
Jim Fetzer
Noelle Anderson - Michael Baker Intl
Diane Harvey, Cl...
Diane Harvey, Clallam County
Matthew Huish, City of Sequim
crystie
Tom Sanford - N...
Tom Sanford - North Olympic Land Trust (h...
1/2
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Jesse Waknitz -...
Jesse Waknitz - Port of Port Angeles
Alyssa Rodrigue...
Alyssa Rodriguez (she/her) Cascadia
Marty Martinez...
Marty Martinez - Peninsula College
Meggan Uecker,...
Meggan Uecker, City of Sequim, she/her
Will Habel; City...
Will Habel; City of Port Angeles
Derrell Sharp Po...
Derrell Sharp Port Angeles Fire
Holden A. Flemi...
Holden A. Fleming, AICP
James Roubal (Q...
James Roubal (Quileute Tribe)
Justine Chorley...
Justine Chorley Clallam County
Keith & Blaine C...
Keith & Blaine CCFD#3
Unmute
Start Video
Participants
33
Q&A
Chat
Share Screen
Summary
AI Companion
Record
Show Captions
Reactions
Apps
Whiteboards
Notes
Leave
Clallam County Hazard Mitigation and Clim...
Supply chain vulnerability is related to Severe Weather, Pandemic, Terrorist events, Landslide, flood Seismic etc..
Robert Knapp - Jamestown S'Klallam Tribe left
Anne Chastain - Clallam Emergency Manage... 11:24 AM
Good point Shailesh. Power outage happens, like the supply chain due to a multitude of reasons
Ian Miller (he/him; Washington Sea Grant) 11:27 AM
Can you clarify for me if there is a certain time frame specified for the estimation of risk in the HMP? Likelihood of impact within a certain time period?
Crystie Kisler left
crystie joined as a guest
Mary Ann Rozance (she/her), Cascadia Cons... 11:29 AM
https://survey123.arcgis.com/share/2310b0f0d7b042b39f0f2ef624d7500c?portalUrl=https://websrv31.clallamcountywa.gov/portal
https://doodle.com/meeting/participate/id/avmWzz5e
Matthew Huish, City of Sequim 11:31 AM
Thank you. Impressive!
Anne Chastain - Clallam Emergency Management left
Mark Doten (he/him), IT Director left
Jen Garcelon, Clallam County Health (she/her) left
Who can see your messages? Recording On
To: Meeting Group Chat
Message Clallam County Hazard Mitigation and Cli...
11:31 AM
3/25/2024

APPENDIX B.3

HMCR Steering Committee Meeting #2

Hazard Mitigation and Climate Resilience Steering Committee

Steering Committee Meeting #2 Agenda | April 29, 2024 | 1:00-3:00 PM | Zoom link

Agenda

Time	Agenda Item
1:00-1:10 PM	Introduction and Updates
1:10-1:40 PM	Goals Discussion
1:40-1:55 PM	Policy Audit Summary
1:55-2:45 PM	Hazard Prioritization Exercise
2:45-3:00 PM	Questions and Next Steps

Meeting #2 Objectives

- Provide update on work to date
- Review and discuss Climate Element and MJHMP Goals
- Identify and prioritize hazards and risks
- Summarize next steps

Project Team

Clallam County	Role on Project
Diane Harvey, Sheriff's Office	Project Lead
Holden Fleming, Deputy Director, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Director, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
Mary Ann Rozance, Cascadia Consulting Group	Project Manager
Alyssa Rodriguez, Cascadia Consulting Group	Engagement lead
Mike Chang, Cascadia Consulting Group	Principal in Charge
Abigail Lambert, Cascadia Consulting Group	Climate and Policy Analyst
Jay Carhart, Cascadia Consulting Group	Engagement Support
Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead

Casey Marchese, Michael Baker International	Hazard Mitigation Analyst
Jim Buck	Strategic advisor

Detailed Agenda

Time	Topic	Notes
1:00-1:10 PM	Introduction and Updates	**Introduction** • Brief introduction for new members • Re-introduce goals of Steering Committee • Share meeting objectives Name, organization, Icebreaker in chat: What is one thing you are excited about as summer approaches? **Updates** • Provide project updates and work to date • Answer questions about process and/or Committee role
1:10-1:35 PM	Goals Discussion	**Goals Discussion (**See goals below) • Present draft goals for MJHMP and Climate Element deliverables • Refine goals with Committee input Discussion question: Do you have any refinements to these draft goals? Is there anything missing?
1:35-1:50 PM	Policy Audit Summary	**Policy Audit Summary** • Introduce policy audit methodology and preliminary results • Share how audit results will be used to inform policy development • *Discussion Question: What climate resilience initiatives, goals, plans, or programs are you familiar with that we may have missed?*
2:05-2:50 PM	Hazard Prioritization Exercise	**Hazard Prioritization Exercise (**See slides below) • Update on hazard organization and voting exercise • Complete the prioritization exercise and answer questions
2:50-3:00 PM	Questions and Next Steps	**Summarize next steps** • Discuss data needs and capabilities • Review timeline and workplan **Questions and Discussion** • *Answer any final questions*

Goals of MJHMP and Climate Element

The following goals will be discussed during the Steering Committee meeting.

MJHMP

2019 HMP Goals

- Goal 1: Maintain and expand transportation routes across the County, during and after key hazards events.
- Goal 2: Maintain emergency services capabilities by providing redundancies.
- 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.

Suggested MJHMP Update Goals

- **Goal 1**: Reduce the impacts of natural hazards on community lifeline infrastructure and services (including transportation routes, communication systems, utilities, and emergency services) and other critical assets through: resiliency and reliability enhancement efforts, modernization, and redundancy of critical infrastructure.
- **Goal 2**. Emphasize the role of sustainable development and climate adaptation in hazard mitigation in order to minimize risks and vulnerabilities caused in part by climate change.
- **Goal 3**: Increase community capabilities and leverage interagency and public-private coordination to mitigate losses and prepare, respond, and recover from disasters. Prioritize effective long-term partnerships across all levels of government.
- **Goal 4**: Minimize property damage and reduce repetitive losses to property from natural hazards.
- **Goal 5**: Champion and prioritize people-centered mitigation actions in addition to property-centered actions.
- **Goal 6**: Enhance public outreach, education, and preparedness for all hazards, including effective strategies for reaching underserved and vulnerable populations. Empower the public to reduce personal vulnerability and enhance preparedness.

Climate Element

In the initial stages of Climate Element development, Commerce suggests that jurisdictions craft a vision statement and goals to guide their efforts. The goal is to create a vision that reflects the social, economic, and environmental priorities of Clallam County, especially in the face of climate change. This involves understanding what matters most to community members and why they want to sustain these aspects amidst climate challenges.

Suggested Climate Element Goals

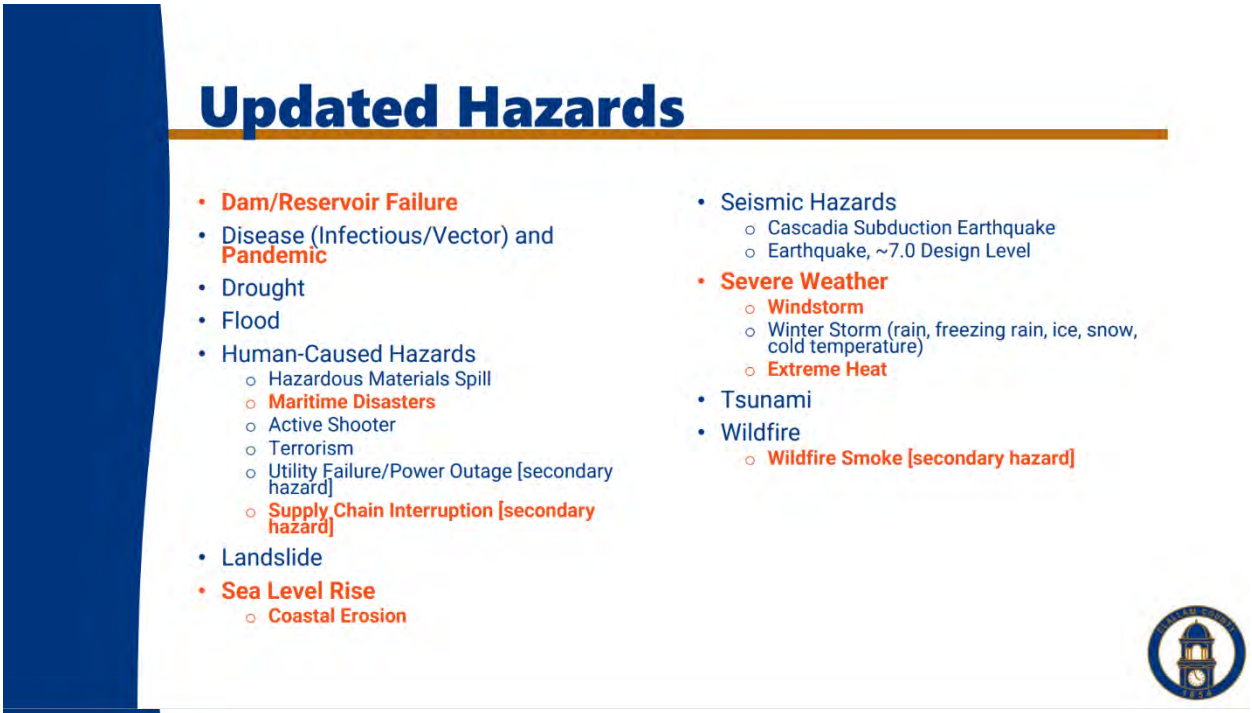
- **Goal 1:** Collaborate with regional partners, local governments, and communities in the County to develop resilient solutions to climate change and prepare the community for future impacts.
- **Goal 2:** Identify and protect social, economic, and built-environment systems in the County that are vulnerable to natural hazards created or aggravated by climate change, including sea level rise, landslides, flooding, drought, heat, smoke, wildfire, and other hazards.
- **Goal 3:** Rely on the best available science and resources to develop and update goals, policies, and plans that are transparent and actionable to address identified vulnerabilities.
- **Goal 4:** Ensure environmental benefits reach all members of the community and address historical inequalities and environmental injustices.
- **Goal 5:** Emphasize the need for urgent climate action while prioritizing inclusive engagement in sustainability planning through diverse communication channels.

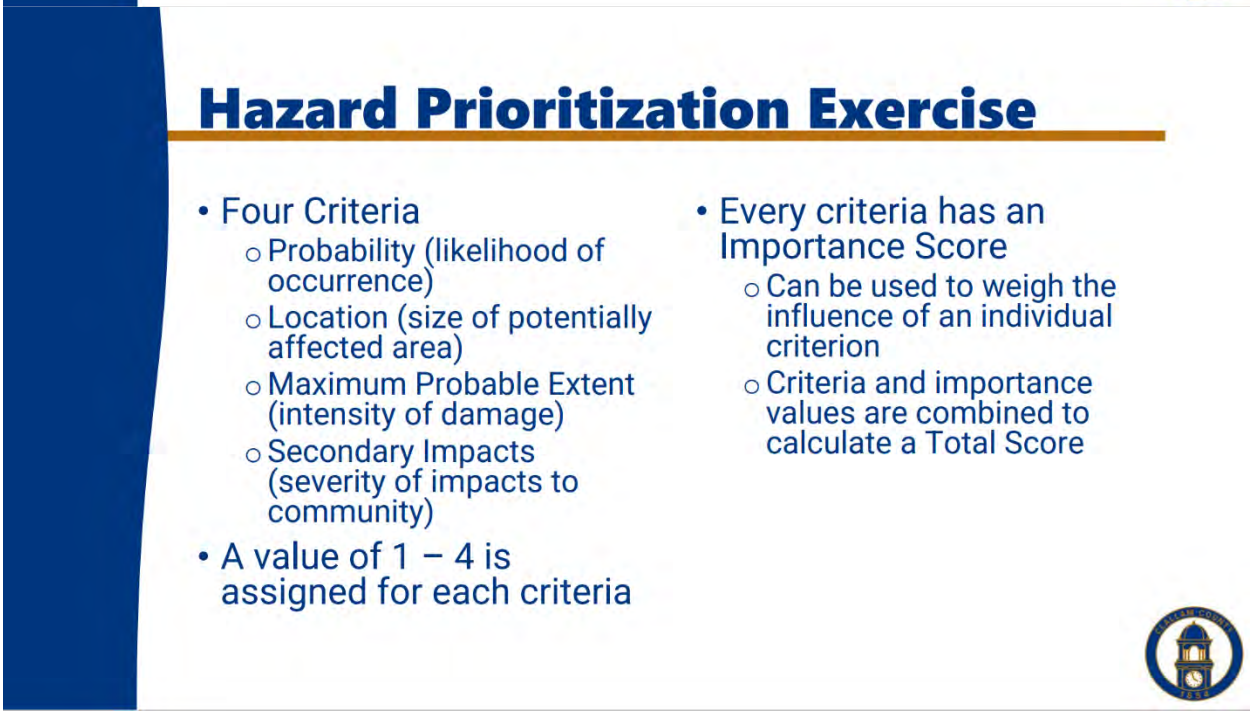
Example of Climate Vision Statement (From NOAA Grant):

Clallam County will be well-prepared for the significant impacts of climate change on our region, building climate-resilient communities that will support our well-being, our environment, and our economy, through a strong and strategic collaboration centered on equity and sustainability.

Hazard Prioritization Exercise

The following slides will be used to conduct the hazard prioritization exercise.





Score Example: Tsunami

Probability

Importance score: 2.0

Unlikely (1)	Occasional (2)	**Likely (3)**	Highly Likely (4)

Probability score: 2.0 x 3 = 6

Location

Importance score: 0.8

Negligible (1)	Limited (2)	Significant (3)	**Extensive (4)**

Affected Area score: 0.8 x 4 = 3.2

Score Example: Tsunami

Primary Impact

Importance score: 0.7

Weak (1)	**Moderate (2)**	Severe (3)	Extreme (4)

Primary Impact score: 0.7 x 2 = 1.4

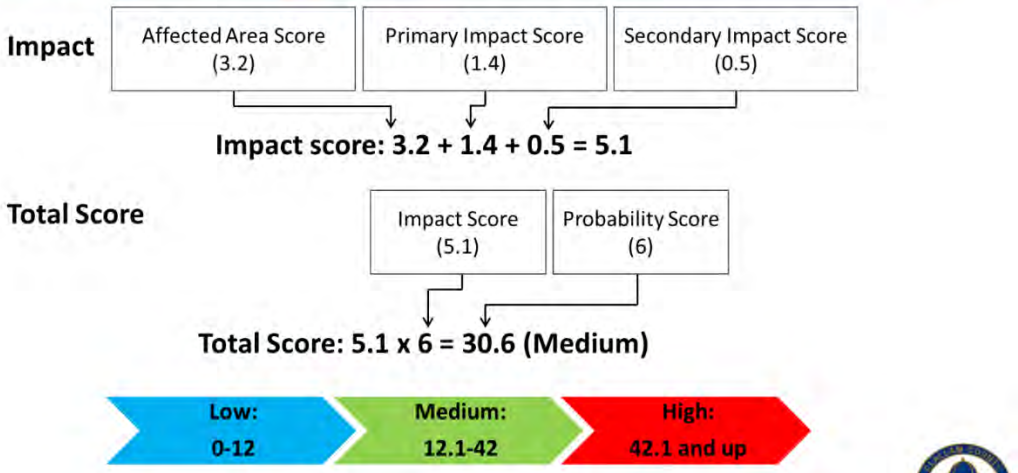
Secondary Impacts

Importance score: 0.5

Negligible (1)	Limited (2)	Moderate (3)	High (4)

Secondary Impacts score: 0.5 x 4 = 0.5

Score Example: Tsunami



Tamayo, Audrey

From: Marchese, Casey
Sent: Thursday, August 22, 2024 11:54 AM
To: Tamayo, Audrey
Subject: FW: EXTERNAL: Clallam County HMCR Steering Committee #2 Agenda
Attachments: HMCR Steering Committee Meeting ^N2 Agenda.pdf

Thank you,
Casey Marchese | Planner II – Community Planning and Resilience
5 Hutton Centre Drive, Suite 500 | Santa Ana, CA 92707 | [O] 949-472-3494 | [M] 410-206-9265
casey.marchese@mbakerintl.com | www.mbakerintl.com

Michael Baker INTERNATIONAL | *We Make a Difference*

From: Mary Ann Rozance <maryann@cascadiaconsulting.com>
Sent: Tuesday, April 23, 2024 9:33 AM
To: rodf <rodf@forkswashington.org>; Charisse Deschenes <cdeschenes@sequimwa.gov>; Will Habel <Whabel@cityofpa.us>; rknapp <rknapp@jamestowntribe.org>; Luke Strong-Cvetich <lstrong@jamestowntribe.org>; glen.roggenbuck <glen.roggenbuck@elwha.org>; Jesse Waknitz <jessew@portofpa.com>; Shailesh Shere x241 <sshere@clallampud.net>; mmartinez <mmartinez@pencol.edu>; Lauren Lesser <lauren@noprcd.org>; Karen Affeld <karen@noprcd.org>; Cindy Jayne <cindyjaynept@gmail.com>; crystie@finnriver.com; smartinez@peninsulapha.org; sharon.maggard@serenityhouseclallam.org; tinker.lucas2@makah.com; James Roubal <qnr.planner@quileutetribe.com>; dsharp@cityofpa.us; jpatterson@clallamfire2.org; thudson@ccfd3.org; cclallam@centurytel.net; ckeen@3riversfire.org; Elizabeth.C.Miller@uscg.mil; jablack@olympicmedical.org; adriaw@forkshospital.org; immiller@uw.edu; NGlaude@nols.org; julie.koehlinger@hohtribe-nsn.org; bzechenelly@ccfd3.org; rkeithkoehler@outlook.com; steve.gray <steve.gray@clallamcountywa.gov>; joe.donisi <joe.donisi@clallamcountywa.gov>; Emery, Bruce <bruce.emery@clallamcountywa.gov>; jennifer.garcelon@clallamcountywa.gov; holden.fleming <holden.fleming@clallamcountywa.gov>; lorraine.shore@clallamcountywa.gov; Harvey, Diane <diane.harvey@clallamcountywa.gov>; anne.chastain@clallamcountywa.gov; justine.chorley@clallamcountywa.gov; mark.doten@clallamcountywa.gov; Meggan Uecker <muecker@sequimwa.gov>; ellen.chappelka@mil.wa.gov; Tom@northolympiclandtrust.org; dburnett@sequimwa.gov; Rhiana.Barkie@clallamcountywa.gov; Garcelon, Ron <Ron.Garcelon@clallamcountywa.gov>
Cc: Abigail Lambert <abigail@cascadiaconsulting.com>; Anderson, Noelle <Noelle.Anderson@mbakerintl.com>; Alyssa Rodriguez <alyssa@cascadiaconsulting.com>; Marchese, Casey <Casey.Marchese@mbakerintl.com>; buckdj@olypen.com
Subject: EXTERNAL: Clallam County HMCR Steering Committee #2 Agenda

EXTERNAL EMAIL

Dear Hazard Mitigation & Climate Resilience (HMCR) Steering Committee,

We are looking forward to our second HMCR Steering Committee meeting next Monday, April 29 from 1pm-3pm. Please find the agenda attached. We will cover brief introductions and updates, discuss goals for the Multi-Jurisdiction Hazard Mitigation Plan (MJHMP) and the Climate Element for the County's Comprehensive Plan

update, share and discuss findings from the climate policy audit, and work through a hazard prioritization exercise for the MJHMP.

Here is the link to join the meeting: https://us02web.zoom.us/j/86028811960 (Meeting ID: 860 2881 1960).

Please let me know if you have any questions.

Best regards,
Mary Ann Rozance

Mary Ann Rozance, PhD
Senior Associate (she, her, hers)
Cascadia Consulting Group
maryann@cascadiaconsulting.com
www.cascadiaconsulting.com
LinkedIn | Facebook | Twitter | Instagram

I am currently working a part-time schedule (Monday-Thursday, 9:00 a.m. to 5:00 p.m. Pacific Time)

Hazard Mitigation and Climate Resilience Steering Committee

Steering Committee Meeting #2 Agenda | April 29th, 2024 | 1:00-3:00 PM | Zoom link

Agenda

Time	Agenda Item
1:00-1:10 PM	Introduction and Updates
1:10-1:40 PM	Goals Discussion
1:40-1:55 PM	Policy Audit Summary
1:55-2:45 PM	Hazard Prioritization Exercise
2:45-3:00 PM	Questions and Next Steps

Meeting #2 Objectives

- Provide update on work to date
- Review and discuss Climate Element and MJHMP Goals
- Identify and prioritize hazards and risks
- Summarize next steps

Project Team

Clallam County	Role on Project
Diane Harvey, Sheriff's Office	Project Lead
Holden Fleming, Deputy Director, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Director, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
Mary Ann Rozance, Cascadia Consulting Group	Project Manager and Climate Resilience Lead
Alyssa Rodriguez, Cascadia Consulting Group	Engagement Lead
Mike Chang, Cascadia Consulting Group	Principal in Charge
Abigail Lambert, Cascadia Consulting Group	Climate and Policy Analyst
Jay Carhart, Cascadia Consulting Group	Engagement Support
Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead
Casey Marchese, Michael Baker International	Hazard Mitigation Analyst

Jim Buck	Strategic Advisor

Meeting Materials

- ✓ Facilitator's agenda
- ✓ Pre-meeting packet
  - Participant Agenda
  - Draft goals for Climate Element and MJHMP
  - Hazard Prioritization Exercise materials
  - Final Engagement Plan
- ✓ PowerPoint Slides
- ✓ Notetaking document (Michael Baker)

Detailed Agenda

Time	Topic	Lead	Notes
1:00-1:10 PM	Introduction and Updates	Cascadia / Mary Ann	**Introduction** ✓ Brief introduction for new members ✓ Re-introduce goals of Steering Committee ✓ Share meeting objectives Name, organization, Icebreaker in chat: What is one thing you are excited about as summer approaches? **Updates** ✓ Provide project updates and work to date ✓ Answer questions about process and/or Committee role
1:10-1:40 PM	Goals Discussion	Cascadia / Mary Ann	**Goals Discussion** ✓ Present draft goals for MJHMP and CE deliverables ○ Include engagement goals Refine goals with Committee input Polling software to guide conversation (Mentimeter) Discussion question: Do you have any refinements to these draft goals? Is there anything missing?
1:40-1:55 PM	Policy Audit Summary	Cascadia / Abigail	**Policy Audit Summary** ✓ Introduce policy audit methodology and preliminary results ✓ Share how audit results will be used to inform policy development *Discussion Question: What climate resilience initiatives, goals, plans, or programs are you familiar with that we may have missed?*
1:55-2:45 PM	Hazard Prioritization Exercise	MB	**Hazard Prioritization Exercise** ✓ Update on hazard organization and introduce the voting concepts and get everyone set up on Mentimeter (10 mins)

			✓ Walk through the exercise and answer questions (40 mins)
2:45-3:00 PM	Questions and Next Steps	Cascadia / Mary Ann	**Summarize next steps** ✓ Discuss data needs and capabilities ✓ Review timeline and workplan **Questions and Discussion** ✓ *Answer any final questions*

Goals of MJHMP and Climate Element

MJHMP

2019 HMP Goals

- Goal 1: Maintain and expand transportation routes across the County, during and after key hazards events.
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Suggested MJHMP Update Goals

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Climate Element

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Suggested Climate Element Goals

- **Goal 1:** Collaborate with regional partners, local governments, and communities in the County to develop resilient solutions to climate change and prepare the community for future impacts.
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Example of Climate Vision Statement (From NOAA Grant):

Clallam County will be well-prepared for the significant impacts of climate change on our region, building climate-resilient communities that will support our well-being, our environment, and our economy, through a strong and strategic collaboration centered on equity and sustainability.

Meeting Discussion Summary

Meeting discussion included a recap of the outreach and engagement plan, Climate Element goals, Climate Element Policy Audit and MJHMP Hazard Prioritization Exercise. Public engagement to date and upcoming events were discussed. Recommendations for the Climate Element goals were suggested. Suggestions were made for additional policies and documents to be reviewed under the Climate Element Policy Audit. The discussion also included clarifications on the scope and scale of the Climate Element, MJHMP, Vulnerability Assessment, and mitigation strategies.

Detailed Meeting Notes

Introduction/Updates:

- Question from Tom Sanford (North Olympic Land Trust): It looks like this project includes current or upfront public engagement and public engagement later in the process. Can you talk about what we are looking to get out of each phase of public engagement?
    - Answer from Alyssa Rodriguez (Cascadia, Engagement Lead): Phase 1 is about spreading the word which includes the hazard survey, website, etc. Phase 2 is about identifying priorities including the climate survey, community events, planning commission. Phase 3 is going to focus on detailed feedback on the vulnerability assessment and draft policies, etc.
    - Diane Harvey (Sheriff's Office, Project Lead): For everyone's awareness, we already did the Home Show; we got comments from about 40 community members. I was also on KNOP radio last week to get the word out about this project. The County website will allow people to comment, and we will attach the meeting minutes from these steering committee meetings so people will have the opportunity to comment on those as well. So far, we have over 600 responses on these outreach channels including the surveys on the county website.

Draft Climate Element Goals:

- Tom Sanford (North Olympic Land Trust): Suggestion for Goal 2, I recommend including "ecological" along with the social, economic and built-environment systems.
    - Mary Ann Rozance (Cascadia, Project Manager): We can make that change and include ecological systems to that goal.
- Tom Sanford (North Olympic Land Trust): In the NOAA Grant vision statement example, the goal is framed as building a stronger climate-resilient community. But in the draft goals for the Climate Element, it sounds like we are focused on

addressing the problem of climate change. Could we adjust the goals to be more optimistic about being climate resilient as opposed to facing climate problems?
    - Karen Affeld (North Olympic Development Council) – To that point, in Goal 1, a more accurate aim may be to develop mitigation/adaptation strategies rather than solutions since climate solutions are not straightforward.
    - Mary Ann Rozance (Cascadia, Project Manager): We can look into reframing the goals with those suggestions in mind.
- Bruce Emery (Clallam County, Community Development Director): For Goal 4, I suggest focusing on the benefits of resilience instead of environmental benefits. Something like "ensure resilience reaches all members of the community…"
    - Mary Ann Rozance (Cascadia, Project Manager): That sounds good. We can make that change.

Climate Element Policy Audit:

- Question from Tom Sanford (North Olympic Land Trust): Who should we send additional prior planning information to?
- Question from Meggan Uecker (City of Sequim): Will you be soliciting input on policy sources via email?
    - Answer from Mary Ann Rozance (Cascadia, Project Manager): You can send additional information to me. I can follow up via email with you Meggan if you have other policy documents that should be reviewed.
- Luke Strong (Jamestown S'Klallam Tribe Planning Director): I know that insurance premiums may be affected by climate policies. It might be good to look into the policies that intersect with insurance rates.
- Question from Colin Young (Clallam County PUD): Will this project look into how climate change may affect our ground water levels, snowpack and surface water runoff. Ultimately climate change may impact the water supply and water availability.
    - Answer from Mary Ann Rozance (Cascadia, Project Manager): That may be included in the Vulnerability Assessment, but we can look into the nexus between climate change, runoff, and water table levels, ground water levels and how that impacts a water utilities water supply for folks.

Hazard Prioritization and Ranking Exercise:

- Question from Jim Buck (Strategic Advisor): I question whether we can include wildfire smoke as a hazard in the MJHMP. How does wildfire smoke and the built environment intersect from a mitigation standpoint?

- Justine Chorley (Clallam County, Emergency Management Coordinator): Sheltering or resources to mitigate wildfire smoke are an option.
- Answer from Noelle Anderson (Michael Baker, MJHMP Consultant): We can mitigate wildfire smoke and the built environment through HVAC systems. We include wildfire smoke in the hazard analysis because it would specifically impact vulnerable populations and we want to mitigate it on that front as well.

Project Next Steps:

- Question from Tom Sanford (North Olympic Land Trust): The Climate Element is going to be a standalone section the Comprehensive Plan, correct? Will we be getting specific about the risks of certain hazards on a neighborhood level; for example, addressing wildfire on specific areas like the City of Forks?
  - Answer from Mary Ann Rozance (Cascadia, Project Manager): This is a standalone element, but it will also include an analysis across other elements. We will be getting specific to some degree. This is part of an update to the entire Comprehensive Plan, although, it is not going to be a full overhaul. We will document specific vulnerabilities such as fire risk to Forks in the Vulnerability Assessment.

Action Items:

- Consultant Team to update climate element goals with recommendations discussed.
- Consultant Team to follow up via email for any additional policy documents to be reviewed.
- Consultant Team to consider policies related to insurance premiums and climate vulnerability of water supply.

Hazard Mitigation and Climate Resilience (HMCR) Steering Committee

Meeting #2

April 29, 2024 | 1:00-3:00 PM | Zoom link

Role of Steering Committee

Phase 1: Discovery & Visioning

March 2024

Meeting 1

Objective: Establish operating procedures, gain important background context, build a collective vision and goals for the Climate Element and MJHMP.

Phase 2: Risk Identification & Prioritization

April/May 2024

Meetings 2 & 3

Objective: Identify key climate risks, relevant agencies and partners that these changes will affect, and prioritize these risks to inform climate policies and hazard mitigation options.

Phase 3: Measures & Strategies

June/September 2024

Meetings 4 & 5

Objective: Identify, vet, and prioritize measures and strategies to include in the MJHMP and the Climate Element.

Phase 4: Final Review & Implementation

October 2024

Meeting 6

Objective: Support the integration of the MJHMP and the Climate Element for seamless implementation following the adoption of these plans.

Committee Goals

- Facilitate deep and thorough understanding of perspectives that address gaps and barriers in current plans.
- Lead key practitioners and project proponents through exercises to identify, vet, and prioritize climate and hazard mitigation strategies.
- Discuss how the County can best address community needs and key trends, develop potential strategies, identify monitoring and evaluation criteria, and integrate specific elements such as equity, inclusion, and environmental justice.

Meeting purpose

Review and discuss work to date and goals for Climate Element and MJHMP; identify and prioritize hazards and risks.

Type in the chat: Name, organization

Icebreaker (on Menti): What is one thing you are excited about as summer approaches?

Please rename yourself with your first name, organization, and pronouns.

Menti Instructions

Meeting Objectives

- Provide update on work to date
- Review and discuss Climate Element and MJHMP Goals
- Identify and prioritize hazards and risks
- Summarize next steps

Meeting Agenda

- Welcome and Introductions
- Goals Discussion
- Policy Audit Summary
- MJHMP Update
- Hazard Prioritization Exercise
- Questions and Next Steps

Update on Work to Date

Progress to Date

- Climate Element
  - ✓Climate Impacts Summary
  - ✓Policy Audit
- MJHMP
  - ✓Critical Facilities List
  - ✓Repetitive loss properties
  - ✓Preliminary hazard mapping
  - ✓Hazard profiles
- Both
  - ✓HMCR Steering Committee
  - ✓Engagement Plan
  - ✓Launched hazards survey

HMCR Meeting #1

Vision for the plan	• Land and water rights • Rural context
Specific areas of concern	• Aging and vulnerable populations • Older infrastructure • Hospital capacity during an emergency
Scope of the MJHMP	• Creating the understanding that this will be an actionable plan, with realistic goals and strategies
Hazards discussed	• Sea level rise • Coastal flooding and erosion • Wildfire

Engagement Plan

Engagement next steps

- Review and provide contacts in the Engagement contact tracker
- Review Engagement Plan and provide comments
- **Deadline: May 13th**

Questions?

Type your comment or question into the Zoom chat

OR

Raise your virtual hand to comment or ask verbally

Climate Element and MJHMP Goals

Project Background and Goal

- County is updating the **MJHMP** in collaboration with the same 2019 participating jurisdictions, agencies, and Tribes.
- Concurrently developing a Comprehensive Plan **Climate Element.**

Goal: Elevate key **climate and hazard issues** facing the community and ensure that there is **alignment between the plans** while addressing **state and federal requirements**.

2019 MJHMP Goals

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- **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.

2023 Washington State HMP Goals

- **Goal 1:** Reduce the impacts of natural hazards on our community lifeline infrastructure and other critical assets.
- **Goal 2:** Prioritize effective long-term partnerships across all levels of government.
- **Goal 3:** Allow the risk and vulnerability assessments to drive the State's Mitigation Strategy and prioritization of mitigation actions.
- **Goal 4:** Improve our understanding of multi-hazard environments.
- **Goal 5:** Embed cultural understanding into our mitigation work.

2023 Washington State HMP Goals

- **Goal 6:** Ensure improved and equitable access to hazards information.
- **Goal 7:** Champion and prioritize people-centered mitigation actions in addition to property-centered ones.
- **Goal 8:** Emphasize the role of sustainable development and climate adaptation in hazard mitigation.
- **Goal 9:** Strategically reduce the number of repetitive loss and severe repetitive loss properties.
- **Goal 10:** Ensure all counties and sub-county jurisdictions in Washington understand their hazard risks and are eligible for mitigation funding opportunities.

Draft Goals: MJHMP Update

- **Goal 1**: Reduce the impacts of natural hazards on community lifeline infrastructure and services (including transportation routes, communication systems, utilities, and emergency services) and other critical assets through: resiliency and reliability enhancement efforts, modernization, and redundancy of critical infrastructure.
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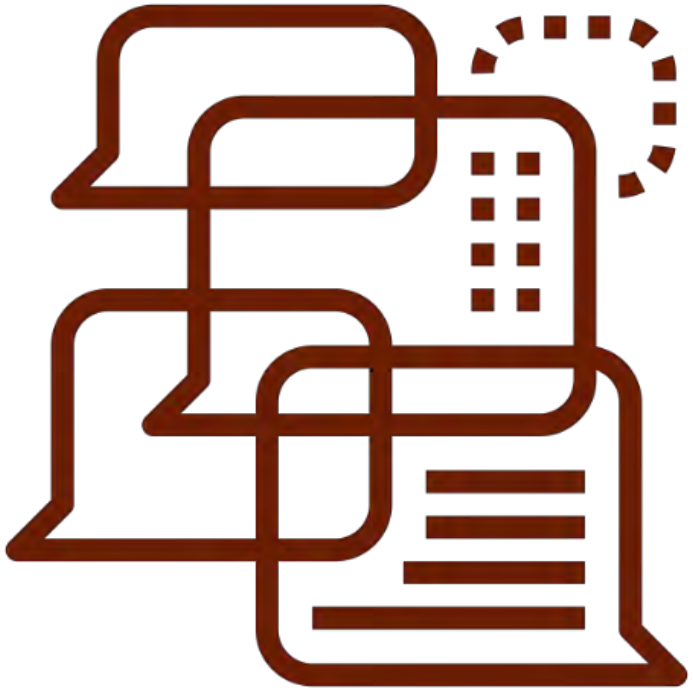
MJHMP Goals Discussion



- Do you have any refinements to these draft goals? Is there anything missing?

Draft Vision: Climate Element

Example of Climate Vision Statement (From NOAA Grant):

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Draft Goals: Climate Element

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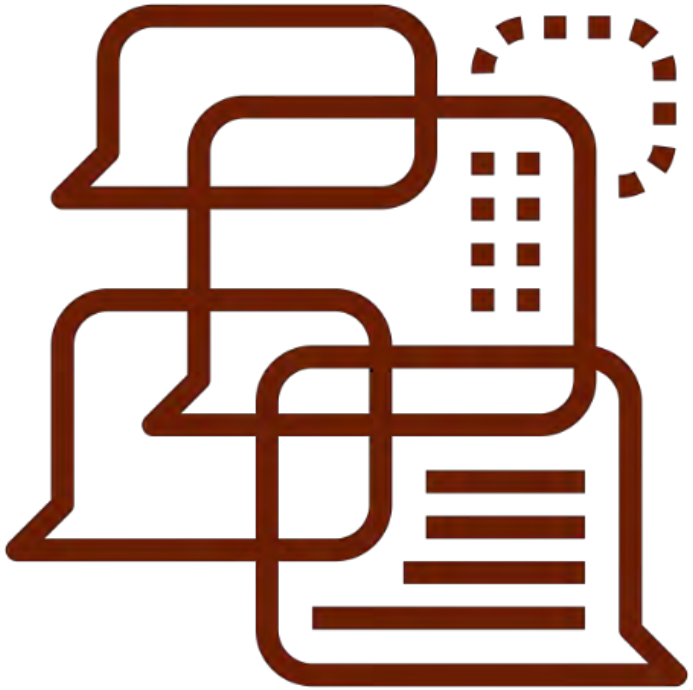
- **Goal 5:** Emphasize the need for urgent climate action while prioritizing inclusive engagement in sustainability planning through diverse communication channels.

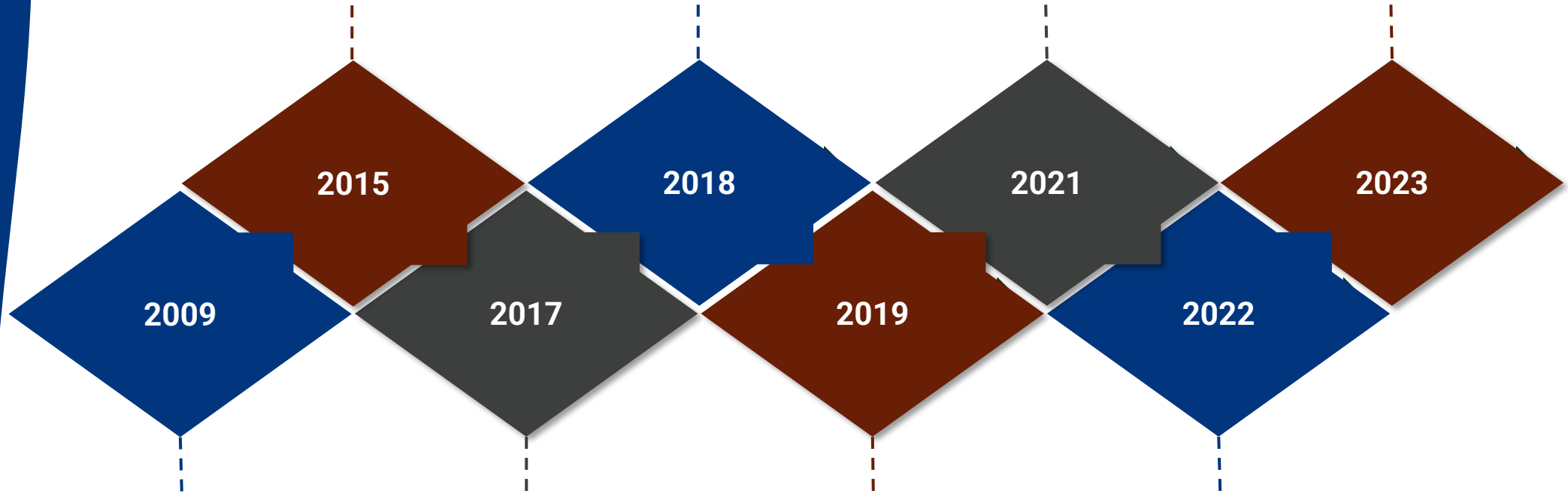
Climate Element Goals Discussion



- Do you have any refinements to these draft goals? Is there anything missing?

Climate Element Policy Audit

Past Climate Action in Clallam



- **Clallam County Climate Action Plan**

- Quileute Tribe Climate Plan

- **Clallam County Hazard Mitigation Plan Update**
- **Port Angeles Resiliency Plan**
- Port Angeles Housing Action Plan

- Jamestown S'Klallam Tribe Carbon Neutral Plan
- North Olympic Peninsula Resource & Development Council (NODC) Climate Action, Resiliency and Disaster Planning

- **NODC Climate Change Report**

- **Jamestown S'Klallam Tribe Vulnerability Assessment and Adaptation Plan**
- BOCC Authorizing Action On Climate Change Resolution

- GHG Reduction Ordinance
- **Shoreline Master Program**

- **Clallam County Climate Action Plan**
- **Makah Hazard Mitigation Plan**

Policy Audit Methodology

Comprehensive database of **270 goals and policies** assessed.

- Identified alignment with Commerce-identified priority sector; climate element nexus; climate indicator, hazards, and impacts; and assets to assess trends, gaps, and opportunities for policy inclusion in the CE.

Clallam County Comprehensive Plan	Shoreline Master Plan	Multi-jurisdictional Hazard Mitigation Plan	Clallam County Climate Action Plan	Port Angeles Climate Resilience Plan
Makah Hazard Mitigation Plan	Jamestown S'Klallam Climate Plan	Critical Area Code	Capital Facilities Plan	

Policy Audit Preliminary Results

Policies were coded by which priority sector they most closely aligned. The following priority sectors were identified by Commerce as sectors most vulnerable to climate impacts.

Priority Sector	#Policies/Actions
Ecosystems	64
Emergency Management	64
Water Resources	53
Buildings & Energy	39
Zoning & Development	35
Agriculture & Food Systems	33
Health & Well-being	33
Transportation	32
Cultural Resources & Practices	22
Economic Development	22
Waste Management	8

Policy Audit Preliminary Results

All policies were coded based on the climate-related hazard(s) that the measure addresses.

Hazard	# Policies/Actions
Extreme precipitation	156
Flooding	144
Sea level rise	109
Cross-cutting	73
Extreme heat	64
Reduced snowpack	46
Wildfire	37
Other	9

"Cross-cutting" indicates that the measure did not specifically address any climate hazard and/or was mitigation focused.

Policy Audit Gaps, Opportunities, and Barriers

For each priority sector, the Policy Audit Memorandum summarizes key climate resiliency measures in the County's current plans, major gaps in planning, and suggested policy opportunities to address these gaps.

Key Opportunities

- Strengthening the **connection between climate and other sectors**, and more **explicitly addressing current and projected climate impacts** throughout all Comprehensive Plan elements using the climate vulnerability and hazard plan assessments.
- **Aligning with and drawing from existing plans** and priorities such as the County's Climate Action Plan, NODC climate change reports, relevant jurisdictions' adaptation plans, and Commerce Menu of Measures.
- Focusing on **equitably distributing benefits** and services of climate resilience measure implementation.

Policy Audit Next Steps

Next Steps: The results of this audit will serve as the foundation in **drafting climate resilience goals and policies**.

Consolidate policies using the results from the Policy Audit and identify potential risks to mitigate early in the process and/or strengths to leverage.

Develop new policies in accordance with Comprehensive Plan and Climate Element framework, referencing Commerce's Menu of Measures and other relevant resources.

Vet and refine policies with the Steering Committee, through public engagement, the climate vulnerability assessment and other prioritization exercises.

Questions?

- Do you have any questions or comments about this approach?

Policy Audit Next Steps

- What climate resilience initiatives, goals, plans, or programs are you familiar with that we may have missed?

MJHMP Update

MJHMP Development

HMP Development

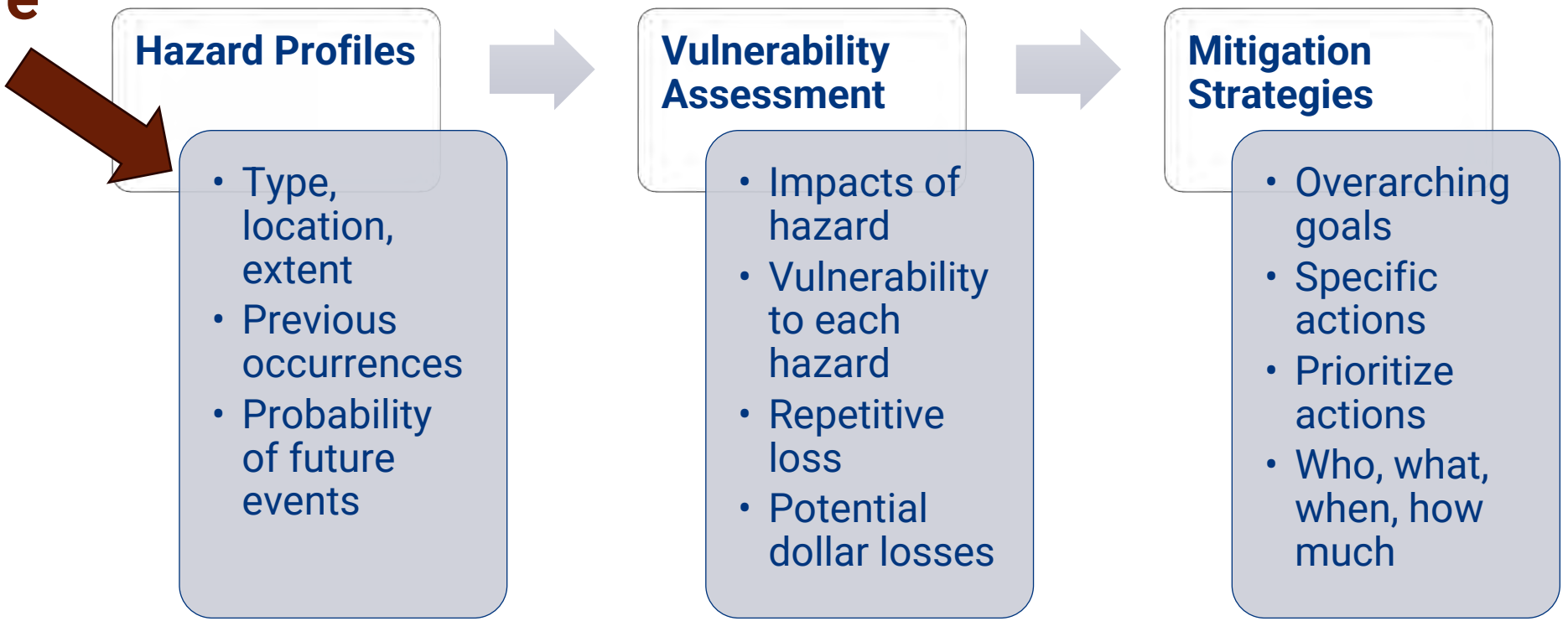
- Hazard profiles
- Vulnerability assessment
- Mitigation strategies

Plan Adoption

- Plan submitted to Washington EMD/FEMA for Review
- The County and Participating Jurisdictions individually adopt the HMP
- FEMA issues approval letter

HMP Development

We are here:



Summarize and Document Risk Assessment

Hazard Prioritization Exercise

Updated Hazards

- **Dam/Reservoir Failure**
- Disease (Infectious/Vector) and **Pandemic**
- Drought
- Flood
- Human-Caused Hazards
  - Hazardous Materials Spill
  - **Maritime Disasters**
  - Active Shooter
  - Terrorism
  - Utility Failure/Power Outage [secondary hazard]
  - **Supply Chain Interruption [secondary hazard]**
- Landslide
- **Sea Level Rise**
  - **Coastal Erosion**
- Seismic Hazards
  - Cascadia Subduction Earthquake
  - Earthquake, ~7.0 Design Level
- **Severe Weather**
  - **Windstorm**
  - Winter Storm (rain, freezing rain, ice, snow, cold temperature)
  - **Extreme Heat**
- Tsunami
- Wildfire
  - **Wildfire Smoke [secondary hazard]**

Hazard Prioritization Exercise

- Four Criteria
  - Probability (likelihood of occurrence)
  - Location (size of potentially affected area)
  - Maximum Probable Extent (intensity of damage)
  - Secondary Impacts (severity of impacts to community)
- A value of 1 – 4 is assigned for each criteria

- Every criteria has an Importance Score
  - Can be used to weigh the influence of an individual criterion
  - Criteria and importance values are combined to calculate a Total Score

Score Example: Tsunami

Probability

Importance score: 2.0

Unlikely (1)	Occasional (2)	**Likely (3)**	Highly Likely (4)

Probability score: 2.0 x 3 = 6

Location

Importance score: 0.8

Negligible (1)	Limited (2)	Significant (3)	**Extensive (4)**

Affected Area score: 0.8 x 4 = 3.2

Score Example: Tsunami

Primary Impact

Importance score: 0.7

Weak (1)	**Moderate (2)**	Severe (3)	Extreme (4)

Primary Impact score: 0.7 x 2 = 1.4

Secondary Impacts

Importance score: 0.5

Negligible (1)	Limited (2)	Moderate (3)	High (4)

Secondary Impacts score: 0.5 x 4 = 0.5

Score Example: Tsunami

Impact

Affected Area Score (3.2)	Primary Impact Score (1.4)	Secondary Impact Score (0.5)

Impact score: 3.2 + 1.4 + 0.5 = 5.1

Total Score

Impact Score (5.1)	Probability Score (6)

Total Score: 5.1 x 6 = 30.6 (Medium)

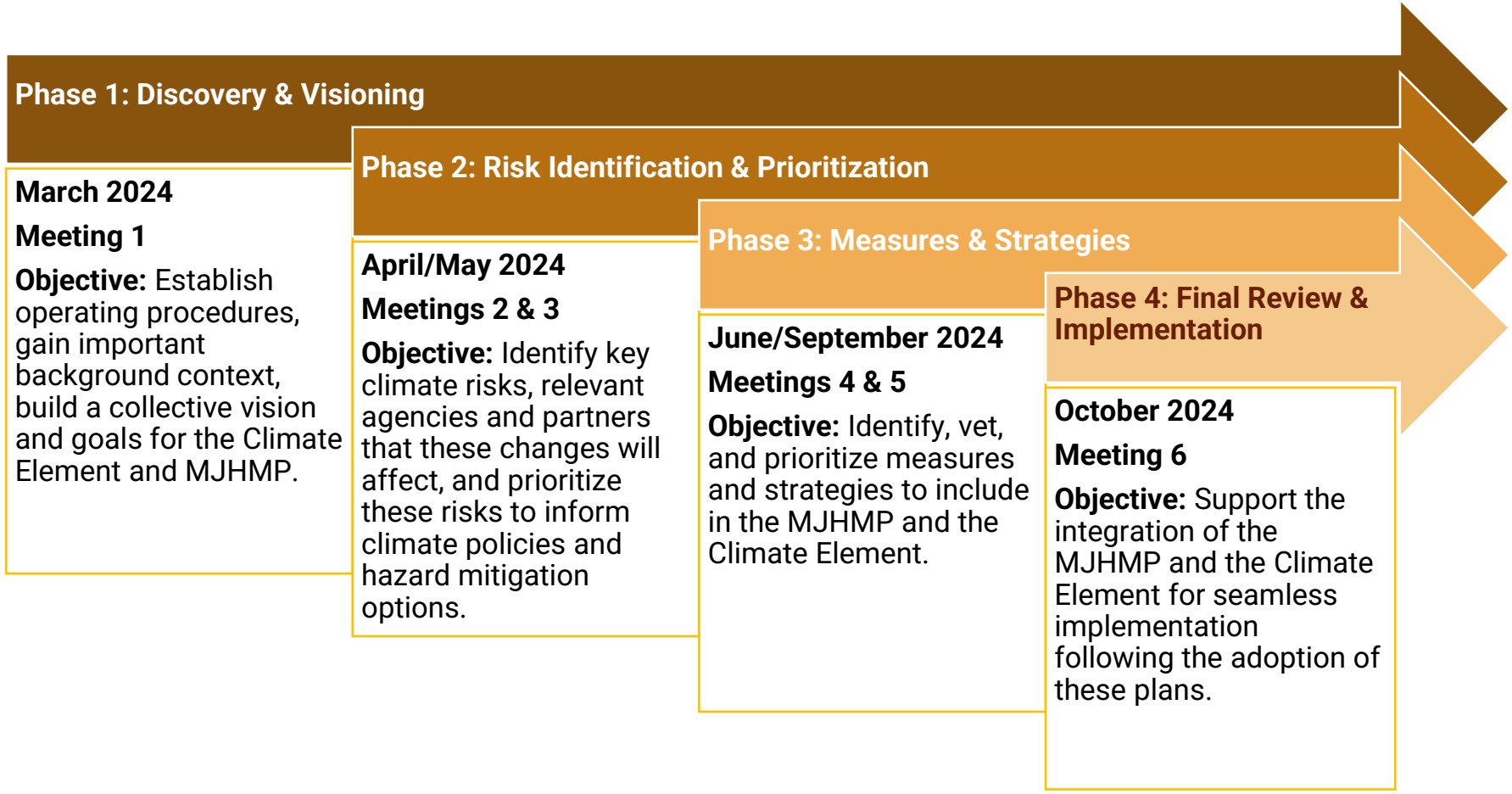
Low:	Medium:	High:
0-12	12.1-42	42.1 and up

Next Steps

Project Next Steps

- Climate Element
  - ✓Policy consolidation
  - ✓Climate vulnerability assessment
- MJHMP
  - ✓Hazard prioritization exercise to Operational Areas meetings and report back to HMCR #3
  - ✓Capabilities Assessment
  - ✓Hazard identification & mapping
  - ✓Hazard mitigation actions
- Both
  - ✓Public Engagement
  - ✓Hazards survey results
  - ✓Climate impacts survey

Next Steps: Committee Timeline



HMCR Next Steps

- Review engagement plan and engagement tracker
- Doodle poll for HMCR #3 (May 28, June 20, or June 26)
  - Doodle Poll

Thank you!

Mentimeter

Instructions

Go to

www.menti.com

Enter the code

4188 5336

Or use QR code

Mentimeter

Icebreaker: What is one thing you are excited about as summer approaches?

Lake time

Long daylight hours

opening the swimming pool

Biking on the discovery trail

Going on vacation

8 billion tourists showing up all at once

Long days!

Beach time in the sun!

23

Mentimeter

Icebreaker: What is one thing you are excited about as summer approaches?

lake days

Warm weather and sunshine

Longer hours of daylight.

Warmer weather and long daylight hours!

road trips

Longer days and vacations

friends and family visits this summer

Paddleboarding

Mentimeter

Icebreaker: What is one thing you are excited about as summer approaches?

Blue Skies

tidepooling

Long days, getting outdoors!

Beach, fishing, and camping

Getting into the great outdoors

Lots of hiking, with an early start in the mountains due to lack of snowpack, yikes!

eating al fresco

End of Grant season - taking a vacation

23

Mentimeter

Icebreaker: What is one thing you are excited about as summer approaches?

I need some help understanding 'people-centered mitigation actions'

Is it appropriate to include "maintain eligibility for FEMA hazard mitigation funding"?

Recommend changing "solutions" in Goal 1 to "mitigation and adaptation." There aren't currently solutions to cliamte change.

23

Mentimeter

Do you have any refinements to these draft goals? Is there anything missing?

Seems like a goal that more specifically includes impacts to people, especially vulnerable people, – heat, drought, wildfire smoke and wildfires, flooding, etc. could be added. Related to goal 5.

What is 'people-centered mitigation actions'?

This may be intended in one of the goals, create a pathway for individual homeowners and businesses to receive assistance for mitigations to their properties.

Would it benefit us to add "language barriers-focused communication" in with "communications"? Spanish speaking populations etc

- **Goal 2**. Emphasize the role of sustainable development and climate adaptation in

If these goals are to be actionable they will need to be fundable

I like the generlized goals. Leave the specificis to the body of the plan.

These goals are broad enough to cover most everything

Goal 2 should include 'ecological systems' as one of the things we are seeking to protects from natural hazards created or aggravated by climate change...

natural hazards.

- **Goal 5**: Champion and prioritize people-centered mitigation actions in addition to property-centered actions.
- **Goal 6**: Enhance public outreach, education, and preparedness for all hazards, including effective strategies for reaching underserved and vulnerable populations. Empower the public to reduce personal vulnerability and enhance preparedness.

2 6

Mentimeter

Do you have any refinements to these draft goals? Is there anything missing?

Those look good

:e the impacts of natural hazards on community lifeline infrastructure
(including transportation routes, communication systems, utilities, and
:rvices) and other critical assets through: resiliency and reliability
: efforts, modernization, and redundancy of critical infrastructure.

- **Goal 2**. Emphasize the role of sustainable development and climate adaptation in hazard mitigation in order to minimize risks and vulnerabilities caused in part by climate change.
- **Goal 3**: Increase community capabilities and leverage interagency and public-private coordination to mitigate losses and prepare, respond, and recover from disasters. Prioritize effective long-term partnerships across all levels of government.
- **Goal 4**: Minimize property damage and reduce repetitive losses to property from natural hazards.
- **Goal 5**: Champion and prioritize people-centered mitigation actions in addition to property-centered actions.
- **Goal 6**: Enhance public outreach, education, and preparedness for all hazards, including effective strategies for reaching underserved and vulnerable populations. Empower the public to reduce personal vulnerability and enhance preparedness.

2 6

Mentimeter

Do you have any refinements to these draft goals? Is there anything missing?

Goal 3: add "other" before "resources.."

Clallam County Climate Action Committee Report.

ers, local governments, and communities
ons to climate change and prepare the community for future impacts.

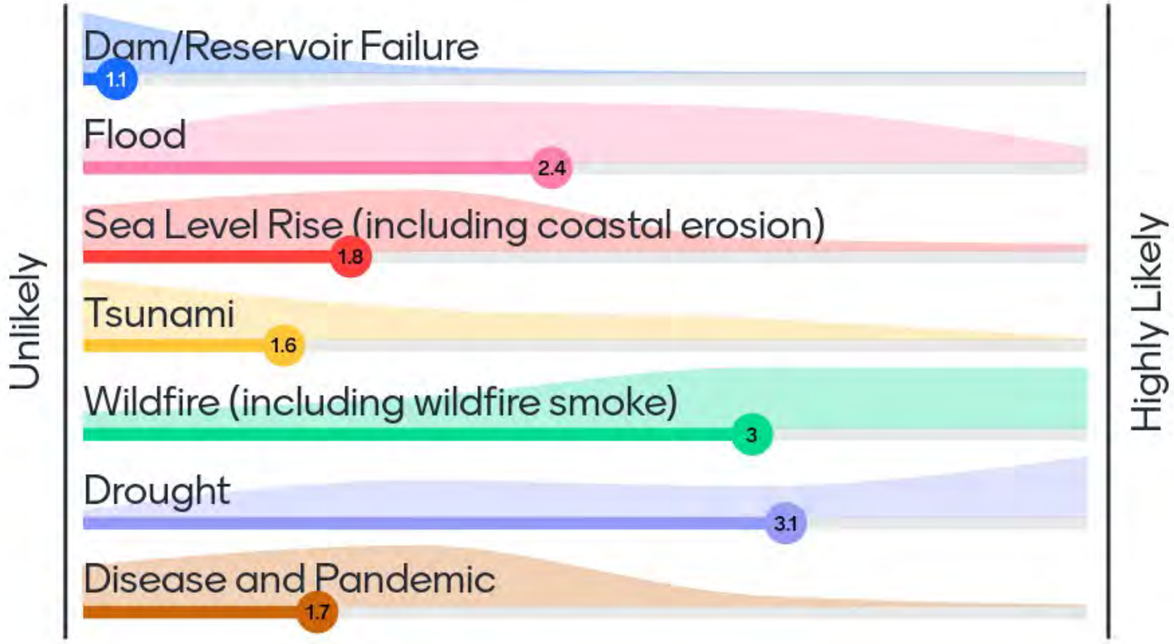
- **Goal 2:** Identify and protect social, economic, and built-environment systems in the County that are vulnerable to natural hazards created or aggravated by climate change, including sea level rise, landslides, flooding, drought, heat, smoke, wildfire, and other hazards.
- **Goal 3:** Rely on the best available science and resources to develop and update goals, policies, and plans that are transparent and actionable to address identified vulnerabilities.
- **Goal 4:** Ensure environmental benefits reach all members of the community and address historical inequalities and environmental injustices.
- **Goal 5:** Emphasize the need for urgent climate action while prioritizing inclusive engagement in sustainability planning through diverse communication channels.

1

Mentimeter

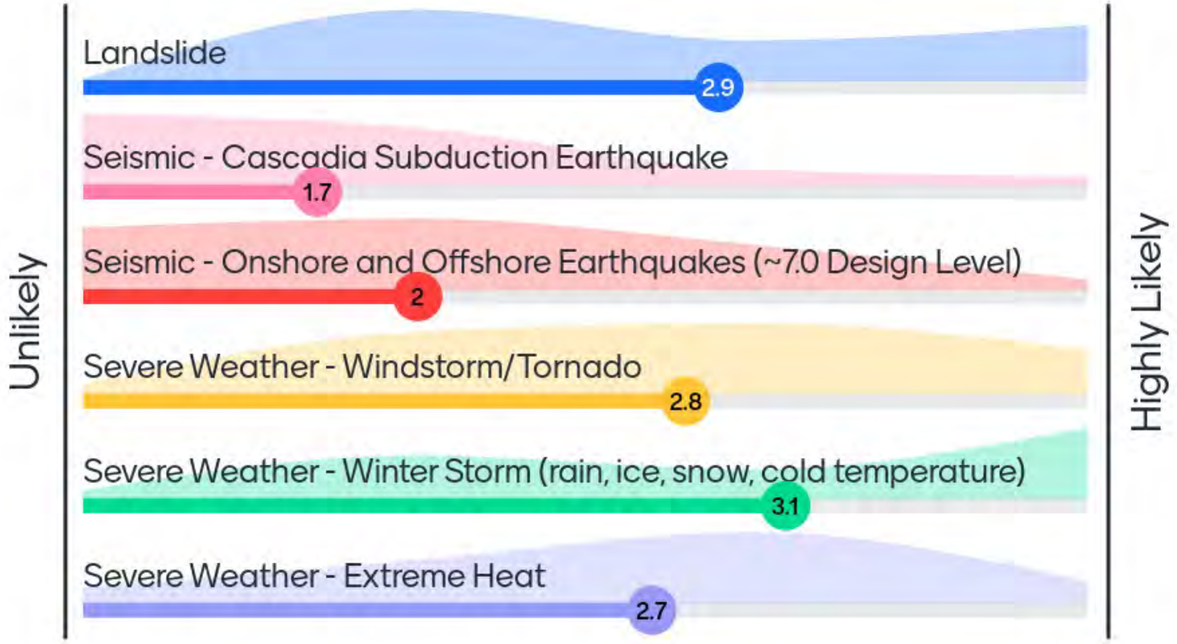
What climate resilience initiatives, goals, plans, or programs are you familiar with that we may have missed?

Probability: Likelihood of Occurrence within the Next Year

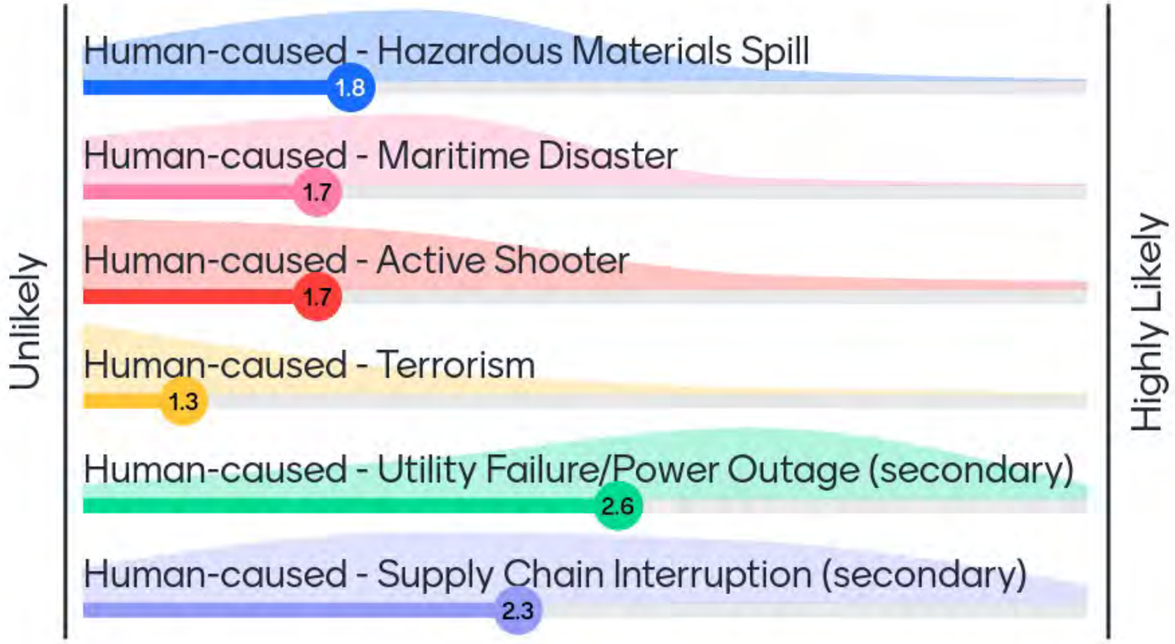


Mentimeter

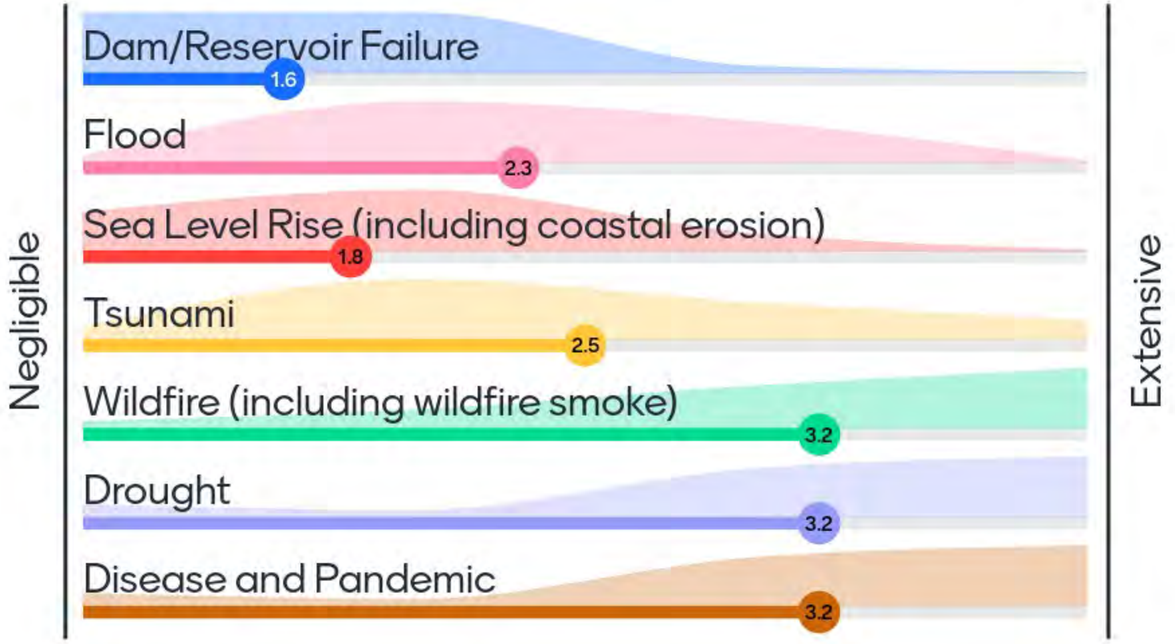
Probability: Likelihood of Occurrence within the Next Year



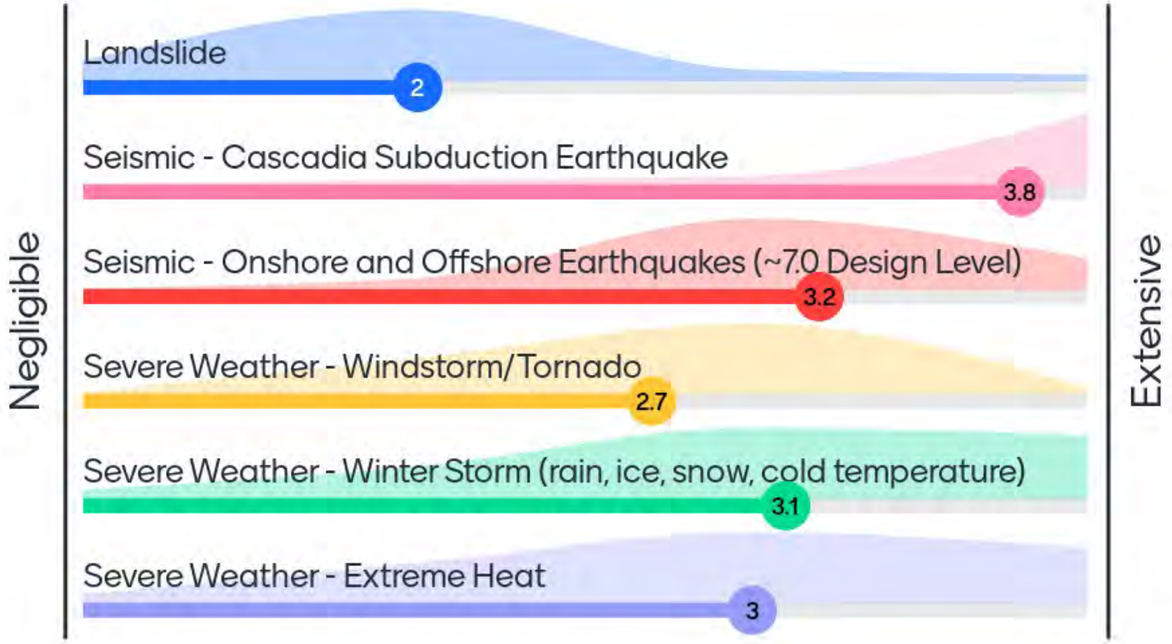
Probability: Likelihood of Occurrence within the Next Year



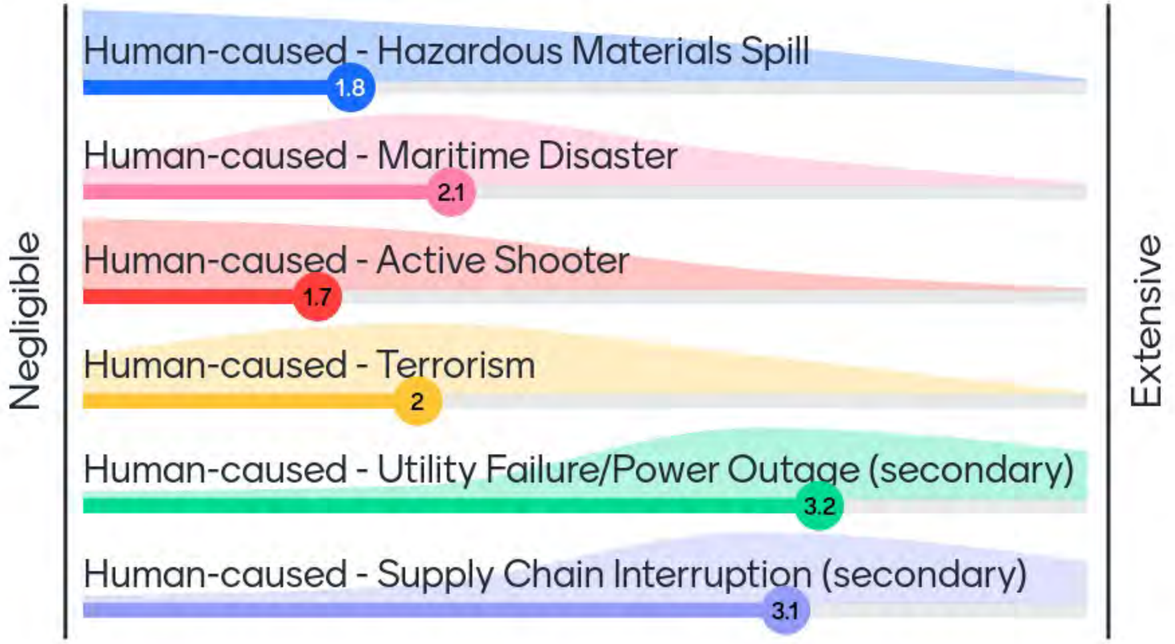
Location: Size of the Geographical Area Affected by Hazard



Location: Size of the Geographical Area Affected by Hazard

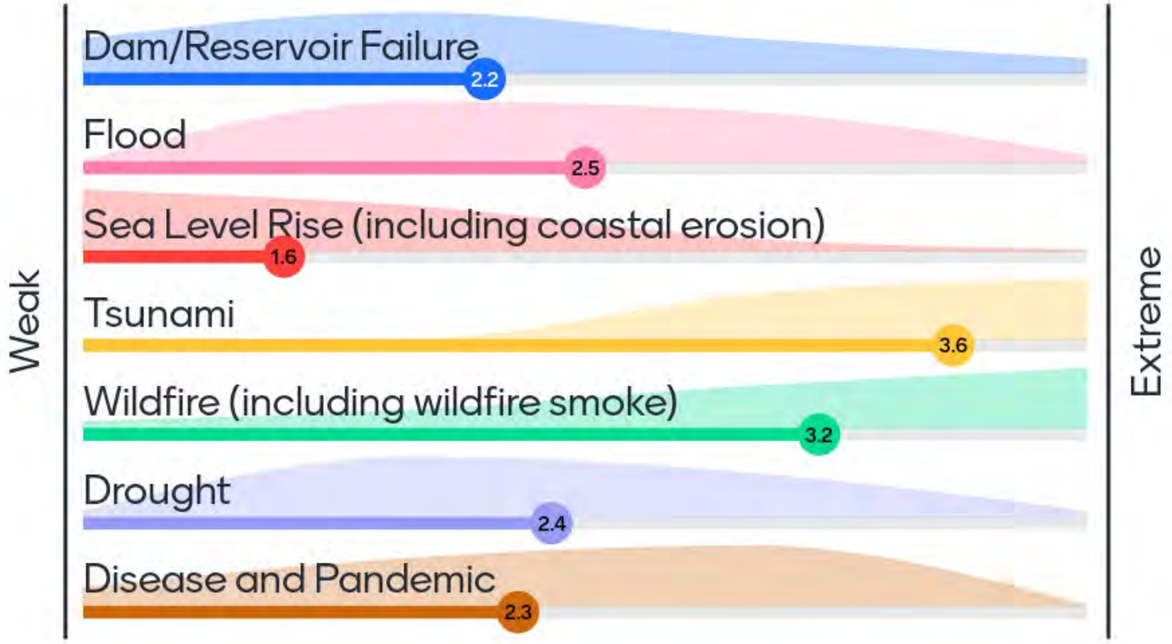


Location: Size of the Geographical Area Affected by Hazard



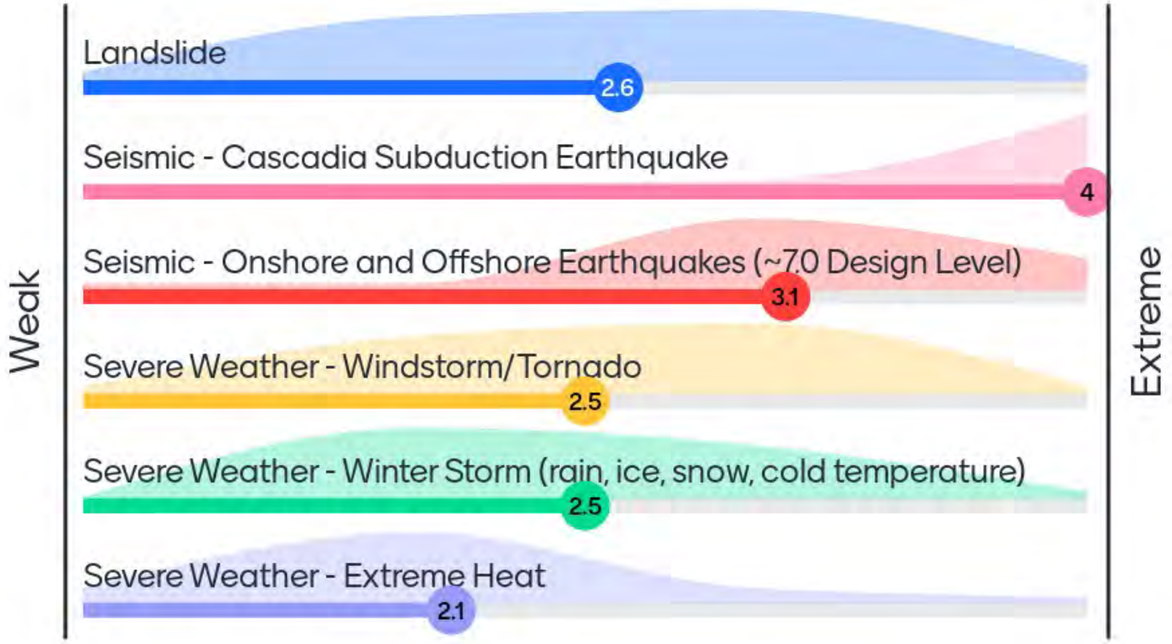
Mentimeter

Primary Impact: Percentage of Damage to Typical Facility in Community



Mentimeter

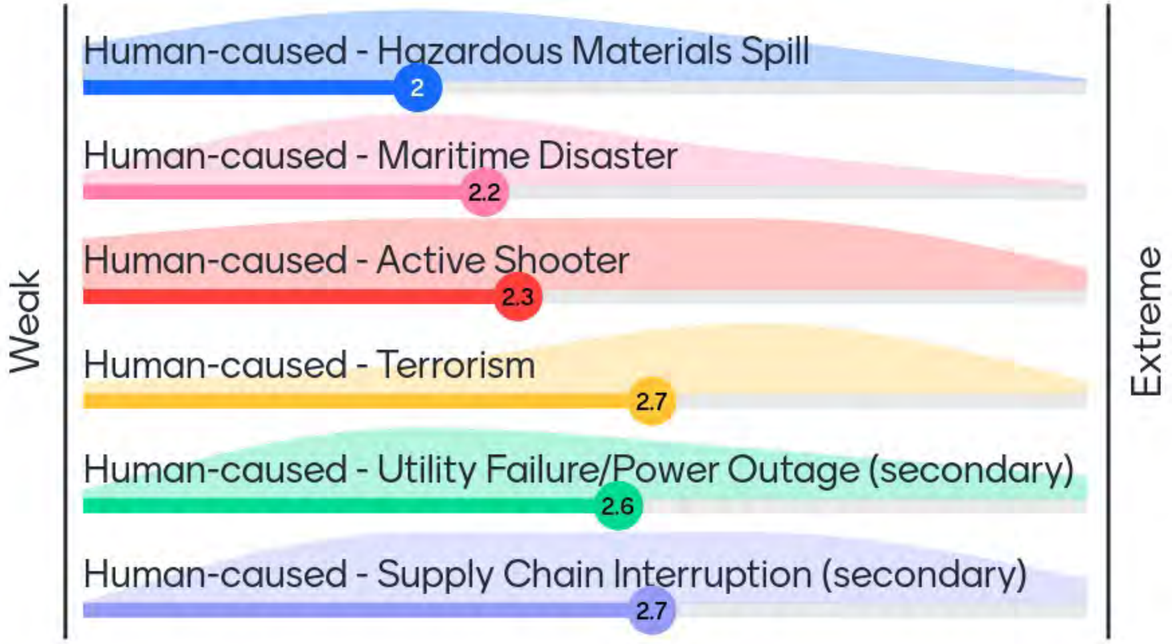
Primary Impact: Percentage of Damage to Typical Facility in Community



22

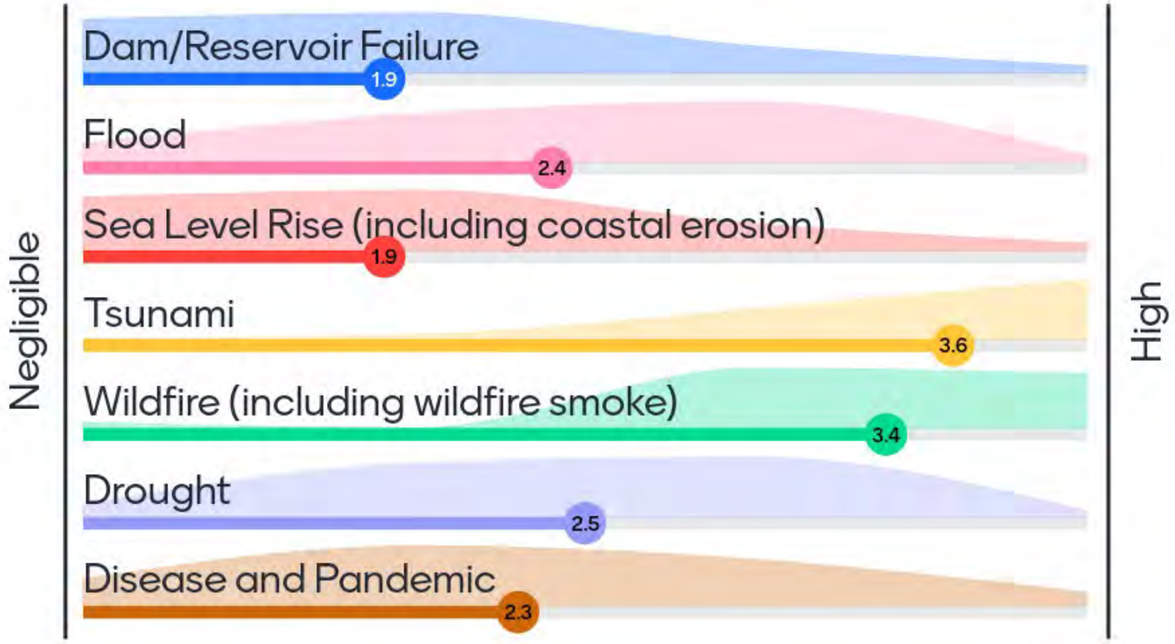
Mentimeter

Primary Impact: Percentage of Damage to Typical Facility in Community

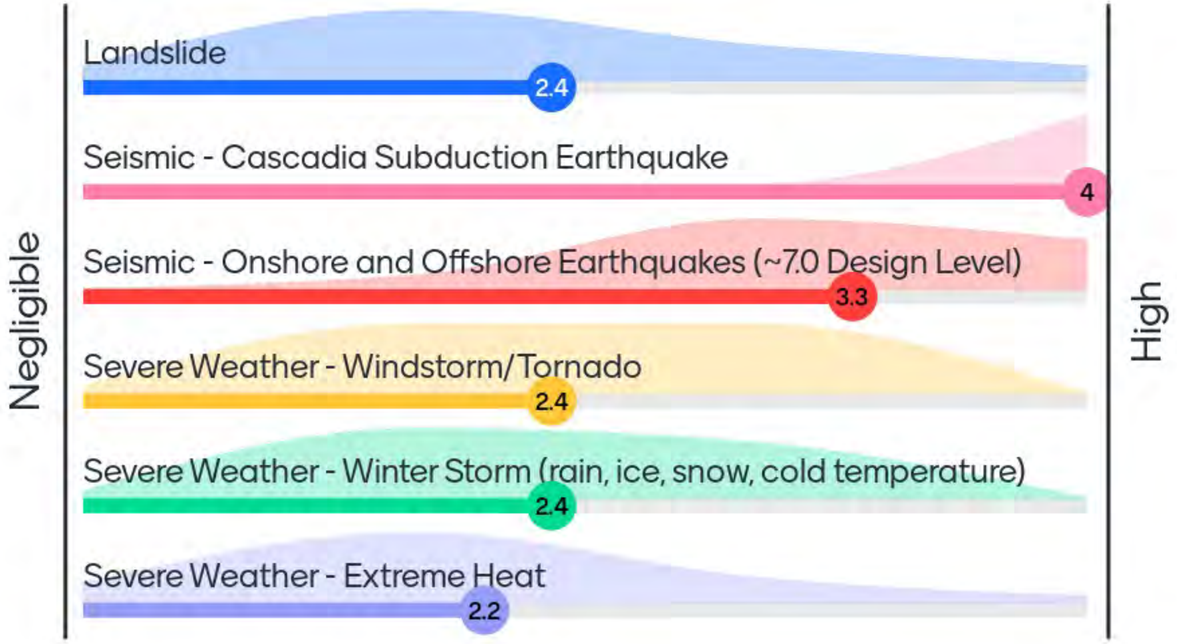


Mentimeter

Secondary Impacts: Estimated to the Community at Large

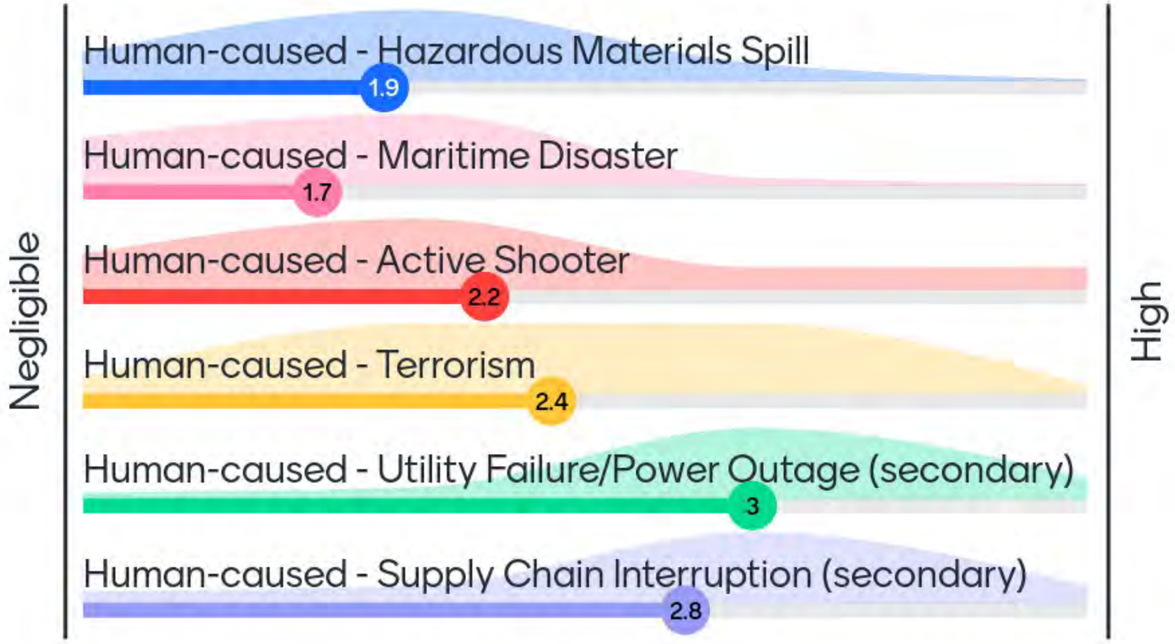


Secondary Impacts: Estimated to the Community at Large



Mentimeter

Secondary Impacts: Estimated to the Community at Large



Mentimeter

HAZARD RANKING WORKSHEET - Clallam County MJHMP					DATE: 5/15/2024	
Hazard Type	**Probability**	**Impact**			**Total Score**	**Hazard Planning Consideration**
		Location	**Primary Impact**	**Secondary Impacts**		
Dam/Reservoir Failure	1.12	1.48	2.16	2.03	8.30	Low
Flood	2.32	2.09	2.38	2.48	21.27	Medium
Sea Level Rise (including coastal erosion)	1.97	1.82	1.56	1.97	13.92	Medium
Tsunami	1.50	2.27	3.38	3.58	17.91	Medium
Wildfire (including wildfire smoke)	2.88	3.03	3.03	3.19	35.41	Medium
Drought	2.91	3.00	2.31	2.39	30.35	Medium
Disease and Pandemic	1.85	2.97	2.25	2.26	18.83	Medium
Landslide	2.67	1.97	2.52	2.43	24.27	Medium
Seismic - Cascadia Subduction Earthquake	1.58	3.47	3.73	3.96	23.22	Medium
Seismic - Onshore and Offshore Earthquakes (~7.0 Design Level)	1.76	2.91	3.09	3.36	21.69	Medium
Severe Weather - Windstorm/Tornado	2.61	2.59	2.48	2.43	26.19	Medium
Severe Weather - Winter Storm (rain, ice, snow, cold temperature)	2.88	3.00	2.39	2.32	30.15	Medium
Severe Weather - Extreme Heat	2.45	2.79	1.97	2.04	22.74	Medium
Human-caused - Hazardous Materials Spill	1.85	1.63	2.00	1.93	13.57	Medium
Human-caused - Maritime Disaster	1.61	1.94	2.16	1.77	12.69	Medium
Human-caused - Active Shooter	1.67	1.63	2.32	2.27	13.54	Medium
Human-caused - Terrorism	1.27	1.80	2.52	2.40	11.20	Low
Human-caused - Utility Failure/Power Outage (secondary)	2.45	2.77	2.39	2.70	25.71	Medium
Human-caused - Supply Chain Interruption (secondary)	2.09	2.66	2.39	2.63	21.38	Medium

Probability

Based on estimated likelihood of occurrence from historical data

Importance
2.0

Probability	Score
Unlikely	1
Occasional	2
Likely	3
Highly Likely	4

Secondary Impacts

Based on estimated secondary impacts to community at large

Importance
0.5

Impact	Score
Negligible - no loss of function, downtime, and/or evacuations	1
Limited - minimal loss of function, downtime, and/or evacuations	2
Moderate - some loss of function, downtime, and/or	3
High - major loss of function, downtime, and/or	4

Location

Based on size of geographical area of community affected by

Importance
0.8

Affected Area	Score
Negligible	1
Limited	2
Significant	3
Extensive	4

Total Score = Probability x Impact, where:

Probability = (Probability Score x Importance)

Impact = (Affected Area + Primary Impact + Secondary Impacts), where:

Affected Area = Affected Area Score x Importance

Primary Impact = Primary Impact Score x Importance

Secondary Impacts = Secondary Impacts Score x Importance

Maximum Probable Extent (Primary Impact)

Based on percentage of damage to typical facility in community

Importance
0.7

Impact	Score
Weak - little to no damage	1
Moderate - some damage, loss of service for days	2
Severe - devastating damage, loss of service for months	3
Extreme- catastrophic damage, uninhabitable conditions	4

Hazard Planning Consideration

Total Score	Range	Distribution	Hazard Level
0.0	12.0	2	Low
12.1	42.0	17	Medium
42.1	64.0	0	High

The probability of each hazard is determined by assigning a level, from unlikely to highly likely, based on the likelihood of occurrence from historical data. The total impact value includes the affected area, primary impact

Name (Original Name)	User Email	Join Time	Leave Time	Duration (Minut	Guest	Recording Disc	In Waiting Roor
Abigail Lambert (she/her)# Cascadia Consulting Group (Zoom Cascadia)	zoom@cascadiaconsulting.co	4/29/2024 12:46	4/29/2024 15:10	145	No	OK	No
Noelle.Anderson		4/29/2024 12:46	4/29/2024 12:47	1	Yes	No Response	Yes
Mary Ann Rozance		4/29/2024 12:47	4/29/2024 12:47	1	Yes	No Response	Yes
Noelle Anderson (Michael Baker Intl) (Noelle.Anderson)		4/29/2024 12:47	4/29/2024 15:10	144	Yes	OK	No
Mary Ann Rozance (she/her)# Cascadia Consulting Group (Mary Ann Rozance)		4/29/2024 12:47	4/29/2024 15:10	144	Yes	OK	No
Casey.Marchese		4/29/2024 12:47	4/29/2024 12:47	1	Yes	No Response	Yes
Casey.Marchese		4/29/2024 12:47	4/29/2024 15:10	143	Yes	OK	No
Diane Harvey, Clallam County		4/29/2024 12:52	4/29/2024 12:52	1	Yes	No Response	Yes
Diane Harvey, Clallam County		4/29/2024 12:52	4/29/2024 14:56	124	Yes	OK	No
Alyssa Rodriguez (she/her) Cascadia		4/29/2024 12:53	4/29/2024 12:53	1	Yes	No Response	Yes
Alyssa Rodriguez (she/her) Cascadia		4/29/2024 12:53	4/29/2024 14:32	100	Yes	OK	No
dburnett		4/29/2024 12:55	4/29/2024 12:58	3	Yes	No Response	Yes
Keith Koehler		4/29/2024 12:55	4/29/2024 12:58	3	Yes	No Response	Yes
Ron Garcelon		4/29/2024 12:56	4/29/2024 12:57	2	Yes	No Response	Yes
Derrell Sharp Port Angeles Fire		4/29/2024 12:56	4/29/2024 12:58	2	Yes	No Response	Yes
Jake Patterson		4/29/2024 12:57	4/29/2024 12:58	2	Yes	No Response	Yes
Chip Keen		4/29/2024 12:57	4/29/2024 12:58	2	Yes	No Response	Yes
Derrell Sharp Port Angeles Fire		4/29/2024 12:58	4/29/2024 14:56	118	Yes	OK	No
dburnett		4/29/2024 12:58	4/29/2024 14:56	118	Yes	No Response	No
Jake Patterson (Clallam 2 Fire-Rescue) (Jake Patterson)		4/29/2024 12:58	4/29/2024 14:56	118	Yes	OK	No
Keith Koehler & Blaine Zechenelly (CCFD#3) (Keith Koehler)		4/29/2024 12:58	4/29/2024 14:47	109	Yes	OK	No
Chip Keen CCFPD#6 (Chip Keen)		4/29/2024 12:58	4/29/2024 14:56	118	Yes	OK	No
Ron Garcelon		4/29/2024 12:58	4/29/2024 12:58	1	Yes	No Response	Yes
Cindy Jayne		4/29/2024 12:58	4/29/2024 12:58	1	Yes	No Response	Yes
Ron Garcelon Clallam County Utilities Manager (Ron Garcelon)		4/29/2024 12:58	4/29/2024 14:48	110	Yes	OK	No
Robert Knapp		4/29/2024 12:58	4/29/2024 12:58	1	Yes	No Response	Yes
Cindy Jayne (Local 20/20) (Cindy Jayne)		4/29/2024 12:58	4/29/2024 13:27	30	Yes	OK	No
Shailesh Shere		4/29/2024 12:58	4/29/2024 12:58	1	Yes	No Response	Yes
Meggan Uecker		4/29/2024 12:58	4/29/2024 12:58	1	Yes	No Response	Yes
Robert Knapp-Jamestown S'Klallam Tribe (Robert Knapp)		4/29/2024 12:58	4/29/2024 13:29	31	Yes	OK	No
Tom Sanford		4/29/2024 12:58	4/29/2024 12:58	1	Yes	No Response	Yes
Sarah T. Martinez		4/29/2024 12:58	4/29/2024 12:58	1	Yes	No Response	Yes
Shailesh Shere# Clallam County PUD (Shailesh Shere)		4/29/2024 12:58	4/29/2024 14:17	79	Yes	OK	No
Meggan Uecker# City of Sequim (Meggan Uecker)		4/29/2024 12:58	4/29/2024 14:56	118	Yes	OK	No
Sarah T. Martinez - Peninsula Housing Authority (Sarah T. Martinez)		4/29/2024 12:58	4/29/2024 14:47	109	Yes	OK	No
Tom Sanford# North Olympic Land Trust (Tom Sanford)		4/29/2024 12:58	4/29/2024 14:56	118	Yes	OK	No
Justine Chorley Clallam County Emergency Management		4/29/2024 12:59	4/29/2024 12:59	1	Yes	No Response	Yes

Justine Chorley Clallam County Emergency Management	4/29/2024 12:59	4/29/2024 14:47	109	Yes	No Response	No
read.ai meeting notes	4/29/2024 12:59	4/29/2024 12:59	1	Yes	No Response	Yes
rhiana.barkie	4/29/2024 12:59	4/29/2024 12:59	1	Yes	No Response	Yes
read.ai meeting notes	4/29/2024 12:59	4/29/2024 14:04	65	Yes	OK	No
Ellen Chappelka (EMD)	4/29/2024 12:59	4/29/2024 12:59	1	Yes	No Response	Yes
Rhiana Barkie (Clallam County Project Coordinator)(she/her) (rhiana.barkie)	4/29/2024 12:59	4/29/2024 14:56	117	Yes	OK	No
Michael Hill	4/29/2024 12:59	4/29/2024 13:00	1	Yes	No Response	Yes
William Habel	4/29/2024 12:59	4/29/2024 12:59	1	Yes	No Response	Yes
Marty Martinez	4/29/2024 12:59	4/29/2024 12:59	1	Yes	No Response	Yes
Ellen Chappelka# (she/her)# WA EMD (Ellen Chappelka (EMD))	4/29/2024 12:59	4/29/2024 14:56	117	Yes	OK	No
Marty Martinez (Peninsula College) (Marty Martinez)	4/29/2024 12:59	4/29/2024 14:56	117	Yes	OK	No
William Habel# City of Port Angeles (William Habel)	4/29/2024 12:59	4/29/2024 14:46	107	Yes	OK	No
Jim Fetzer	4/29/2024 13:00	4/29/2024 13:00	1	Yes	No Response	Yes
Michael Hill	4/29/2024 13:00	4/29/2024 14:56	116	Yes	OK	No
Jim Fetzer	4/29/2024 13:00	4/29/2024 13:28	29	Yes	OK	No
Jesse Waknitz - Port of Port Angeles	4/29/2024 13:00	4/29/2024 13:00	1	Yes	No Response	Yes
Jesse Waknitz - Port of Port Angeles	4/29/2024 13:00	4/29/2024 14:47	108	Yes	OK	No
Jim Buck	4/29/2024 13:00	4/29/2024 13:00	1	Yes	No Response	Yes
Amy Lehman (Cascadia Water)	4/29/2024 13:00	4/29/2024 13:00	1	Yes	No Response	Yes
Amy Lehman (Cascadia Water)	4/29/2024 13:00	4/29/2024 13:28	28	Yes	OK	No
Jim Buck	4/29/2024 13:00	4/29/2024 14:56	116	Yes	OK	No
Julie Ann Koehlinger	4/29/2024 13:01	4/29/2024 13:01	1	Yes	No Response	Yes
Julie Ann Koehlinger	4/29/2024 13:01	4/29/2024 14:56	115	Yes	OK	No
Karen Affeld - North Olympic Development Council	4/29/2024 13:02	4/29/2024 13:02	1	Yes	No Response	Yes
Karen Affeld - North Olympic Development Council	4/29/2024 13:02	4/29/2024 14:56	114	Yes	OK	No
Bruce Emery, Clallam County DCD	4/29/2024 13:02	4/29/2024 13:02	1	Yes	No Response	Yes
Bruce Emery, Clallam County DCD	4/29/2024 13:03	4/29/2024 14:56	114	Yes	OK	No
Luke Strong-Cvetich	4/29/2024 13:03	4/29/2024 13:03	1	Yes	No Response	Yes
Luke Strong-Cvetich	4/29/2024 13:03	4/29/2024 14:56	113	Yes	OK	No
Noah Glaude, NOLS	4/29/2024 13:04	4/29/2024 13:04	1	Yes	No Response	Yes
Noah Glaude, NOLS	4/29/2024 13:04	4/29/2024 14:56	112	Yes	OK	No
Tinker Lucas - Makah Tribe EM	4/29/2024 13:06	4/29/2024 13:06	1	Yes	No Response	Yes
Tinker Lucas - Makah Tribe EM	4/29/2024 13:06	4/29/2024 14:56	110	Yes	OK	No
Holden A. Fleming, AICP	4/29/2024 13:08	4/29/2024 13:08	1	Yes	No Response	Yes
Holden A. Fleming, AICP	4/29/2024 13:08	4/29/2024 14:57	109	Yes	OK	No
Jesse Goodman	4/29/2024 13:08	4/29/2024 13:08	1	Yes	No Response	Yes
Jesse Goodman	4/29/2024 13:08	4/29/2024 14:40	93	Yes	OK	No
Crystie’s iPhone	4/29/2024 13:14	4/29/2024 13:14	1	Yes	No Response	Yes

Crystie’s iPhone	4/29/2024 13:14	4/29/2024 13:15	1	Yes	Leave Meeting	No
Colin Young	4/29/2024 13:28	4/29/2024 13:28	1	Yes	No Response	Yes
iPhone	4/29/2024 13:28	4/29/2024 13:28	1	Yes	No Response	Yes
iPhone	4/29/2024 13:28	4/29/2024 13:50	23	Yes	OK	No
Colin Young	4/29/2024 13:28	4/29/2024 14:57	89	Yes	OK	No
Tony Hudson	4/29/2024 13:31	4/29/2024 13:31	1	Yes	No Response	Yes
Tony Hudson	4/29/2024 13:31	4/29/2024 14:03	32	Yes	OK	No
Tony Hudson	4/29/2024 14:03	4/29/2024 14:57	55	Yes	No Response	No
Ian Miller	4/29/2024 14:31	4/29/2024 14:32	1	Yes	No Response	Yes
Ian Miller	4/29/2024 14:32	4/29/2024 14:56	25	Yes	OK	No

Zoom Meeting

You are viewing Noelle Anderson (Michael Baker...'s screen | View Options

This meeting is being recorded. | OK | Leave meeting | Sign in | View

Hazard Mitigation and Climate Resilience (HMCR) Steering Committee

Meeting #2

April 29, 2024 | 1:00-3:00 PM | Zoom link

WH **From William Habel, City of Port Angeles to Everyone**

Its lovely outside

Derrell Sharp P...	Jake Patterson
Derrell Sharp Port Ang...	Jake Patterson
Robert Knapp-J...	Shailesh Shere,...
Robert Knapp-Jamesto...	Shailesh Shere, Clalla...
Sarah T. Martin...	Justine Chorley...
Sarah T. Martinez - Pen...	Justine Chorley Clalla...
read.ai meeting...	Ellen Chappelka...
read.ai meeting notes	Ellen Chappelka (EMD)
Marty Martinez	William Habel,...
Marty Martinez	William Habel, City of ...
Michael Hill	Amy Lehman (C...
Michael Hill	Amy Lehman (Cascadi...

Unmute | Stop Video | Security | Participants 29 | Q&A | Chat 2 | Share Screen | Summary | AI Companion | Record | Reactions | Apps | Whiteboards | Notes | More | Leave

1:00 PM
4/29/2024

Zoom Meeting

Recording...

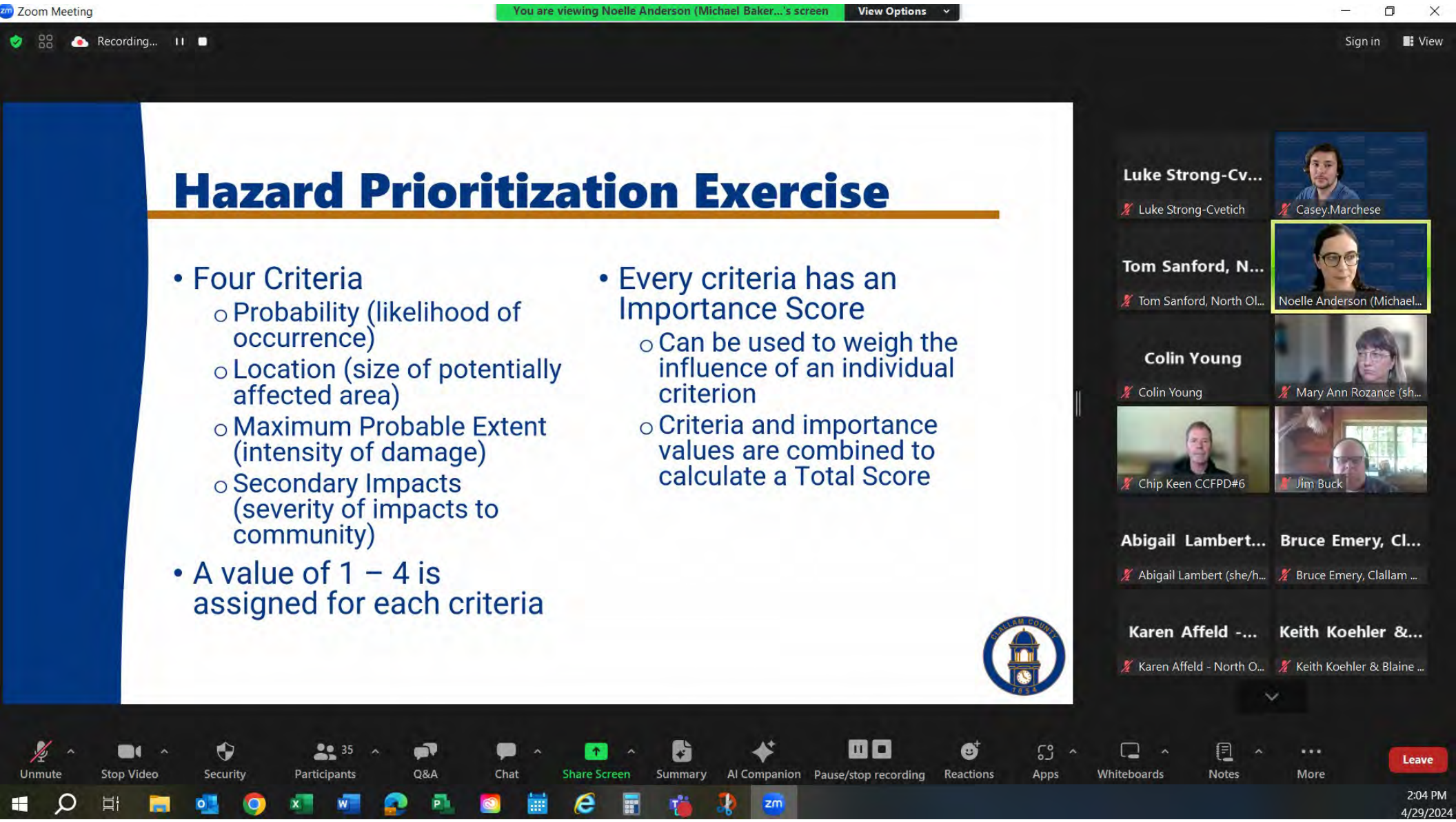
Sign in

Draft Goals: MJHMP Update

- **Goal 1**: Reduce the impacts of natural hazards on community lifeline infrastructure and services (including transportation routes, communication systems, utilities, and emergency services) and other critical assets through: resiliency and reliability enhancement efforts, modernization, and redundancy of critical infrastructure.
- **Goal 2**. Emphasize the role of sustainable development and climate adaptation in hazard mitigation in order to minimize risks and vulnerabilities caused in part by climate change.
- **Goal 3**: Increase community capabilities and leverage interagency and public-private coordination to mitigate losses and prepare, respond, and recover from disasters. Prioritize effective long-term partnerships across all levels of government.
- **Goal 4**: Minimize property damage and reduce repetitive losses to property from natural hazards.
- **Goal 5**: Champion and prioritize people-centered mitigation actions in addition to property-centered actions.
- **Goal 6**: Enhance public outreach, education, and preparedness for all hazards, including effective strategies for reaching underserved and vulnerable populations. Empower the public to reduce personal vulnerability and enhance preparedness.

Tom Sanford, N...
Tom Sanford, North Ol...
Casey.Marchese
Noelle Anderson (Mich...
Diane Harvey, C...
Diane Harvey, Clallam ...
Mary Ann Rozance (she/h...
Alyssa Rodrigue...
Alyssa Rodriguez (she/...
Keith Koehler & Blaine ...
Chip Keen CCFPD#6
Jim Fetzer
Jim Buck
Abigail Lambert (she/h...
Bruce Emery, Cl...
Bruce Emery, Clallam ...

1:23 PM
4/29/2024


Zoom Meeting
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Hazard Prioritization Exercise
• Four Criteria
○ Probability (likelihood of occurrence)
○ Location (size of potentially affected area)
○ Maximum Probable Extent (intensity of damage)
○ Secondary Impacts (severity of impacts to community)
• A value of 1 – 4 is assigned for each criteria
• Every criteria has an Importance Score
○ Can be used to weigh the influence of an individual criterion
○ Criteria and importance values are combined to calculate a Total Score
Luke Strong-Cv...
Luke Strong-Cvetich
Casey.Marchese
Tom Sanford, N...
Tom Sanford, North Ol...
Noelle Anderson (Michael...
Colin Young
Colin Young
Mary Ann Rozance (sh...
Chip Keen CCFPD#6
Jim Buck
Abigail Lambert...
Abigail Lambert (she/h...
Bruce Emery, Cl...
Bruce Emery, Clallam ...
Karen Affeld -...
Karen Affeld - North O...
Keith Koehler &...
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Q&A
Chat
Share Screen
Summary
AI Companion
Pause/stop recording
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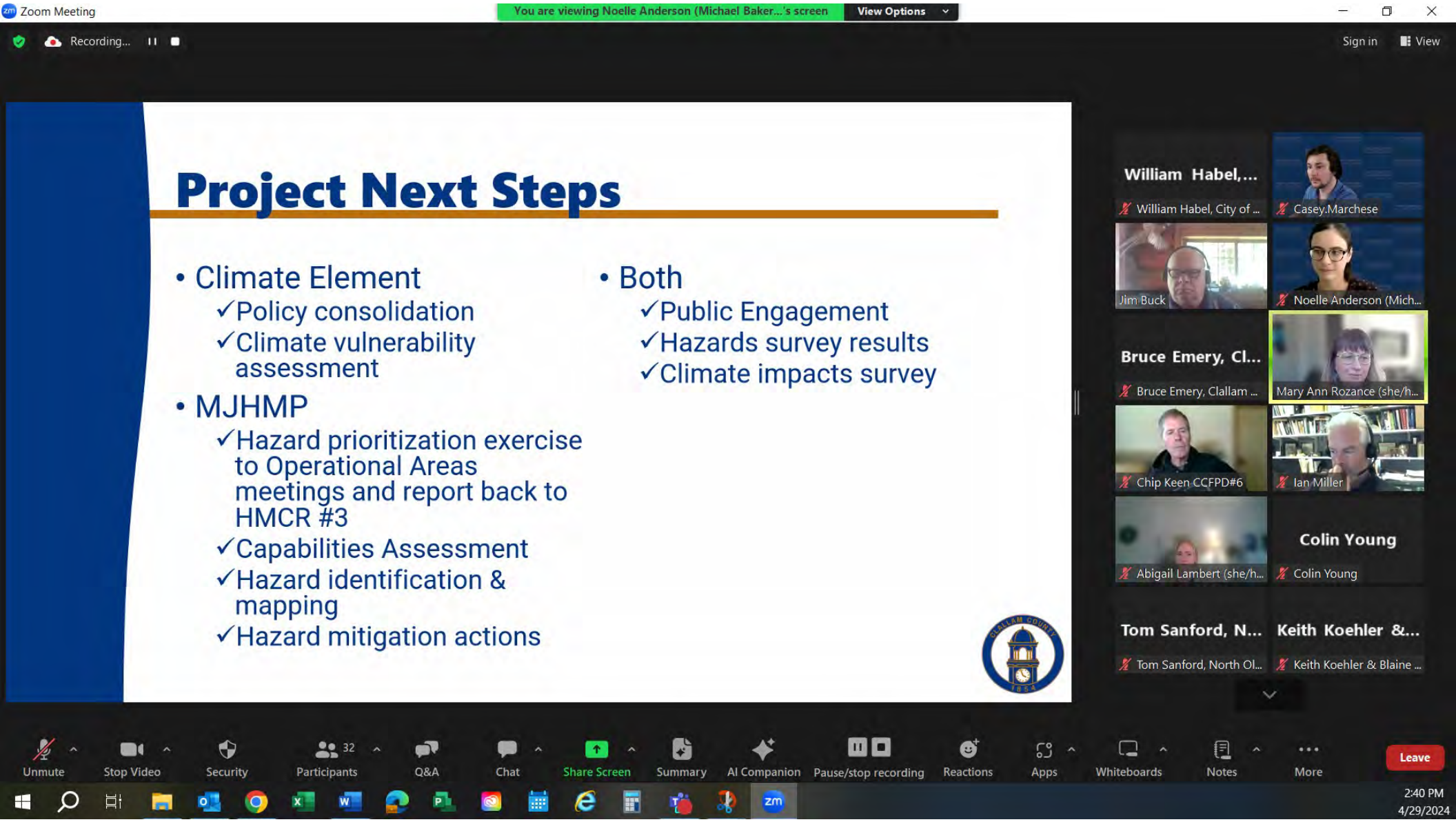
4/29/2024


Zoom Meeting
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Sign in
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Project Next Steps
• Climate Element
✓Policy consolidation
✓Climate vulnerability assessment
• MJHMP
✓Hazard prioritization exercise to Operational Areas meetings and report back to HMCR #3
✓Capabilities Assessment
✓Hazard identification & mapping
✓Hazard mitigation actions
• Both
✓Public Engagement
✓Hazards survey results
✓Climate impacts survey
William Habel,...
William Habel, City of ...
Casey.Marchese
Jim Buck
Noelle Anderson (Mich...
Bruce Emery, Cl...
Bruce Emery, Clallam ...
Mary Ann Rozance (she/h...
Chip Keen CCFPD#6
Ian Miller
Abigail Lambert (she/h...
Colin Young
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Tom Sanford, N...
Tom Sanford, North Ol...
Keith Koehler &...
Keith Koehler & Blaine ...
Unmute
Stop Video
Security
Participants
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Q&A
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Share Screen
Summary
AI Companion
Pause/stop recording
Reactions
Apps
Whiteboards
Notes
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Leave
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4/29/2024

APPENDIX B.4

HMCR Steering Committee Meeting #3

Hazard Mitigation and Climate Resilience Steering Committee

Steering Committee Meeting #3 Agenda | May 28th, 2024 | 1:00-2:00 PM | Zoom link: https://us02web.zoom.us/j/81833498220

Agenda

Time	Agenda Item
1:00-1:10 PM	Introduction and Updates
1:10-1:30 PM	Hazard Survey Results
1:30-1:40 PM	Climate Survey Next Steps
1:40-1:55 PM	Vulnerability Assessment Overview
1:55-2:00 PM	Questions and Next Steps

Meeting #3 Objectives

- Provide update on work to date
- Review and discuss hazard survey results and next steps for climate survey
- Review and discuss vulnerability assessment approach
- Summarize next steps

Project Team

Clallam County	Role on Project
Diane Harvey, Sheriff's Office	Project Lead
Holden Fleming, Deputy Director, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Director, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
Mary Ann Rozance, Cascadia Consulting Group	Project Manager and Climate Resilience Lead
Alyssa Rodriguez, Cascadia Consulting Group	Engagement Lead
Mike Chang, Cascadia Consulting Group	Principal in Charge
Abigail Lambert, Cascadia Consulting Group	Climate and Policy Analyst
Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead
Casey Marchese, Michael Baker International	Hazard Mitigation Analyst

Jim Buck	Strategic Advisor

Detailed Agenda

Time	Topic	Lead	Notes
1:00-1:10 PM	Introduction and Updates	Cascadia / Mary Ann	**Introduction** ✓ Ice breaker and introductions ✓ Share meeting objectives ✓ Work-to-date Name, organization, Icebreaker in chat: What is something about your community that you think we should know about as we approach summer engagement for this project? **Updates** ✓ Provide project updates and work to date. ✓ Answer questions about process and/or work to date
1:10-1:30 PM	Hazard Survey Results	Cascadia / Alyssa	**Hazard Survey Results Discussion** ✓ Present Hazard Survey Results *Discussion question: Do you have any questions about these results? Is there anything surprising about these findings?*
1:30-1:40 PM	Climate Survey Next Steps	Cascadia / Alyssa	**Climate Survey Next Steps** ✓ Introduce climate survey goals and objectives. ✓ Share how climate survey will be distributed across county. *Discussion Question: Do you have any questions about this approach? Do you have suggestions or revisions to the content or approach?*
1:40-1:55 PM	Vulnerability Assessment	MB & Cascadia	**Vulnerability Assessment** ✓ Update on hazard and climate vulnerability assessment process and focus areas.

			Discussion Question: Do you have any questions about this approach? Do you have suggestions or revisions to the focus areas or approach?
1:55-2:00 PM	Questions and Next Steps	Cascadia / Mary Ann	**Summarize next steps** ✓ Discuss data needs and questions ✓ Review timeline and workplan **Questions and Discussion** ✓ *Answer any final questions*

Tamayo, Audrey

Subject: EXTERNAL: Clallam County Hazard Mitigation and Climate Resilience Steering Committee Meeting
Location: https://us02web.zoom.us/j/81833498220

Start: Tue 5/28/2024 1:00 PM
End: Tue 5/28/2024 2:00 PM
Show Time As: Tentative

Recurrence: (none)

Meeting Status: Not yet responded

Organizer: Mary Ann Rozance

-----Original Appointment-----
From: Mary Ann Rozance <maryann@cascadiaconsulting.com>
Sent: Friday, May 10, 2024 7:07 AM
To: Mary Ann Rozance; Rod Fleck; Will Habel; rknapp; Luke Strong-Cvetich; glen.roggenbuck; Jesse Waknitz; Shailesh Shere x241; Marty Martinez; lauren@noprcd.org; Karen Affeld; cindyjaynept@gmail.com; crystie@finnriver.com; smartinez@peninsulapha.org; sharon.maggard@serenityhouseclallam.org; tinker.lucas2@makah.com; qnr.planner@quileutetribe.com; dsharp@cityofpa.us; jpatterson@clallamfire2.org; thudson@ccfd3.org; cclallam@centurytel.net; ckeen@3riversfire.org; Elizabeth.C.Miller@uscg.mil; jablack@olympicmedical.org; adriaw@forkshospital.org; immiller@uw.edu; NGlaude@nols.org; julie.koehlinger@hohtribe-nsn.org; bzechenelly@ccfd3.org; rkeithkoehler@outlook.com; steve.gray; joe.donisi; Emery, Bruce; jennifer.garcelon@clallamcountywa.gov; holden.fleming; lorraine.shore@clallamcountywa.gov; Harvey, Diane; anne.chastain@clallamcountywa.gov; justine.chorley@clallamcountywa.gov; mark.doten@clallamcountywa.gov; Meggan Uecker; ellen.chappelka@mil.wa.gov; Tom@northolympiclandtrust.org; dburnett@sequimwa.gov; Rhiana.Barkie@clallamcountywa.gov; Ron.Garcelon@clallamcountywa.gov; Tim.Havel@clallamcountywa.gov; Abigail Lambert; Alyssa Rodriguez; Anderson, Noelle; Marchese, Casey
Cc: Alicia Fennell; Victoria Alvarez-Conn; Jay Carhart; chip@qriverresort.com; nt1\sshere@clallampud.net
Subject: EXTERNAL: Clallam County Hazard Mitigation and Climate Resilience Steering Committee Meeting
When: Tuesday, May 28, 2024 1:00 PM-2:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: https://us02web.zoom.us/j/81833498220

EXTERNAL EMAIL

Meeting #3 of the Clallam County Hazard Mitigation and Climate Resilience (HMCR) Steering Committee This will be a shorter meeting focused discussion on early engagement results and project next steps. Meeting materials will be provided in advance of this meeting.

Zoom Cascadia is inviting you to a scheduled Zoom meeting.

Topic: Clallam County Hazard Mitigation and Climate Resilience Steering Committee Meeting

Time: May 28, 2024 01:00 PM Pacific Time (US and Canada)

Join Zoom Meeting

https://us02web.zoom.us/j/81833498220

Meeting ID: 818 3349 8220

One tap mobile

+12532050468,,81833498220# US

+12532158782,,81833498220# US (Tacoma)

Dial by your location

- +1 253 205 0468 US
- +1 253 215 8782 US (Tacoma)
- +1 346 248 7799 US (Houston)
- +1 669 444 9171 US
- +1 669 900 6833 US (San Jose)
- +1 719 359 4580 US
- +1 929 205 6099 US (New York)
- +1 301 715 8592 US (Washington DC)
- +1 305 224 1968 US
- +1 309 205 3325 US
- +1 312 626 6799 US (Chicago)
- +1 360 209 5623 US
- +1 386 347 5053 US

- +1 507 473 4847 US
- +1 564 217 2000 US
- +1 646 931 3860 US
- +1 689 278 1000 US

Meeting ID: 818 3349 8220

Find your local number: https://us02web.zoom.us/u/kdp03dm4Zp

Hazard Mitigation and Climate Resilience Steering Committee

Steering Committee Meeting #3 Agenda | May 28th, 2024 | 1:00-2:00 PM | Zoom link: https://us02web.zoom.us/j/81833498220

Agenda

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1:10-1:30 PM	Hazard Survey Results
1:30-1:40 PM	Climate Survey Next Steps
1:40-1:55 PM	Vulnerability Assessment Overview
1:55-2:00 PM	Questions and Next Steps

Meeting #3 Objectives

- Provide update on work to date
- Review and discuss hazard survey results and next steps for climate survey
- Review and discuss vulnerability assessment approach
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Holden Fleming, Deputy Director, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Director, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
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Alyssa Rodriguez, Cascadia Consulting Group	Engagement Lead
Mike Chang, Cascadia Consulting Group	Principal in Charge
Abigail Lambert, Cascadia Consulting Group	Climate and Policy Analyst
Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead
Casey Marchese, Michael Baker International	Hazard Mitigation Analyst

Jim Buck	Strategic Advisor

Detailed Agenda

Time	Topic	Lead	Notes
1:00-1:10 PM	Introduction and Updates	Cascadia / Mary Ann	**Introduction** ✓ Ice breaker and introductions ✓ Share meeting objectives ✓ Work-to-date Name, organization, Icebreaker in chat: What is something about your community that you think we should know about as we approach summer engagement for this project? **Updates** ✓ Provide project updates and work to date. ✓ Answer questions about process and/or work to date
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1:30-1:40 PM	Climate Survey Next Steps	Cascadia / Alyssa	**Climate Survey Next Steps** ✓ Introduce climate survey goals and objectives. ✓ Share how climate survey will be distributed across county. *Discussion Question: Do you have any questions about this approach? Do you have suggestions or revisions to the content or approach?*
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			Discussion Question: Do you have any questions about this approach? Do you have suggestions or revisions to the focus areas or approach?
1:55-2:00 PM	Questions and Next Steps	Cascadia / Mary Ann	**Summarize next steps** ✓ Discuss data needs and questions ✓ Review timeline and workplan **Questions and Discussion** ✓ *Answer any final questions*

Meeting Discussion Summary

Meeting discussion included a recap and update on the work to date for both the Climate Element and MJHMP. The results of the hazard survey were presented and discussed. Details on the upcoming climate survey were discussed including poll questions for the steering committee to guide the goals and content of the climate survey. An update on the MJHMP vulnerability assessment was presented and the metrics of the vulnerability assessment were discussed. The meeting concluded with an overview of next steps for the Hazard Mitigation and Climate Resilience (HMCR) Steering Committee.

Detailed Meeting Notes

Introduction/Updates:

- Question from Ian Miller (Washington Sea Grant): Can you summarize the response to the survey as far as level of engagement?
    - Answer from Mary Ann Rozance (Cascadia, Project Manager): Yes, we received 619 responses, and that is our next topic so thanks for the segue.
- Erika Lindholm (North Olympic Land Trust): I am representing North Olympic Land Trust; I am filling in for Tom Sandford and am looking to be brought up to speed since he left.
    - Mary Ann Rozance (Cascadia, Project Manager): I can email you and we can get caught up offline.

Hazard Survey Results:

- Mary Ann Rozance (Cascadia, Project Manager): Any questions or comments on the survey response?
    - Will Habel (City of Port Angeles): I'm surprised so few mentioned experiencing an earthquake, so few remember the 2001 quake.
    - Ian Miller (Washington Sea Grant): I saw that the survey respondents favored the preparedness, coordination and response actions. I am

impressed with the input and glad that we are getting public buy in on preparedness, education, etc.

Climate Survey Next Steps:

- Luke Strong-Cvetich (Jamestown S'Klallam Tribe): I think we should identify what are our goals are here with the Climate Survey and note why we are seeking public involvement so people in the community know what we are answering here and how it benefits the community.
    - Alyssa Rodriguez (Cascadia, Engagement Lead): This survey is focused on climate adaptation policy and so on, but we haven't finalized the survey questions and can incorporate the goals of the survey.
- Ian Miller (Washington Sea Grant): It would be nice to include questions oriented towards collecting perceived impacts, identifying future vulnerabilities (i.e. what climate impacts do people currently think will be most impactful to their lives) and their willingness to accept different types of actions and strategies, especially those that are more regulatory in nature.

Vulnerability Assessment:

- Mary Ann Rozance (Cascadia, Project Manager): Any questions for Noelle?
- Question from Ian Miller (Washington Sea Grant): Noelle, the CDC SVI is analyzed on census blocks I think, of which there are only 8 (I think) in Clallam County, which makes it less than idea for the sort of application you identified. Slightly better is the state's environmental health disparities analysis or NOAA's SVI which are analyzed on zip code areas, so better spatial resolution. Consider using those?
    - Answer from Noelle Anderson (Michael Baker, MJHMP Consultant): CDC is analyzed by census blocks, but this is how FEMA analyzes social vulnerability in terms of their grant approvals. We will integrate other resources, there are many environmental justice resources, and we can look into NOAA's resource.
    - Ian Miller (Washington Sea Grant): Noelle, I would push back a bit to note that IF the goal is to identify vulnerable people and places in Clallam County then we may be better off using a different dataset than the CDC's for that purpose...its a bit of a different goal than alignment with projects. That is important, but can come after IMO.
- Question from Chip Keen (Clallam County Fire District 6): Where can see the critical facilities list?
    - Answer from Noelle Anderson (Michael Baker, MJHMP Consultant): We can distribute that before meeting #4.

- Question from Jim Buck (Strategic Advisor): Are you using SVI raw data or the national risk index? The national risk index doesn't include Cascadia earthquake threat, and tsunami threat.
    - Answer from Noelle Anderson (Michael Baker, MJHMP Consultant): We are using the SVI index not the national risk index. We do export the raw data and look at it on a case-by-case level.

Action Items:

- Consultant Team to follow up with Erika Lindholm at North Olympic Land Trust to get up to speed on the project.
- MBI to distribute the Critical Facilities list before meeting #4.

Hazard Mitigation and Climate Resilience (HMCR) Steering Committee

Meeting #3

May 28, 2024 | 1:00-2:00 PM |
https://us02web.zoom.us/j/81833498220

Meeting purpose

Review and discuss work to date, early engagement findings and next steps for engagement, and discuss process for vulnerability assessment.

Type in the chat: Name, organization

Icebreaker (in chat): What is something about your community that you think we should know about as we approach summer engagement for this project?

Please rename yourself with your first name, organization, and pronouns.

Role of Steering Committee

Phase 1: Discovery & Visioning

March 2024

Meeting 1

Objective: Establish operating procedures, gain important background context, build a collective vision and goals for the Climate Element and MJHMP.

Phase 2: Risk Identification & Prioritization

April/May 2024

Meetings 2 & 3

Objective: Identify key climate risks, relevant agencies and partners that these changes will affect, and prioritize these risks to inform climate policies and hazard mitigation options.

Phase 3: Measures & Strategies

June/September 2024

Meetings 4 & 5

Objective: Identify, vet, and prioritize measures and strategies to include in the MJHMP and the Climate Element.

Phase 4: Final Review & Implementation

October 2024

Meeting 6

Objective: Support the integration of the MJHMP and the Climate Element for seamless implementation following the adoption of these plans.

Committee Goals

- Facilitate deep and thorough understanding of perspectives that address gaps and barriers in current plans.
- Lead key practitioners and project proponents through exercises to identify, vet, and prioritize climate and hazard mitigation strategies.
- Discuss how the County can best address community needs and key trends, develop potential strategies, identify monitoring and evaluation criteria, and integrate specific elements such as equity, inclusion, and environmental justice.

Meeting Objectives

- Provide update on work to date
- Review and discuss hazard survey results and next steps for climate survey
- Review and discuss vulnerability assessment approach
- Summarize next steps

Meeting Agenda

- Introduction and Update
- Hazard Survey Results
- Climate Survey Next Steps
- Vulnerability Assessment Overview
- Questions and Next Steps

Update on Work to Date

Progress to Date

- Climate Element
  - ✓Draft Policy Development
- MJHMP
  - ✓Critical Facilities List
  - ✓Repetitive loss properties
  - ✓Preliminary hazard mapping
  - ✓Hazard profiles
- Both
  - ✓Hazard survey analysis
  - ✓Planning summer engagement
  - ✓Goal refinement
  - ✓Hazard and climate vulnerability framework

HMCR Meeting #2

Goals for MJHMP & Climate Element	• Incorporate "Ecological" • Focus on being climate resilient rather than facing climate problems
Policy Audit Summary	• Suggestions for additional policy sources • Consider insurance premiums • Concern for ground water levels from climate impacts and impacts to water supply & availability
Hazard Prioritization Exercise	• Wildfire (including smoke), Drought, Extreme Heat ranked highest priority

Engagement Plan

Questions?

Type your comment or question into the Zoom chat

OR

Raise your virtual hand to comment or ask verbally

Hazard Survey Results Discussion

Hazard Survey Background

Understand community perspectives and priorities about natural and man-made hazards to inform the MJHMP and Climate Element.

- Online from March 6, 2024 to May 10, 2024
- Received 619 responses:
  - More likely to be older (68% 55 and older). Limited responses from under 18; 18-24 and 25-34.
  - White or Caucasian (76.3%), more Native American respondents, fewer Hispanic, Latino, Latina respondents compared to Census
  - Higher income compared to Census, many (22%) preferred not to say.

Respondents by Jurisdiction or Tribal Affiliation

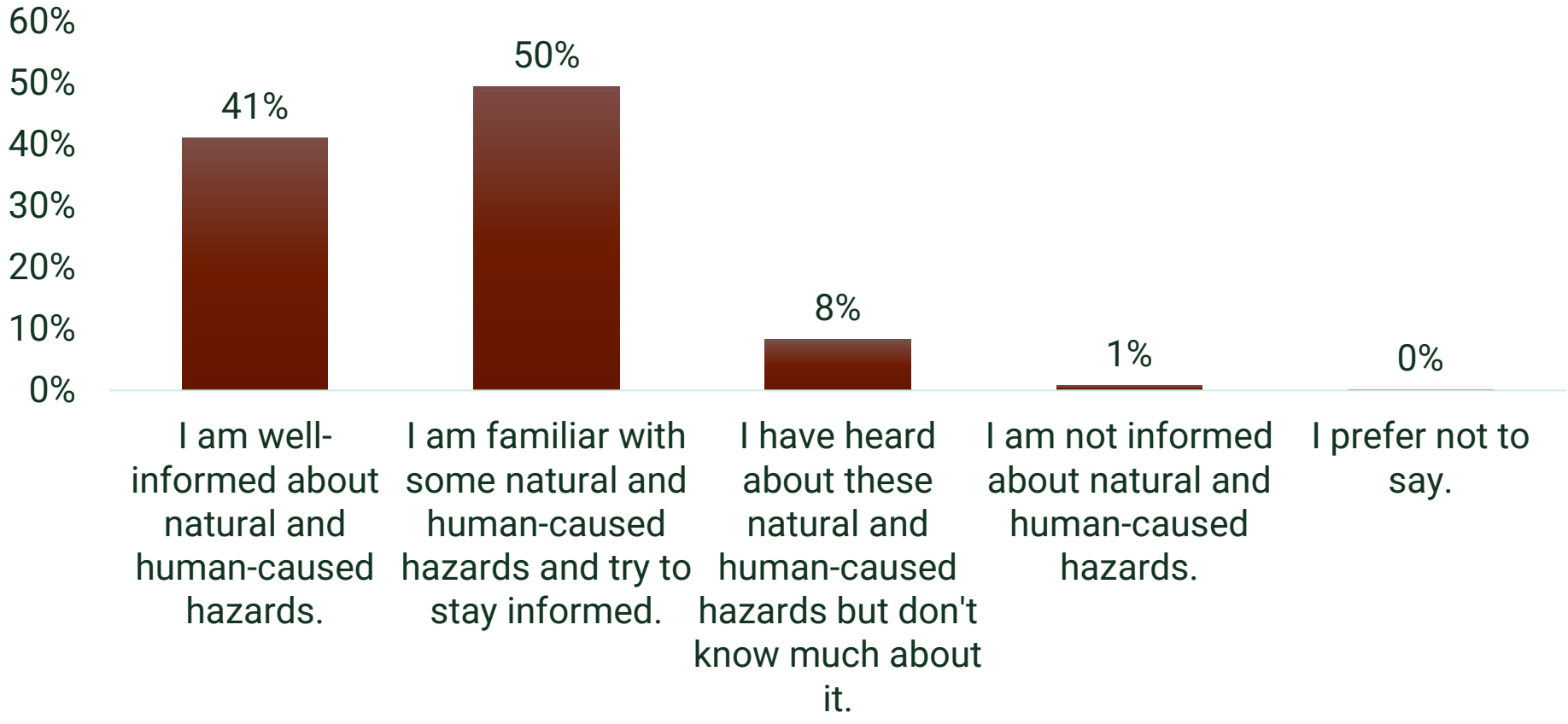
Jurisdiction/Tribal Affiliation	Responses	Percentage
Port Angeles	176	28%
Sequim	193	31%
Forks	29	5%
Jamestown S'Klallam Tribe	6	1.%
Elwha Klallam Tribe	0	0%
Quileute Nation	1	0.2%
Makah Tribe	16	3%
Unincorporated Clallam County	160	26%
Other (please specify)	38	6%

Respondents by Role in Community

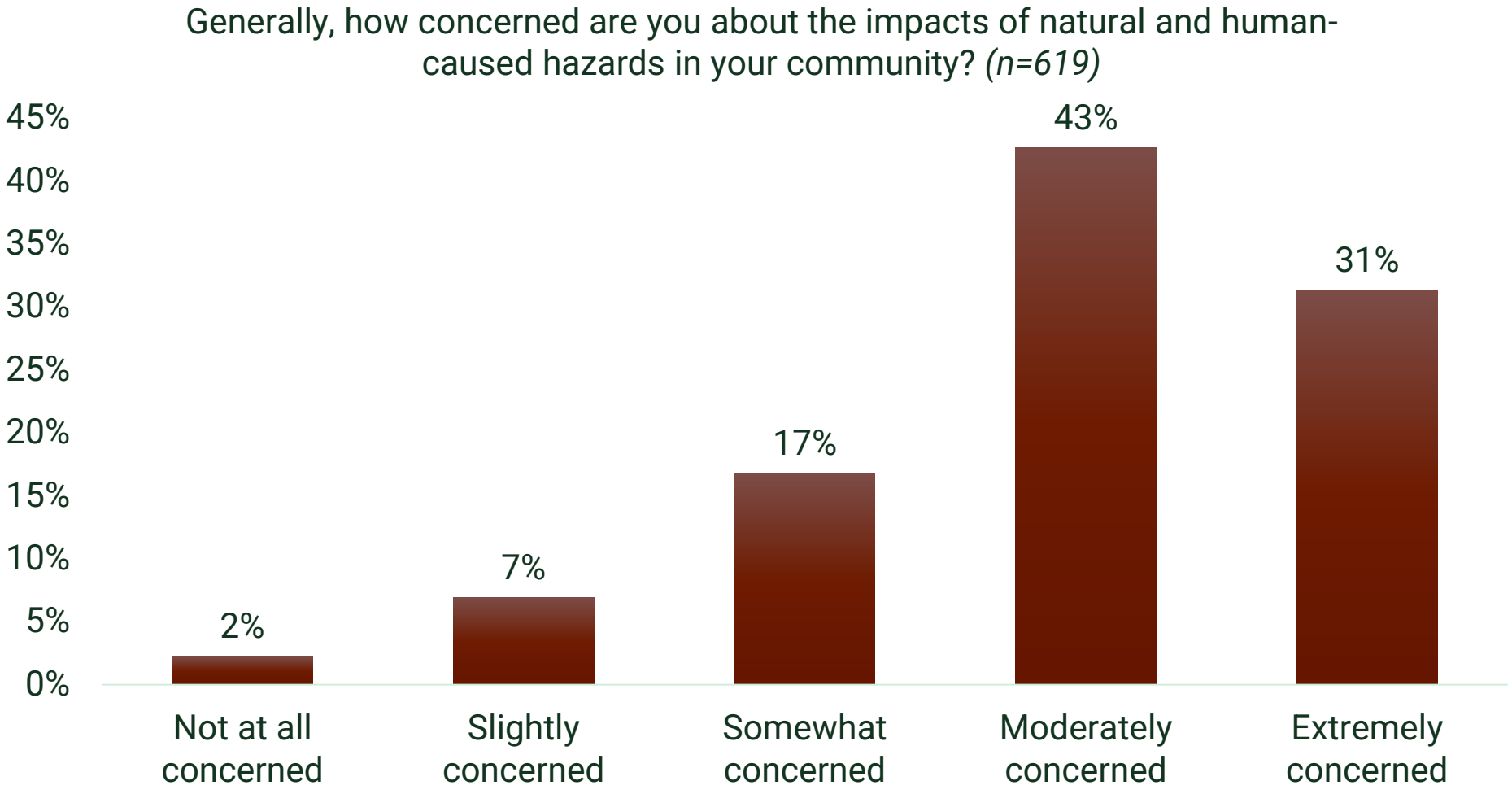
Role	Responses	Percentage
Resident	520	84%
Business Owner	59	10%
Landowner	187	30%
Government Employee	65	11%
Elected Official	13	2%
Tribal Member	27	4%
Student	32	5%
Other (please specify)	43	7%

Awareness & Understanding

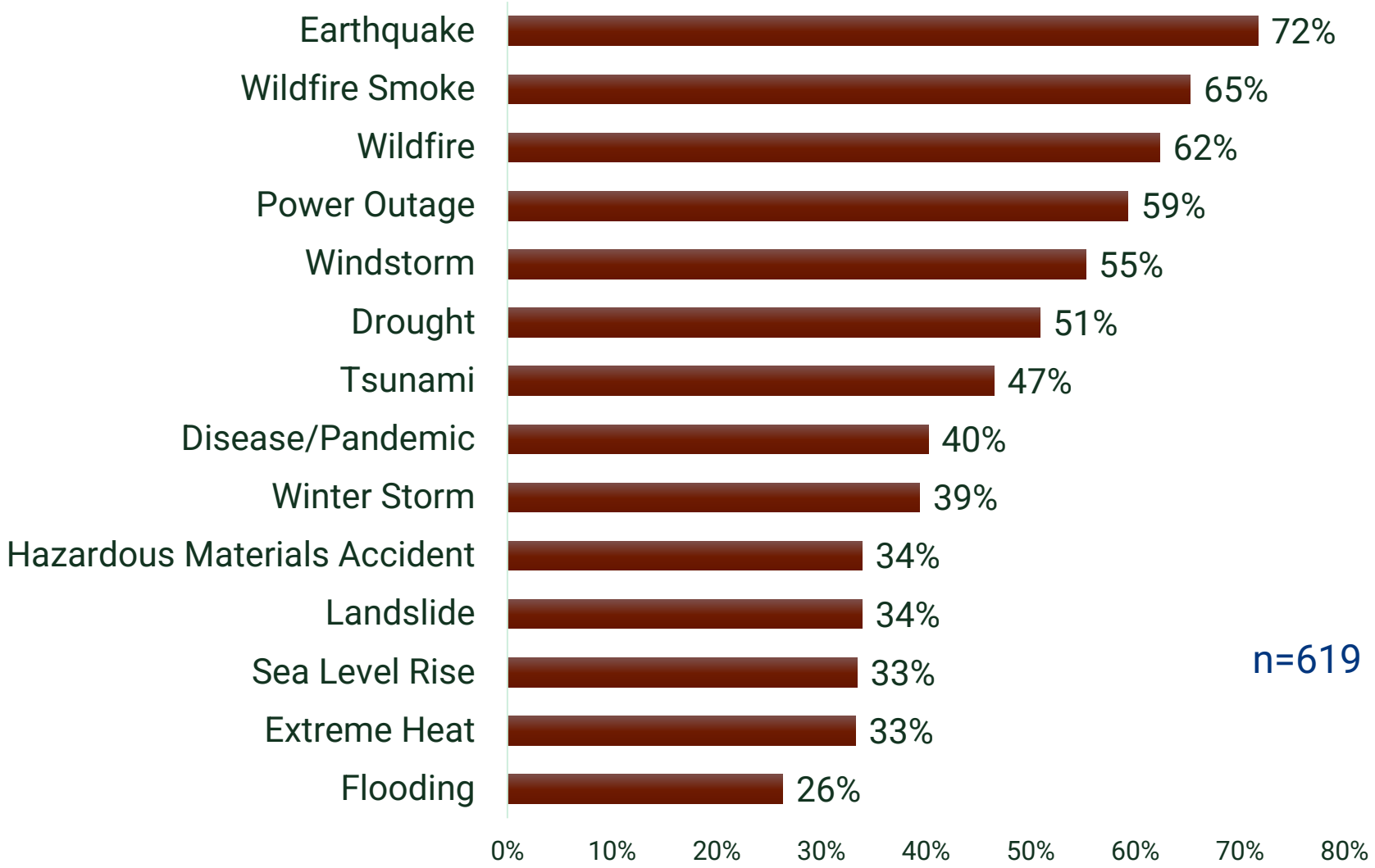
How would you best describe your awareness and understanding of natural and human-caused hazards, such as earthquakes, tsunamis, power outages, etc. facing Clallam County? *(n=602)*



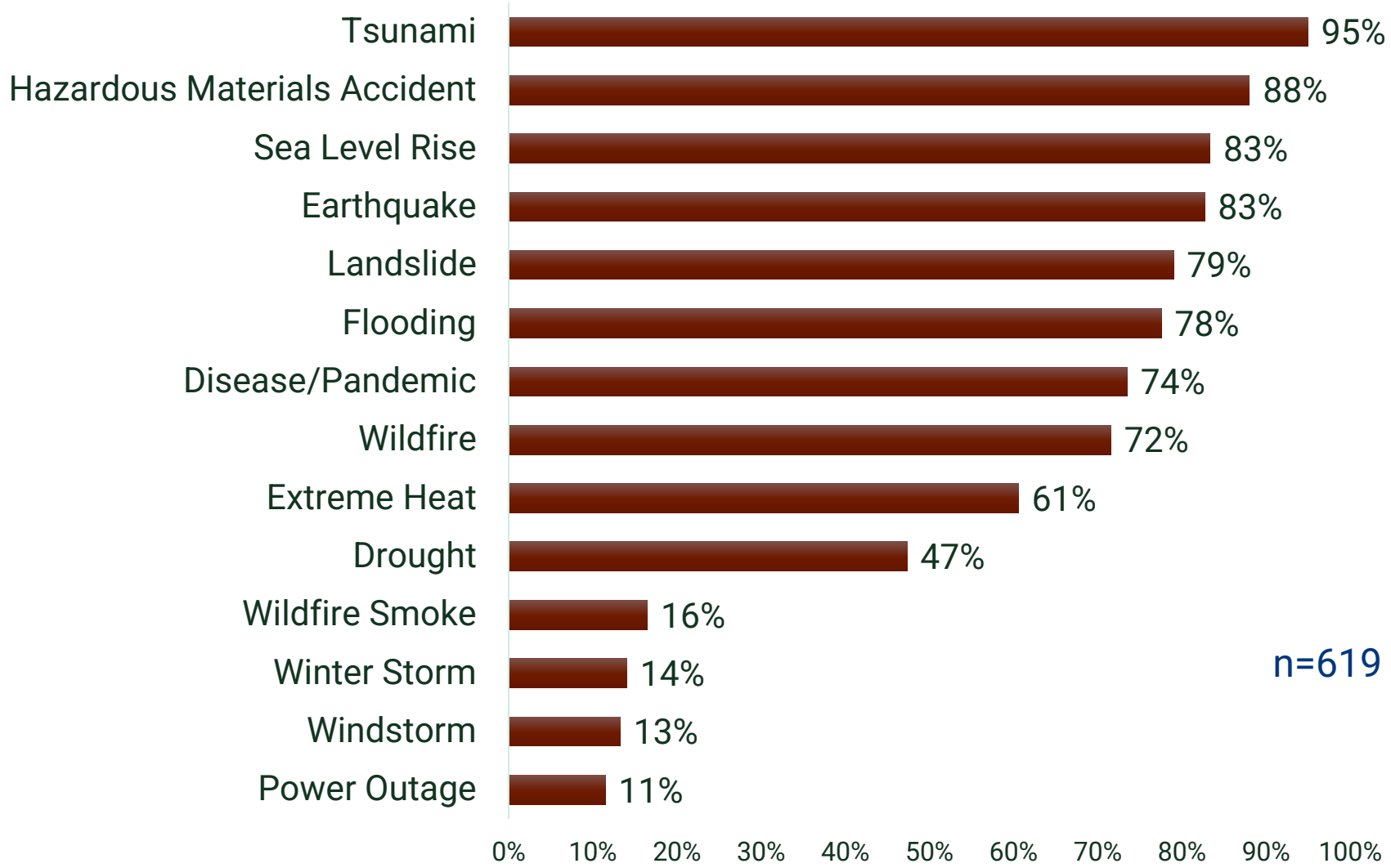
Level of Concern



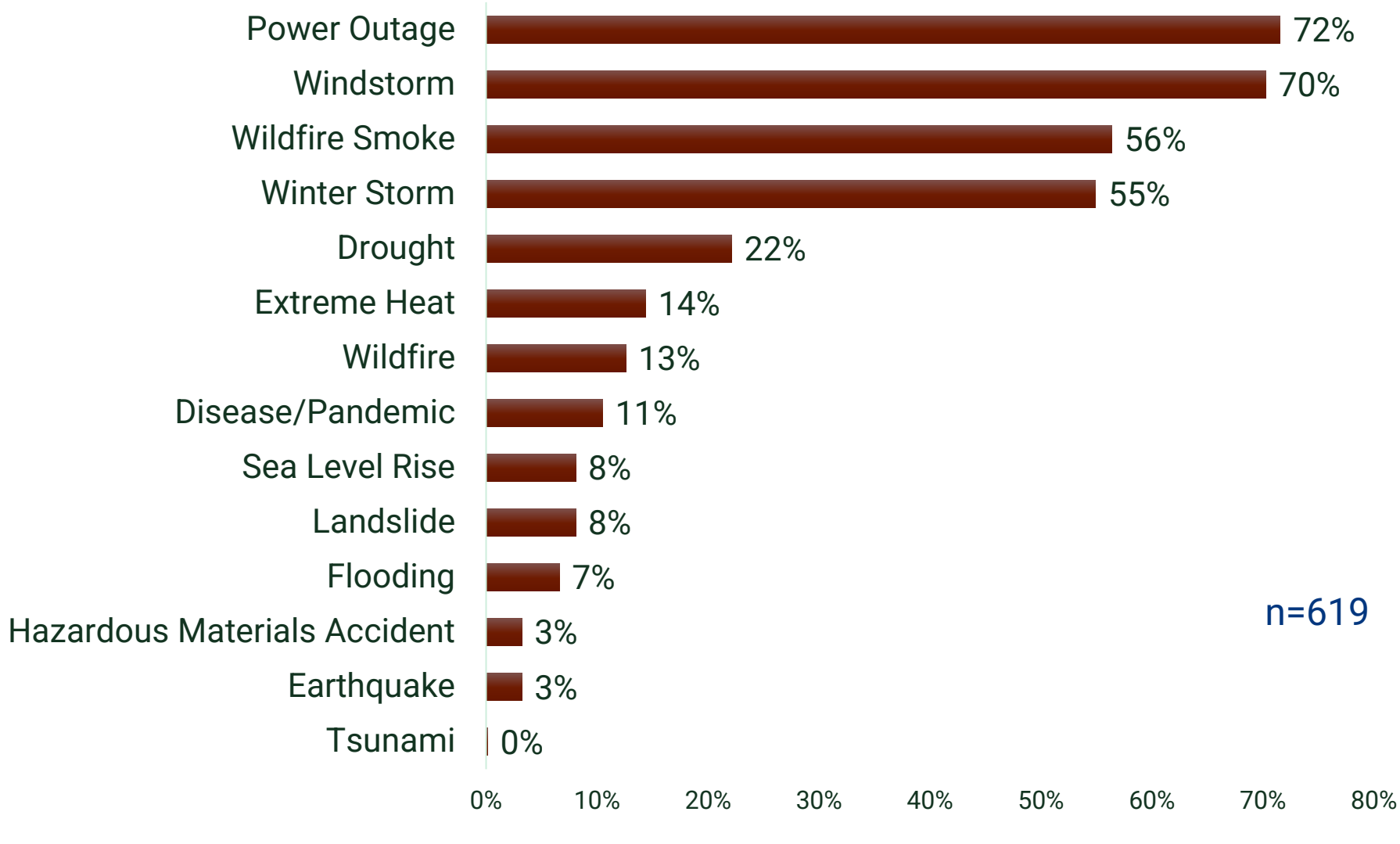
Moderately or Extremely Concerned



Never/Once or a few times



Once or multiple times per year



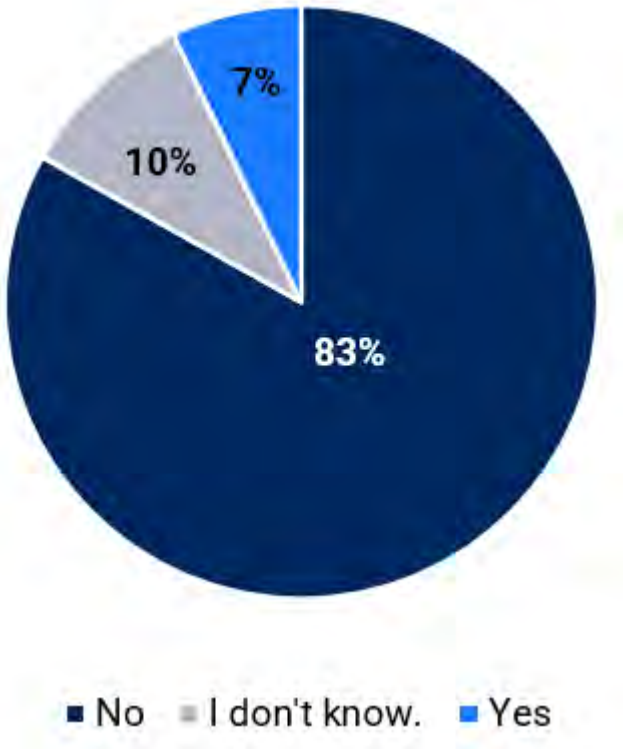
Type of Action

Understand community perspectives and priorities about natural and man-made hazards to inform the MJHMP and Climate Element.

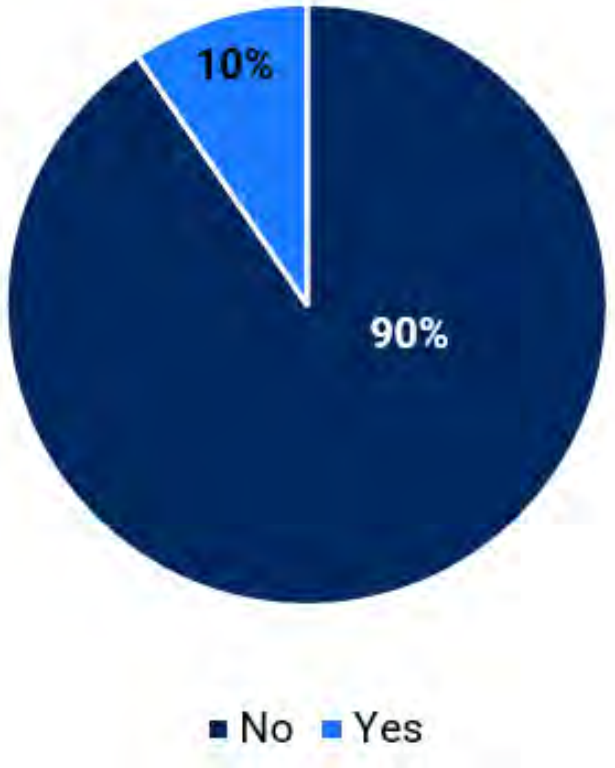
Type of Action	Responses	Percent "Very important"
Preparedness, Coordination and Response Actions	481	78%
Education and Awareness Programs	416	67%
Local Plans and Regulations	363	59%
Structure and Infrastructure Projects	287	46%

Flooding and flood preparedness

Is your home in a designated floodplain? *(n=563)*

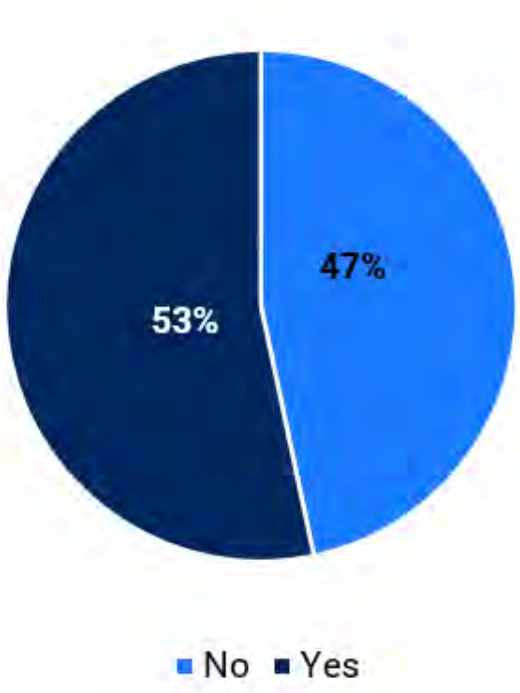


Do you currently have flood insurance? *(n=557)*

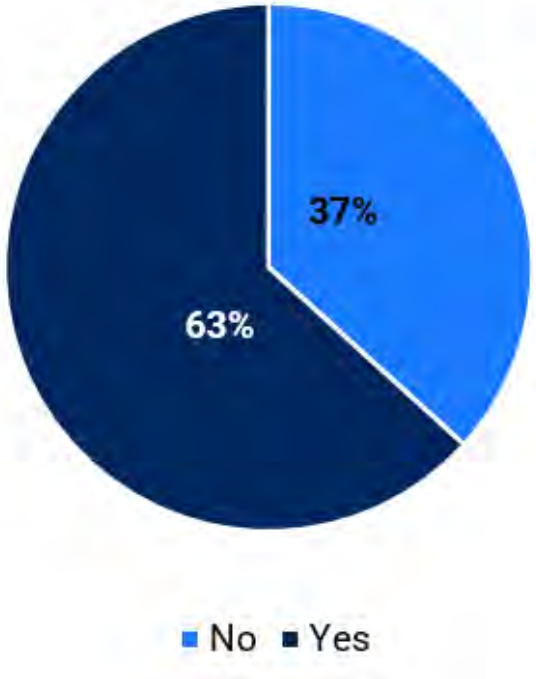


Hazard preparedness

Have you taken actions to protect your home and/or business from impacts of hazards? *(n=557)*



Does your family have a 30-day supply of food and water at your home in case of an emergency? *(n=561)*



Reason for “no” to 30-day supply (n=289)

- **37%** Lack of storage space
- **36%** Limited funds to purchase
- **23%** Have not considered
- **4%** Not concerned

Project Ideas for Hazards

40% of respondents answered “yes” and shared project ideas, including:

- **Infrastructure improvements**, such as alternative evacuation routes, better signage, building retrofits, and road maintenance.
- **Community education and awareness**, including public meetings, announcements, and school programs.
- **Emergency preparedness**, including stockpiling emergency supplies and creating shelters or hubs for disaster relief.
- **Technological solutions**, such as real-time monitoring networks, improved communication systems, and alternative power sources like solar.
- **Coordination among government agencies**, community organizations, and residents to enhance resilience and emergency response capabilities.

Ideas for How to Adapt/Mitigate Effects of Climate Change

About a third (36%) of respondents answered “yes” and shared project ideas, including:

- Implement **water conservation** measures and increase **water reserves**.
- Develop **renewable energy power sources** such as solar and wind.
- Encourage **public transportation and carpooling** to reduce emissions.
- **Preserve forests and natural habitats** to mitigate climate change.
- **Educate** the public on climate change and climate impacts.
- Promote **recycling** and **composting**.
- **Improve disaster preparedness** and response.
- Expand **infrastructure** for **electric vehicles**.
- Address **wildfire risks** through forest management and community

Takeaways & Next Steps

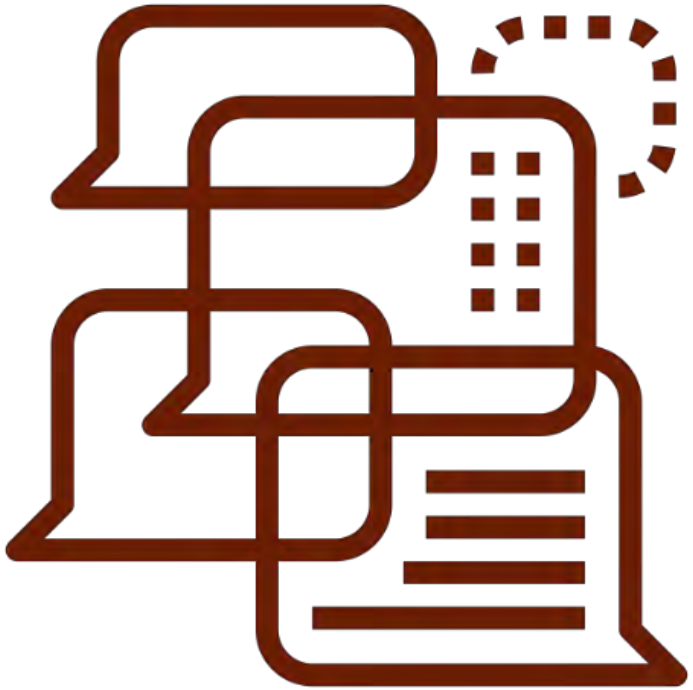
Takeaways:

- Clallam County residents are experiencing & are concerned about hazards. Some are taking action to prepare.
  - Hazards are experienced differently
  - Different preferences & needs for actions/policies

Next Steps:

- Fill in “gaps” with future engagement & climate survey
  - Youth, Lower-income, Hispanic
  - Climate focused impacts (e.g., health, economy)
- Integrate findings into plan
  - Hazard profiles & vulnerability assessment
  - Hazard mitigation actions and Climate Element policies

Hazard Survey Results Discussion



- Do you have any questions about these results?
- Is there anything surprising about these findings?

Climate Survey Next Steps

Climate survey

Purpose:
To gather information regarding Clallam community views, priorities and vision on climate change, climate impacts, and climate solutions/actions.

Objectives:

- Understand current climate awareness and experience
- Identify priorities for enhancing resilience
- Collect the level of support for draft policy areas
- Solicit new ideas for climate policy

Climate Survey Details

Audience

Anyone who lives and/or works in Clallam County

Distribution & Platform

Website, engagement activities

Will remain open for the same length of time as MJHMP survey

Analysis & Reporting

Cascadia to complete survey analysis and key themes memo

Will inform vulnerability assessment and policy/strategy development

Survey Development

- We’re looking for your input to help determine the key elements of the climate survey!
- 2 main sections will remain to be consistent with the MJHMP survey
  - About you
  - Optional demographics

Potential survey sections

Concerns about climate change

- Understand community concerns about climate change and current level of interest and knowledge.

Experience with climate change impacts

- Understand if/how climate change impacts are experienced by community to inform the climate vulnerability assessment.

Priorities for climate impacts

- Help identify what are priorities for policy development, and which impacts from climate change are top of mind in the community.

Climate policy preferences

- Present draft policy examples and gather level of support for the varying types.

Evaluation adaptation strategies

- Identify potential adaptation programs and projects by geographic location to understand preferences.

Input and ideas for solutions

- Share top climate impacts facing the County, types of solutions and ask for community to weigh in options and share new ideas.

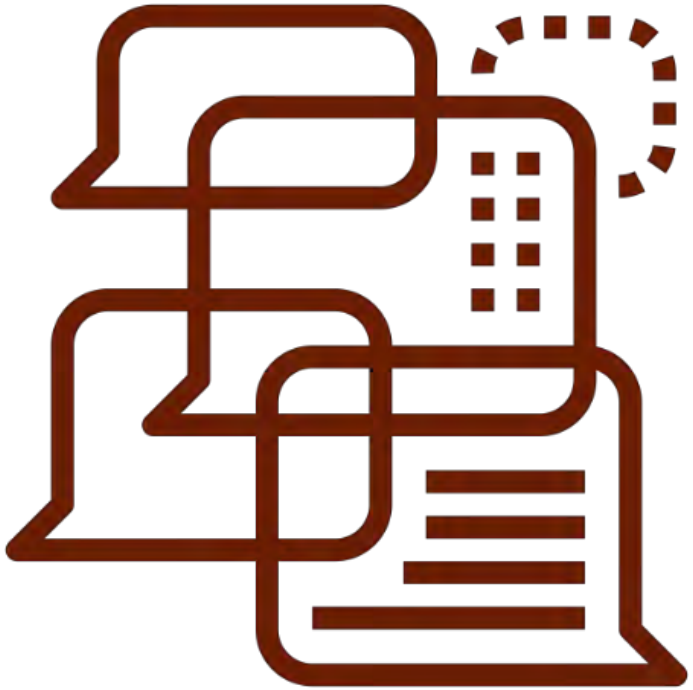
Anticipated challenges and barriers

- Gather input on what community may view as a barrier for implementation or any anticipated challenges.

Zoom Polling Activity

- Please put comments, suggestions or questions in the chat
- We have time for 1 - 2 people to unmute and share responses verbally

Climate Survey Next Steps

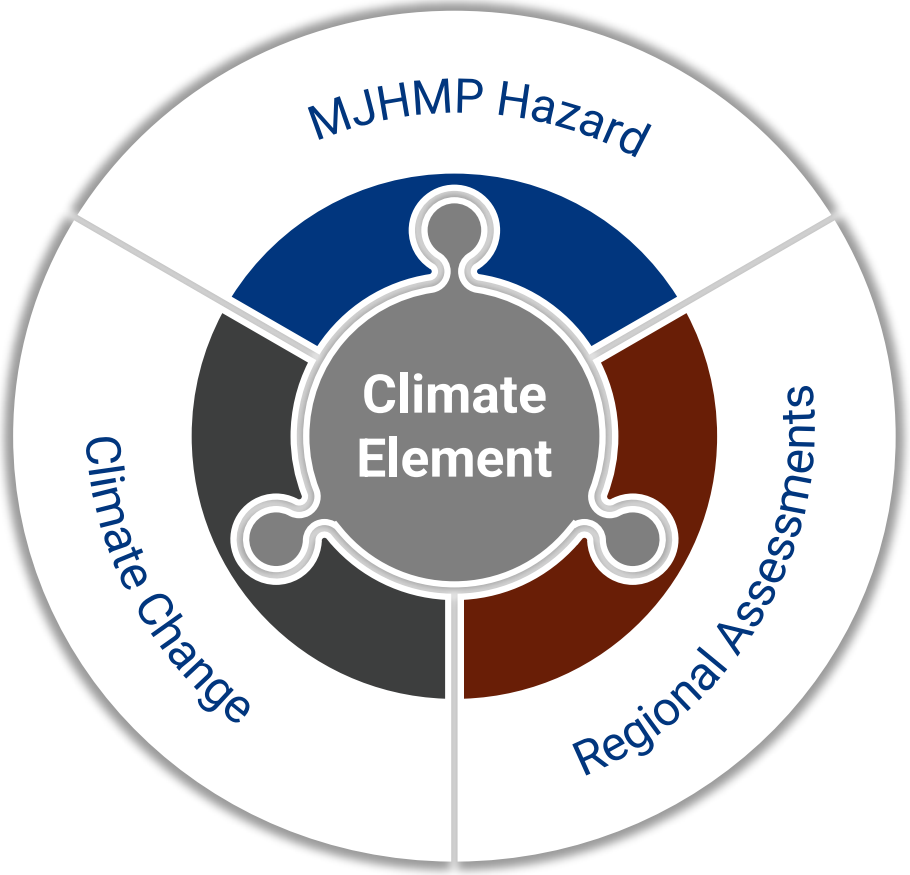


- Use your input to start drafting questions for the Climate Survey
- Climate Survey planned to launch in July

Vulnerability Assessment

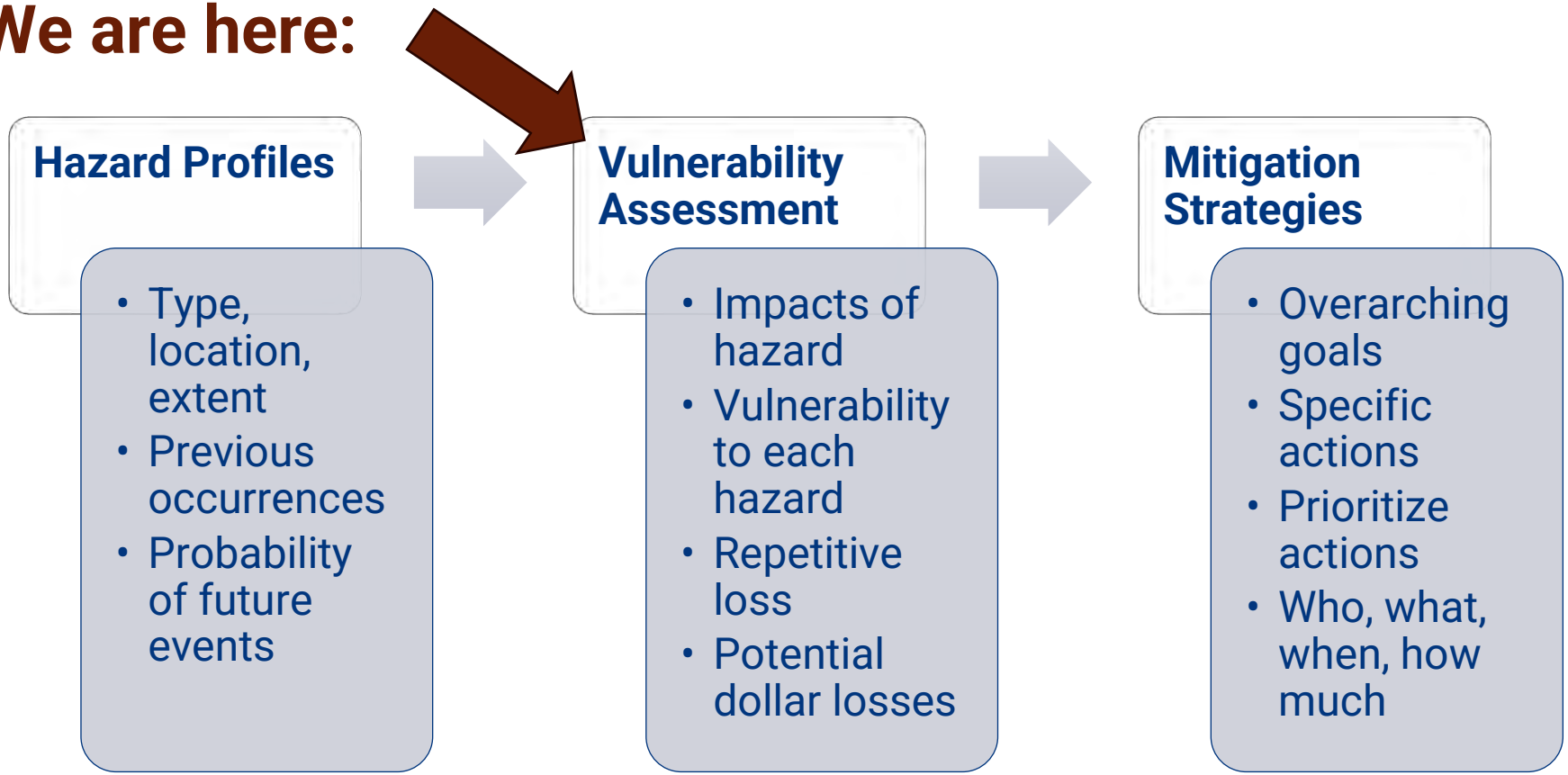
Vulnerability Assessment

- Climate change & hazards
- FEMA and Commerce Requirements
  - Socioeconomic & overburdened communities
- Build from previous efforts
- Incorporate public engagement



HMP Development

We are here:



Summarize and Document Risk Assessment

Hazard Mitigation Plan VA Approach

B2. Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP insured structures that have been repetitively damaged by floods? (Requirement 44 CFR § 201.6(c)(2)(ii))

B2-a. The plan must describe the vulnerability of each participant to the identified hazards. The description must include current and future assets (including people) and the risk that makes them susceptible to damage from the identified hazards.

For plan updates, the risk assessment must meet element E1-a.

The risk assessment must describe the vulnerability of plan participant(s) to each identified hazard. The vulnerability description must include a summary (such as a problem statement) of the hazard and its consequences or effects on the participant(s) and their assets. A list of assets without context is not sufficient.

Vulnerability is a description of which assets, including structures, systems, populations and other assets as defined by the community, within locations identified to be hazard prone, are at risk from the effects of the identified hazard(s).

Assets are determined by the community and include, but are not limited to:

- People (including underserved communities and socially vulnerable populations).
- Structures (including facilities, lifelines and critical infrastructure).
- Systems (including networks and capabilities).
- Natural, historic, and cultural resources.
- Activities that have value to the community.

Hazard Mitigation Plan VA Approach

People (including Socially Vulnerable Populations)

- **Data Source:**
  - CDC SVI Index, Supplemented by State Data
  - Clallam County Parcel Data
  - Risk maps for each hazard (i.e, FEMA flood maps)
- **Approach**
  - Overlay parcel data and SVI data with hazard zones to understand population size and distribution at risk on a hazard-by- hazard basis

Structures and Systems

- **Data Source:**
  - Critical Facilities, self identified by Clallam County + Jurisdictional Annexes
  - Risk maps for each hazard (i.e., FEMA Flood Maps)
- **Approach**
  - Overlay critical facilities database with hazard zones to understand structures/systems and asset distribution at risk on a hazard-by-hazard basis

Community Lifelines

Community Lifelines Defined

A Construct for Community Impact Assessment and Analysis

A lifeline enables the continuous operation of **critical government and business functions** and is **essential to human health and safety or economic security**.

- Lifelines are the most fundamental services in the community that enable all other aspects of society to function.
- Lifelines are the integrated network of assets, services, and capabilities that are used day-to-day to support the recurring needs of the community.
- When disrupted, decisive intervention (e.g., rapid service re-establishment or employment of contingency response solutions) is required.

Menti Hazard Ranking Results

Hazard	Priority
Dam/Reservoir Failure	Low
Flood	Medium
Sea Level Rise (including coastal erosion)	Medium
Tsunami	Medium
Wildfire (including wildfire smoke)	High
Drought	High
Disease and Pandemic	Medium
Landslide	Medium
Seismic - Cascadia Subduction Earthquake	Medium
Seismic - Onshore and Offshore Earthquakes (~7.0 Design Level)	Medium
Severe Weather - Windstorm/Tornado	Medium
Severe Weather - Winter Storm (rain, ice, snow, cold temperature)	Medium
Severe Weather - Extreme Heat	High
Human-caused - Hazardous Materials Spill	Medium
Human-caused - Maritime Disaster	Medium
Human-caused - Active Shooter	Medium
Human-caused - Terrorism	Low
Human-caused - Utility Failure/Power Outage (secondary)	Medium
Human-caused - Supply Chain Interruption (secondary)	Medium

Defining Climate Vulnerability

Climate risks are the range of potential impacts a system would be affected by climate change and are dependent on exposure and sensitivity. To characterize risks, we will look at:

Exposure + **Sensitivity** − **Adaptive Capacity** = **Vulnerability**

The degree to which a system is stressed by the impacts of climate change

The degree to which that system is likely to be affected by climate impacts

Exposure and sensitivity increase vulnerability, while adaptive capacity decreases vulnerability.

The ability to cope and respond to the impacts of climate change. To characterize adaptive capacity, we will look at current and potential adaptation actions that could minimize the impacts of climate risks.

Climate Vulnerability Assessment (CVA)

The CVA outcomes can inform the Comprehensive Plan Climate Element and Hazard Mitigation Plan by:

- Informing us about **specific communities and locations** that will likely experience climate impacts.
- Using **future projections**, not only historical data.
- Illustrating **holistic and overlapping impacts** of climate changes.

Proposed Focus Areas

Public Health and Community Wellbeing	Natural Environment and Water Resources	Economic Development and Land Use	Built Infrastructure

Public Health and Community Wellbeing

Focus Area	Description	Alignment with Comprehensive Plan	Subsectors	Subsector Description
Public Health and Community Wellbeing	Climate change impacts to community assets and services, including health services, safety, food access, and critical facilities, which affect wellbeing.	Natural, Historical, and Cultural Resources	**Health and Medical**	Physical health and **public health** risks (climate-related illness, injury, and death); environmental and socioeconomic health disparities; **medical care;** mental health
			Safety, Security, and Social Services	Community resources; **law enforcement/security; fire service; community safety; food access; hydration; shelter**
			Emergency Management	Critical facilities; emergency services; **communications**
			Cultural Resources	Culturally significant resources and sites

Bolded sectors indicate alignment with FEMA Community Lifelines.

Natural Environment and Water Resources

Focus Area	Description	Alignment with Comprehensive Plan	Subsectors	Subsector Description
Natural Environment and Water Resources	Climate impacts to local ecosystems, including urban and regional watersheds, water systems, forests, critical areas, and other natural assets.	Environment and Open Space, Forest Lands	Ecosystems and Critical Areas	Inland and coastal habitats; critical ecosystems
			Parks, Trails, and Open Space	Multiuse trails, greenways, public lands, and parks
			Water Supply	**Surface and groundwater supply;** water storage and transmission systems; water quality
			Stormwater	Stormwater/LID infrastructure; **wastewater management**

Bolded sectors indicate alignment with FEMA Community Lifelines.

Economic Development and Land Use

Focus Area	Description	Alignment with Comprehensive Plan	Subsectors	Subsector Description
Economic Development and Land Use	Climate change impacts to the local economy, including local industries, businesses, workers, and other economic growth factors.	Economic Development, Agricultural Resource Lands, Resource Lands, Forest Lands, Commercial and Industrial Land Use, Growth Areas	Local Industries and Businesses	Recreation and tourism; labor; local businesses
			Agriculture and Resource Lands	Agriculture, forest, and resource lands
			Growth and Land Use	Land use and zoning; urban growth areas

Bolded sectors indicate alignment with FEMA Community Lifelines.

Built Infrastructure

Focus Area	Description	Alignment with Comprehensive Plan	Subsectors	Subsector Description
Built Infrastructure	Effects and implications of climate change impacts to energy, transportation, and housing infrastructure in Clallam County.	Housing, Public Utilities, Transportation, Land Use, Capital Facilities, Bicycle Facilities	**Transportation**	**Highway/roadway/motor vehicles;** pedestrian and bicycle systems; **mass transit; railway; maritime**
			Housing	Single and multi-family residential buildings
			Energy	Energy supply and demand (I.e. **energy grid**, utilities, and **fuel**); energy infrastructure (I.e. powerlines, substations, and energy transmission and distribution systems)

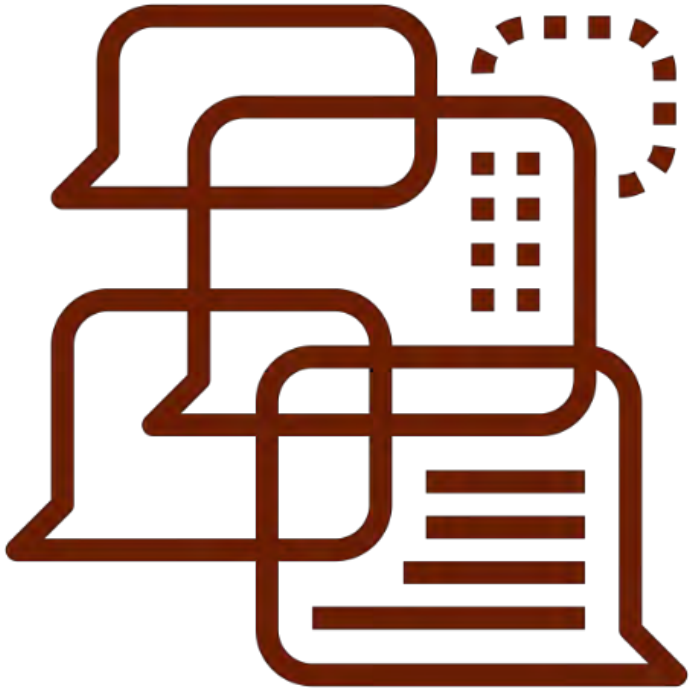
Bolded sectors indicate alignment with FEMA Community Lifelines.

Vulnerability Sector Alignment with Existing Plans

Focus Area	Subsectors	Does the 2019/2024 MJHMP address this topic?	Does the NODC 2015 Climate Plan address this?	Does the 2022 NODC Resiliency Planning Report address this?	Does the North Olympic Land Trust 2024 Resilient Peninsula work address this?	Does the 2016 Treaty of Olympia Tribes Climate VA address this?	Does the 2018 Jamestown S'Klallam Climate VA address this?
Public Health and Community Wellbeing	**Health and Medical**	✓		✓			
	Safety, Security, and Social Services	✓		✓		✓	✓
	Emergency Management	✓	✓	✓			✓
	Cultural Resources	✓			✓	✓	✓
Natural Environment and Water Resources	Ecosystems and Critical Areas	✓	✓	✓	✓	✓	✓
	Parks, Trails, and Open Space	✓		✓	✓	✓	✓
	Water Supply	✓	✓	✓		✓	✓
	Stormwater	✓	✓	✓			✓
Economic Development and Land Use	Local Industries and Businesses	✓	✓		✓		✓
	Agriculture and Resource Lands	✓	✓	✓	✓	✓	✓
	Growth and Zoning	✓	✓		✓	✓	
Built Infrastructure	**Transportation**	✓	✓	✓			✓
	Housing	✓	✓	✓			✓
	Energy	✓		✓			

Bolded checkmarks indicate that the plan thoroughly addresses the sector, while gray checkmarks indicate that the plan partially addresses the sector.

Vulnerability Assessment Discussion



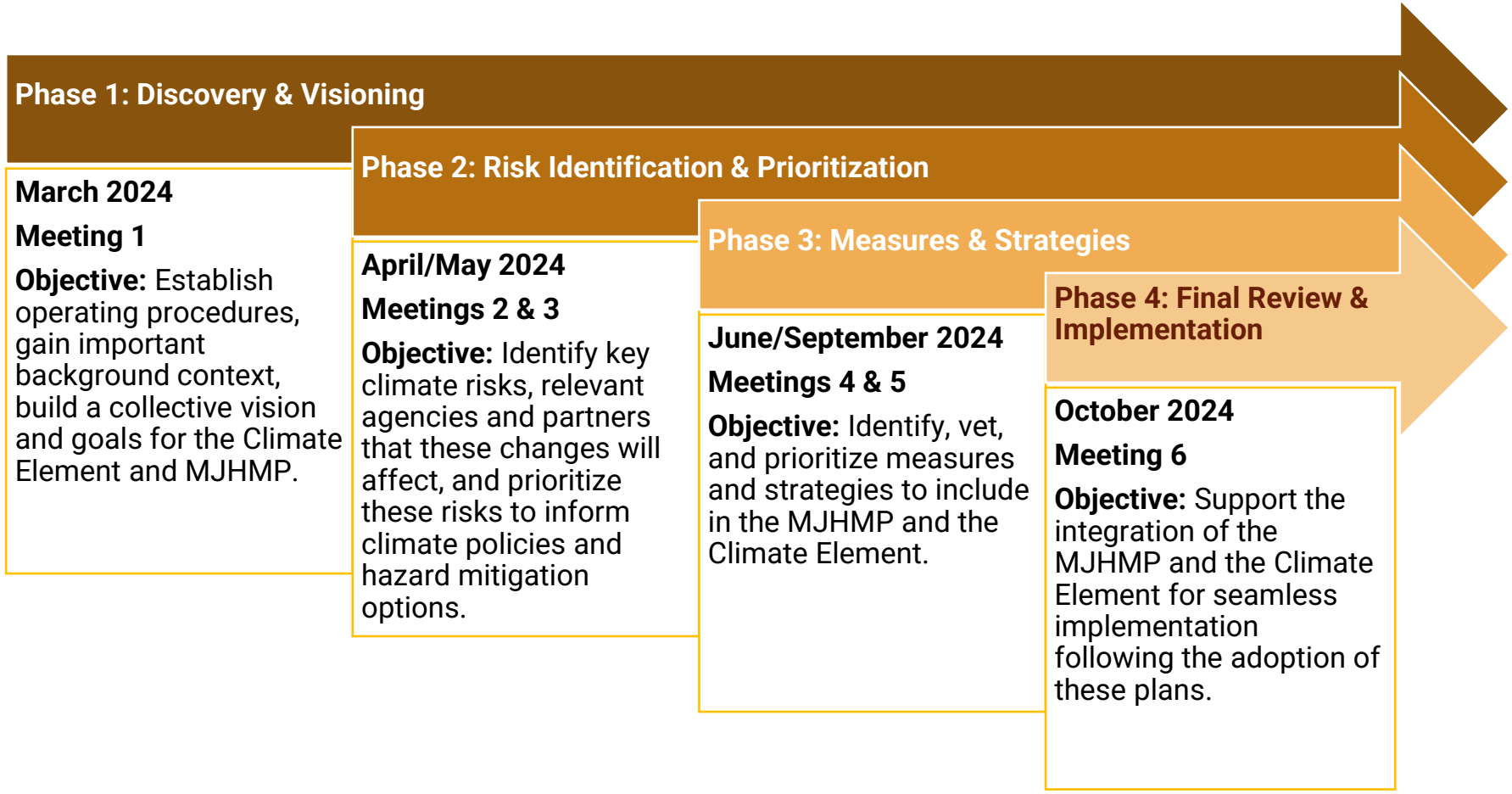
- Do you have any questions about this approach?
- Do you have suggestions or revisions to the focus areas or approach?

Summarize Next Steps

Project Next Steps

- Climate Element
  - ✓Draft policy (HMCR #4)
  - ✓Climate vulnerability assessment
- MJHMP
  - ✓Capabilities Assessment
  - ✓Hazard identification & mapping
  - ✓Hazard mitigation actions
- Both
  - ✓Public Engagement
  - ✓Climate impacts survey

Next Steps: Committee Timeline



HMCR Next Steps

- Will receive pre-meeting packet for HMCR #4 with draft Climate Element Policies
- HMCR #4 June 26, 1pm-4pm
- HMCR #5 & #6 in Sept/Oct

Thank you!

Name (Original Name)	User Email	Join Time	Leave Time	Duration (Min	Guest	In Waiting Room
Abigail Lambert# Cascadia (she/hers) (Zoom Cascadia)	zoom@cascadiaconsulting.com	5/28/2024 12:49	5/28/2024 14:03	75	No	No
Keith Koehler & Blaine Zechenelly CCFD#3		5/28/2024 12:49	5/28/2024 12:59	10	Yes	Yes
Mary Ann Rozance		5/28/2024 12:53	5/28/2024 12:53	1	Yes	Yes
Mary Ann Rozance (she/her)# Cascadia Consulting Group		5/28/2024 12:53	5/28/2024 14:03	71	Yes	No
Alyssa Rodriguez (she/her) Cascadia (Zoom Cascadia)	zoom@cascadiaconsulting.com	5/28/2024 12:54	5/28/2024 14:01	68	No	No
Noelle Anderson (Michael Baker Intl)		5/28/2024 12:55	5/28/2024 12:55	1	Yes	Yes
Noelle Anderson (Michael Baker Intl)		5/28/2024 12:55	5/28/2024 14:03	69	Yes	No
Glen Roggenbuck - Lower Elwha Klallam Tribe		5/28/2024 12:56	5/28/2024 12:59	4	Yes	Yes
Diane Harvey, Clallam County		5/28/2024 12:56	5/28/2024 12:57	1	Yes	Yes
Diane Harvey, Clallam County		5/28/2024 12:57	5/28/2024 14:01	65	Yes	No
Sarah T. Martinez		5/28/2024 12:57	5/28/2024 12:59	3	Yes	Yes
Chip Keen		5/28/2024 12:57	5/28/2024 12:59	2	Yes	Yes
Marty Martinez - Peninsula College		5/28/2024 12:57	5/28/2024 12:59	2	Yes	Yes
Erika Lindholm		5/28/2024 12:58	5/28/2024 12:59	2	Yes	Yes
Lexi Wagor		5/28/2024 12:58	5/28/2024 12:59	1	Yes	Yes
Bruce Emery, Clallam County DCD		5/28/2024 12:58	5/28/2024 12:59	1	Yes	Yes
Jake Patterson- Clallam FD2		5/28/2024 12:59	5/28/2024 12:59	1	Yes	Yes
Sarah T. Martinez - PHA (Sarah T. Martinez)		5/28/2024 12:59	5/28/2024 14:01	63	Yes	No
Bruce Emery, Clallam County DCD		5/28/2024 12:59	5/28/2024 14:02	63	Yes	No
Lexi Wagor (they/she)# North Olympic Land Trust		5/28/2024 12:59	5/28/2024 14:01	63	Yes	No
Erika Lindholm (she/her)# North Olympic Land Trust		5/28/2024 12:59	5/28/2024 14:01	63	Yes	No
Marty Martinez - Peninsula College		5/28/2024 12:59	5/28/2024 14:01	63	Yes	No
Jake Patterson- Clallam FD2		5/28/2024 12:59	5/28/2024 13:41	42	Yes	No
Keith Koehler & Blaine Zechenelly CCFD#3		5/28/2024 12:59	5/28/2024 14:01	63	Yes	No
Chip Keen CCFPD6 (he/him) (Chip Keen)		5/28/2024 12:59	5/28/2024 14:01	63	Yes	No
Glen Roggenbuck - Lower Elwha Klallam Tribe		5/28/2024 12:59	5/28/2024 14:01	63	Yes	No
Tim Havel - County Staff		5/28/2024 12:59	5/28/2024 12:59	1	Yes	Yes
Jesse Waknitz - Port of Port Angeles		5/28/2024 12:59	5/28/2024 12:59	1	Yes	Yes
Jesse Waknitz - Port of Port Angeles		5/28/2024 12:59	5/28/2024 14:01	63	Yes	No
Holden A. Fleming, AICP		5/28/2024 12:59	5/28/2024 12:59	1	Yes	Yes
Tim Havel - Clallam County (Tim Havel - County Staff)		5/28/2024 12:59	5/28/2024 14:01	63	Yes	No
Victoria Alvarez-Conn		5/28/2024 12:59	5/28/2024 12:59	1	Yes	Yes
Holden A. Fleming, AICP		5/28/2024 12:59	5/28/2024 14:02	63	Yes	No
Ellen Chappelka, (she/her), WA EMD		5/28/2024 12:59	5/28/2024 13:00	1	Yes	Yes
Victoria Alvarez-Conn		5/28/2024 12:59	5/28/2024 14:00	61	Yes	No
Ellen Chappelka, (she/her), WA EMD		5/28/2024 13:00	5/28/2024 14:00	61	Yes	No
William Habel- Port Angeles		5/28/2024 13:00	5/28/2024 13:00	1	Yes	Yes

Noah Glaude, North Olympic Library System	5/28/2024 13:00	5/28/2024 13:00	1	Yes	Yes
Noah Glaude, North Olympic Library System	5/28/2024 13:00	5/28/2024 14:01	62	Yes	No
William Habel- Port Angeles	5/28/2024 13:00	5/28/2024 13:46	47	Yes	No
Casey.Marchese	5/28/2024 13:00	5/28/2024 13:00	1	Yes	Yes
Ian Miller (he/him; Washington Sea Grant)	5/28/2024 13:00	5/28/2024 13:00	1	Yes	Yes
Casey Marchese (Michael Baker) (Casey.Marchese)	5/28/2024 13:00	5/28/2024 14:03	63	Yes	No
Ian Miller (he/him; Washington Sea Grant)	5/28/2024 13:00	5/28/2024 14:01	61	Yes	No
Luke Strong-Cvetich	5/28/2024 13:01	5/28/2024 13:01	1	Yes	Yes
Meggan Uecker	5/28/2024 13:01	5/28/2024 13:01	1	Yes	Yes
Luke Strong-Cvetich	5/28/2024 13:01	5/28/2024 14:02	62	Yes	No
Meggan Uecker# city of Sequim# she/her/they	5/28/2024 13:01	5/28/2024 14:01	61	Yes	No
Julie Ann Koehlinger	5/28/2024 13:01	5/28/2024 13:01	1	Yes	Yes
Julie Ann Koehlinger (she/her) (Julie Ann Koehlinger)	5/28/2024 13:01	5/28/2024 14:01	60	Yes	No
James Roubal, Quileute Tribe	5/28/2024 13:01	5/28/2024 13:01	1	Yes	Yes
Jake Poland	5/28/2024 13:01	5/28/2024 13:01	1	Yes	Yes
Jake Poland (Michael Baker Intl) (Jake Poland)	5/28/2024 13:01	5/28/2024 14:03	63	Yes	No
Crystie’s iPhone	5/28/2024 13:01	5/28/2024 13:01	1	Yes	Yes
James Roubal, Quileute Tribe	5/28/2024 13:01	5/28/2024 14:01	60	Yes	No
Jen Garcelon, Clallam County Health (she/her)	5/28/2024 13:01	5/28/2024 13:01	1	Yes	Yes
Crystie’s iPhone	5/28/2024 13:01	5/28/2024 14:01	60	Yes	No
Jen Garcelon, Clallam County Health (she/her)	5/28/2024 13:01	5/28/2024 14:01	60	Yes	No
Jim Buck	5/28/2024 13:03	5/28/2024 13:03	1	Yes	Yes
Jim Buck	5/28/2024 13:03	5/28/2024 14:01	59	Yes	No
Rod Fleck - Forks Washington	5/28/2024 13:16	5/28/2024 13:16	1	Yes	Yes
Rod Fleck - Forks Washington	5/28/2024 13:16	5/28/2024 14:02	46	Yes	No
Derrell Sharp Port Angeles Fire	5/28/2024 13:22	5/28/2024 13:22	1	Yes	Yes
Derrell Sharp Port Angeles Fire	5/28/2024 13:22	5/28/2024 14:01	40	Yes	No
Tony Hudson - Clallam Fire 3	5/28/2024 13:32	5/28/2024 13:33	1	Yes	Yes
Tony Hudson - Clallam Fire 3	5/28/2024 13:33	5/28/2024 14:01	29	Yes	No

Zoom Meeting

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Role of Steering Committee

Phase 1: Discovery & Visioning

March 2024
Meeting 1
Objective: Establish operating procedures, gain important background context, build a collective vision and goals for the Climate Element and MJHMP.

Phase 2: Risk Identification & Prioritization

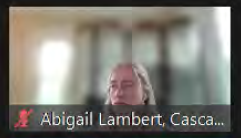
April/May 2024
Meetings 2 & 3
Objective: Identify key climate risks, relevant agencies and partners that these changes will affect, and prioritize these risks to inform climate policies and hazard mitigation options.

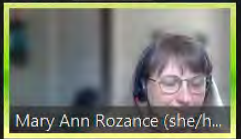
Phase 3: Measures & Strategies

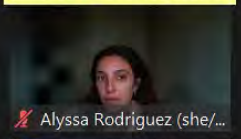
June/September 2024
Meetings 4 & 5
Objective: Identify, vet, and prioritize measures and strategies to include in the MJHMP and the Climate Element.

Phase 4: Final Review & Implementation

October 2024
Meeting 6
Objective: Support the integration of the MJHMP and the Climate Element for seamless implementation following the adoption of these plans.







Unmute Stop Video Participants 31 Share Screen Summary AI Companion Reactions Apps Whiteboards Notes More Leave

Participants (31)

Find a participant

- C Casey.Marchese (Me)
- AL Abigail Lambert, Cascadia (she/h... (Host)
- MA Mary Ann Rozance (she/her), Casc... (Co-host)
- AR Alyssa Rodriguez (she/her) Cascad... (Co-host)
- NA Noelle Anderson (Michael Baker In... (Co-host)
- LS Luke Strong-Cvetich
- BE Bruce Emery, Clallam County DCD
- CK Chip Keen CCFPD6 (he/him)
- CI Crystie's iPhone
- DH Diane Harvey, Clallam County
- EC Ellen Chappelka, (she/her), WA EMD
- EL Erika Lindholm (she/her), North Olympic La...
- GR Glen Roggenbuck - Lower Elwha Klallam Tribe
- HA Holden A. Fleming, AICP
- IM Ian Miller (he/him; Washington Sea Grant)
- JP Jake Patterson- Clallam FD2

Invite Unmute Me

1:03 PM
5/28/2024

Zoom Meeting

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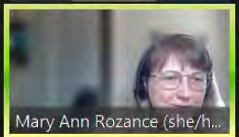
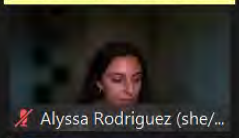
Committee Goals

- Facilitate deep and thorough understanding of perspectives that address gaps and barriers in current plans.
- Lead key practitioners and project proponents through exercises to identify, vet, and prioritize climate and hazard mitigation strategies.
- Discuss how the County can best address community needs and key trends, develop potential strategies, identify monitoring and evaluation criteria, and integrate specific elements such as equity, inclusion, and environmental justice.





Unmute | Stop Video | Participants 31 | Share Screen | Summary | AI Companion | Reactions | Apps | Whiteboards | Notes | More | Leave

Participants (31)

Find a participant

- JP Jake Patterson- Clallam FD2
- JP Jake Poland
- JR James Roubal, Quileute Tribe
- JG Jen Garcelon, Clallam County Health (she/her)
- JW Jesse Waknitz - Port of Port Angeles
- JB Jim Buck
- JA Julie Ann Koehlinger (she/her)
- KK Keith Koehler & Blaine Zechenelly CCFD#3
- LW Lexi Wagor (they/she), North Olympic Land ...
- MM Marty Martinez - Peninsula College
- MU Meggan Uecker, city of Sequim, she/her/they
- NG Noah Glaude, North Olympic Library System
- ST Sarah T. Martinez - PHA
- TH Tim Havel - Clallam County
- VA Victoria Alvarez-Conn
- WH William Habel- Port Angeles

Invite | Unmute Me

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5/28/2024

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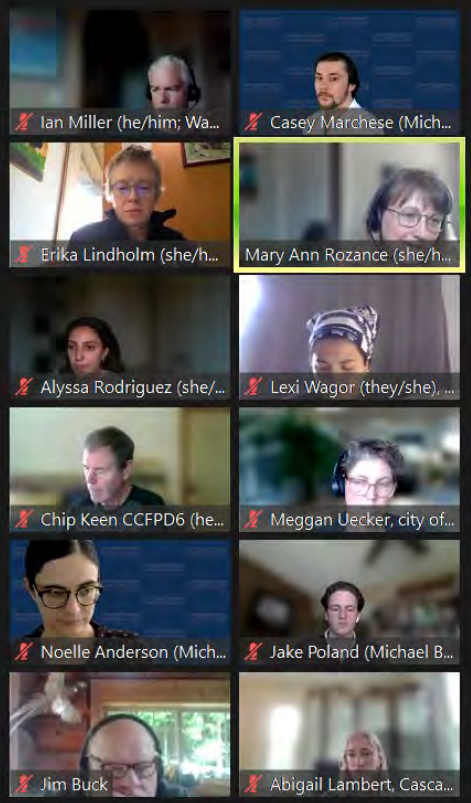
Hazard Survey Background

Understand community perspectives and priorities about natural and man-made hazards to inform the MJHMP and Climate Element.

- Online from March 6, 2024 to May 10, 2024
- Received 619 responses:
  - More likely to be older (68% 55 and older). Limited responses from under 18; 18-24 and 25-34.
  - White or Caucasian (76.3%), more Native American respondents, fewer Hispanic, Latino, Latina respondents compared to Census
  - Higher income compared to Census, many (22%) preferred not to say.



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Zoom Meeting
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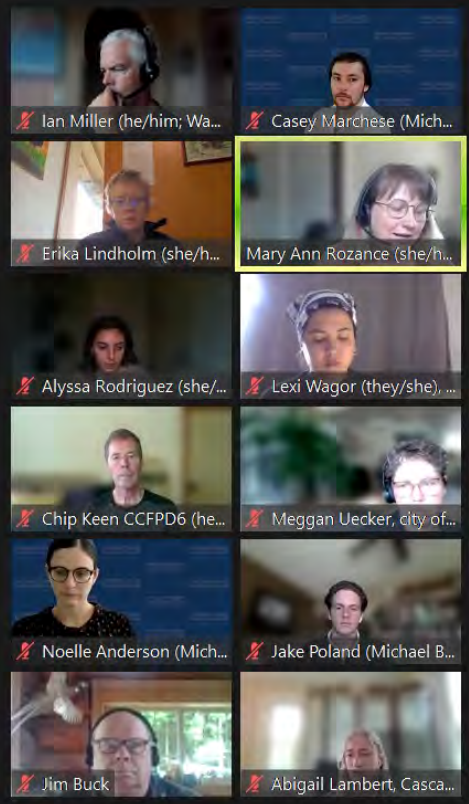
Takeaways & Next Steps

Takeaways:

- Clallam County residents are experiencing & are concerned about hazards. Some are taking action to prepare.
  - Hazards are experienced differently
  - Different preferences & needs for actions/policies

Next Steps:

- Fill in "gaps" with future engagement & climate survey
  - Youth, Lower-income, Hispanic
  - Climate focused impacts (e.g., health, economy)
- Integrate findings into plan
  - Hazard profiles & vulnerability assessment
  - Hazard mitigation actions and Climate Element policies



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5/28/2024

APPENDIX B.5

HMCR Steering Committee Meeting #4

Hazard Mitigation and Climate Resilience Steering Committee

Steering Committee Meeting #4 Agenda | June 26th, 2024 | 1:00-3:00 PM | Zoom link: https://us02web.zoom.us/j/86214269899?pwd=xblSql6FVfGJTioIAoJXvuSObOuCKH.1

Agenda

Time	Agenda Item
1:00-1:10 PM	Introduction and Updates
1:10-2:30 PM	HMP Hazard Profiles Discussion
2:30-2:45 PM	Climate Vulnerability Assessment Update
2:45-2:55 PM	Engagement Update
2:55-3:00 PM	Questions and Next Steps

Meeting #4 Objectives

- Provide update on work to date
- Review and discuss draft hazard profiles and HMP vulnerability assessment approach
- Introduce climate vulnerability assessment and focus areas
- Summarize next steps

Project Team

Clallam County	Role on Project
Diane Harvey, Sheriff's Office	Project Lead
Holden Fleming, Deputy Director, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Director, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
Mary Ann Rozance, Cascadia Consulting Group	Project Manager and Climate Resilience Lead
Alyssa Rodriguez, Cascadia Consulting Group	Engagement Lead
Mike Chang, Cascadia Consulting Group	Principal in Charge
Meg Horst, Cascadia Consulting Group	Climate Vulnerability Assessment Lead

Abigail Lambert, Cascadia Consulting Group	Climate Resilience Policy Lead
Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead
Casey Marchese, Michael Baker International	Hazard Mitigation Analyst and Notetaker
Jim Buck	Strategic Advisor

Detailed Agenda

Time	Topic	Notes
1:00-1:10 PM	Introduction and Updates	**Introduction** Name, organization, Icebreaker in chat: What is one hazard mitigation project or policy that you think helps to build resilience to natural and human-caused hazards? **Project Updates** ✓ Provide brief project updates and work to date.
1:10-1:25 PM	Introduce HMP Hazard Profiles Discussion	**HMP Hazard Profiles: Introduction and First Hazard Group** ✓ Noelles shares VA findings for mapped and non-mapped hazards ✓ Noelle presents on first group of mapped hazard profiles ▪ Seismic – Fault Rupture ▪ Seismic – Liquefaction ▪ Seismic – Ground Shaking ▪ Tsunami *Discussion Question: Q&A; Do you have any questions or reactions to these results?*
1:25-1:50 PM	HMP Hazard Profiles Discussion Breakout #1	**HMP Hazard Profiles: Breakout Session #1** ✓ First breakout session discussion on hazard profiles ▪ Seismic – Fault Rupture ▪ Seismic – Liquefaction ▪ Seismic – Ground Shaking ▪ Tsunami *Breakout Group Discussion Questions:* • *Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?* • *What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?* • *What mitigation actions would you implement to address these vulnerabilities?*

1:50-2:00 PM	HMP Hazard Profiles Discussion Full Group	**HMP Hazard Profiles: Second Hazard Group** ✓ Noelle presents on second group of draft hazard profiles and findings; Q&A. • Extreme Heat • Flood • Landslide • Wildfire
2:00-2:25 PM	HMP Hazard Profiles Discussion Breakout #2	**HMP Hazard Profiles: Breakout Session #2** ✓ Second breakout session discussion on hazard profiles ▪ Extreme Heat ▪ Flood ▪ Landslide ▪ Wildfire
2:25-2:30 PM	HMP Hazard Profiles Discussion Share-out	**HMP Hazard Profiles: Discussion Share-out** ✓ Brief round robin share-out
2:30-2:45 PM	Climate Vulnerability Assessment Discussion	**Climate Vulnerability Assessment** ✓ Update on climate vulnerability assessment process and focus areas. ○ Public Health and Community Wellbeing ○ Natural Environment and Water Resources ○ Economic Development and Land Use ○ Built Infrastructure *Discussion Question: Do you have any questions about this approach? Do you have suggestions or revisions to the focus areas or approach?*
2:45-2:55 PM	Engagement Update	**Engagement Update** ✓ Follow-up on survey discussion from Meeting #3 ✓ Walkthrough of draft survey *Discussion Question: Do you have any questions or reactions to this draft survey?*

2:55-3:00 PM	Questions and Next Steps	**Summarize next steps** ✓ County will continue to workshop Climate Element policies with key partners/jurisdictions ○ Committee should expect to receive worksheet with policies to review over the summer. ✓ HMCR #5 & #6 in Sept/Oct ✓ Review timeline and workplan **Questions and Discussion** ✓ Answer any final questions

Tamayo, Audrey

Subject:	EXTERNAL: Clallam County Hazard Mitigation and Climate Resilience Steering Committee Meeting #4
Location:	Zoom link: https://us02web.zoom.us/j/86214269899?pwd=xblSql6FVfGJTioIAoJXvuSObOuCKH.1
Start:	Wed 6/26/2024 1:00 PM
End:	Wed 6/26/2024 3:00 PM
Show Time As:	Tentative
Recurrence:	(none)
Meeting Status:	Not yet responded
Organizer:	Mary Ann Rozance

-----Original Appointment-----
From: Mary Ann Rozance <maryann@cascadiaconsulting.com>
Sent: Friday, May 10, 2024 7:06 AM
To: Mary Ann Rozance; Rod Fleck; Will Habel; rknapp; Luke Strong-Cvetich; glen.roggenbuck; Jesse Waknitz; Shailesh Shere x241; Marty Martinez; lauren@noprcd.org; Karen Affeld; cindyjaynept@gmail.com; crystie@finnriver.com; smartinez@peninsulapha.org; sharon.maggard@serenityhouseclallam.org; tinker.lucas2@makah.com; qnr.planner@quileutetribe.com; dsharp@cityofpa.us; jpatterson@clallamfire2.org; thudson@ccfd3.org; cclallam@centurytel.net; ckeen@3riversfire.org; Elizabeth.C.Miller@uscg.mil; jablack@olympicmedical.org; adriaw@forkshospital.org; immiller@uw.edu; NGlaude@nols.org; julie.koehlinger@hohtribe-nsn.org; bzechenelly@ccfd3.org; rkeithkoehler@outlook.com; steve.gray; joe.donisi; Emery, Bruce; jennifer.garcelon@clallamcountywa.gov; holden.fleming; lorraine.shore@clallamcountywa.gov; Harvey, Diane; anne.chastain@clallamcountywa.gov; justine.chorley@clallamcountywa.gov; mark.doten@clallamcountywa.gov; Meggan Uecker; ellen.chappelka@mil.wa.gov; Tom@northolympiclandtrust.org; dburnett@sequimwa.gov; Rhiana.Barkie@clallamcountywa.gov; Ron.Garcelon@clallamcountywa.gov; Tim.Havel@clallamcountywa.gov; Abigail Lambert; Alyssa Rodriguez; Marchese, Casey; Anderson, Noelle
Cc: Alicia Fennell; Victoria Alvarez-Conn; chip@qriverresort.com; nt1\sshere@clallampud.net; Lindsey Sehmel; Erika Lindholm; lexi@northolympiclandtrust.org; Meg Horst
Subject: EXTERNAL: Clallam County Hazard Mitigation and Climate Resilience Steering Committee Meeting #4
When: Wednesday, June 26, 2024 1:00 PM-3:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Zoom link: https://us02web.zoom.us/j/86214269899?pwd=xblSql6FVfGJTioIAoJXvuSObOuCKH.1

EXTERNAL EMAIL

Hi Everyone,

This is for meeting #4 of the Clallam County Hazard Mitigation and Climate Resilience (HMCR) Steering Committee. We are updating the meeting to 2-hrs and I added the Zoom link. Abigail will follow-up shortly with the Agenda and pre-meeting materials.

Thank you and please let us know if you have any questions!

Mary Ann

Hazard Mitigation and Climate Resilience Steering Committee

Steering Committee Meeting #4 Agenda | June 26th, 2024 | 1:00-3:00 PM | Zoom link: https://us02web.zoom.us/j/86214269899?pwd=xblSql6FVfGJTioIAoJXvuSObOuCKH.1

Agenda

Time	Agenda Item
1:00-1:10 PM	Introduction and Updates
1:10-2:30 PM	HMP Hazard Profiles Discussion
2:30-2:45 PM	Climate Vulnerability Assessment Update
2:45-2:55 PM	Engagement Update
2:55-3:00 PM	Questions and Next Steps

Meeting #4 Objectives

- Provide update on work to date
- Review and discuss draft hazard profiles and HMP vulnerability assessment approach
- Introduce climate vulnerability assessment focus areas
- Summarize next steps

Project Team

Clallam County	Role on Project
Diane Harvey, Sheriff's Office	Project Lead
Holden Fleming, Deputy Director, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Director, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
Mary Ann Rozance, Cascadia Consulting Group	Project Manager and Climate Resilience Lead
Alyssa Rodriguez, Cascadia Consulting Group	Engagement Lead
Mike Chang, Cascadia Consulting Group	Principal in Charge

Meg Horst, Cascadia Consulting Group	Climate Vulnerability Assessment Lead
Abigail Lambert, Cascadia Consulting Group	Climate Resilience Policy Lead
Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead
Casey Marchese, Michael Baker International	Hazard Mitigation Analyst and Notetaker
Jim Buck	Strategic Advisor

Meeting Materials

- ✓ Facilitator's agenda
- ✓ Pre-meeting packet
  - Participant Agenda
  - Hazard profiles and discussion questions
- ✓ PowerPoint Slides
  - Notetaking document (Casey, Michael Baker will be taking notes)

Detailed Agenda

Time	Topic	Lead	Notes
1:00-1:10 PM	Introduction and Updates	Cascadia / Mary Ann	**Introduction** ✓ Ice breaker and introductions ✓ Share meeting objectives ✓ Work-to-date Name, organization, Icebreaker in chat: What is one hazard mitigation project or policy that you think helps to build resilience to natural and human-caused hazards? **Project Updates** ✓ Provide brief project updates and work to date.
1:10-1:25 PM	Introduce HMP Hazard Profiles Discussion	MB	**HMP Hazard Profiles: Introduction** ✓ Noelles shares VA findings for mapped and non-mapped hazards ▪ Non-Mapped Hazards (i.e., Drought, Heavy Rains, Human-Caused Hazards) – all systems considered vulnerable for HMP planning purposes ✓ Noelle presents on first group of mapped hazard profiles ▪ Seismic – Fault Rupture ▪ Seismic – Liquefaction ▪ Seismic – Ground Shaking ▪ Tsunami *Discussion Question: Q&A; Do you have any questions or reactions to these results?*
1:25-1:50 PM	HMP Hazard Profiles Discussion Breakout #1	Cascadia/ MB	**HMP Hazard Profiles: Breakout Session #1** • First breakout session discussion on hazard profiles ▪ Seismic – Fault Rupture ▪ Seismic – Liquefaction

			▪ Seismic – Ground Shaking ▪ Tsunami *Breakout Group Discussion Questions:* • *Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?* • *What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?* • *What mitigation actions would you implement to address these vulnerabilities?* See below for detailed breakout room facilitation instructions. Shareable link to slides here.
1:50-2:00 PM	HMP Hazard Profiles Discussion Full Group	MB	**HMP Hazard Profiles: Full-group Presentation on Second Hazard Group** • Noelle presents on second group of draft hazard profiles and findings; Q&A • Extreme Heat • Flood • Landslide • Wildfire
2:00-2:25 PM	HMP Hazard Profiles Discussion Breakout #2	Cascadia/ MB	**HMP Hazard Profiles: Breakout Session #2** ✓ Second breakout session discussion ▪ Extreme Heat ▪ Flood ▪ Landslide ▪ Wildfire *Breakout Group Discussion Questions:*

			• *Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?* • *What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?* • *What mitigation actions would you implement to address these vulnerabilities?* See below for detailed breakout room facilitation instructions.
2:25-2:30 PM	HMP Hazard Profiles Discussion Share-out	Cascadia/ MB	**HMP Hazard Profiles: Discussion Share-out** ✓ Brief round robin share-out (Notetakers give 1-2 min recap of group discussion)
2:30-2:45 PM	Climate Vulnerability Assessment Discussion	Cascadia	**Climate Vulnerability Assessment** ✓ Update on climate vulnerability assessment process and focus areas. ○ Public Health and Community Wellbeing ○ Natural Environment and Water Resources ○ Economic Development and Land Use ○ Built Infrastructure *Discussion Question: Do you have any questions about this approach? Do you have suggestions or revisions to the focus areas or approach?*
2:45-2:55 PM	Engagement Update	Cascadia/ Alyssa	**Engagement Update** ✓ Follow-up on survey discussion at Meeting #3 ✓ Walkthrough of draft survey

			Discussion Question: Do you have any questions or reactions to this draft survey?
2:55-3:00 PM	Questions and Next Steps	Cascadia / Mary Ann	**Summarize next steps** ✓ Next steps for CE: Continue to workshop policies with County and solicit feedback from key partners/jurisdictions ○ Summer HW: Introduce worksheet Committee will receive over the summer ✓ Review timeline and workplan **Questions and Discussion** ✓ Answer any final questions

Breakout Room Facilitation Instructions

- 1:10-1:20 PM: Presentation on first group of draft hazard profiles and findings
  - Seismic – Fault Rupture, Seismic – Liquefaction, Seismic – Ground Shaking, Tsunami
- 1:20-1:25 PM: 5 min Q&A
- 1:25-1:50 PM: First breakout session
- 1:50-2:00 PM: Presentation on second group of draft hazard profiles and findings; Q&A
  - Extreme Heat, Flood, Landslide, Wildfire
- 2:00-2:25 PM: Second breakout session (See questions below)
- 2:25-2:30 PM: Brief round robin share-out

Discussion Overview

Gather feedback on the draft hazard profiles and initial vulnerability assessment for the HMP; gather preliminary ideas for hazard mitigation strategies.

- Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?
- What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
- What mitigation actions would you implement to address these vulnerabilities?

Roles

BREAKOUT ROOM FACILITATORS AND NOTETAKERS

- Mary Ann, Breakout Room Facilitator (Main Room)
- Victoria, Notetaker (Main Room)
- Noelle, Breakout Room Facilitator and Notetaker (Room #2)
- Alyssa, Breakout Room Facilitator (Room #3)
- Meg, Notetaker (Room #3)
- Abigail, Breakout Room Facilitator (Room #4)
- Casey, Notetaker (Room #4)

PREP FOR FACILITATORS

- Slide review
- As needed, hazard profiles review

Facilitator Instructions

STRUCTURE

- 4 breakout groups, with one facilitator each
- 2 rounds - 25 minutes each session
    - Participants randomly put into rooms because everyone will be talking about the same hazard profiles.

PROCESS

- You will be automatically placed in a breakout group. Victoria will create breakout rooms and open them when we are ready.
- Facilitator share screen with slides and notes doc (be ready to go back and forth)
- When all group members arrive, **introduce the activity**:
    - Reminder of the hazard profiles and how to access materials.
- Introduce the **flow of the activity** (2 minutes)
    - We will be reviewing 4 hazards at a time, roughly 25 minutes each session.
        - 4-5 minutes for first question (about all hazards)
            - Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?
        - 4-5 minutes per hazard for second and third questions *(note overlap in hazards so it's okay if we talk about several at one time)*

        - What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
        - What mitigation actions would you implement to address these vulnerabilities?
    - After the first session, we will go back to the main room and Noelle will introduce the next set of hazard profiles.
    - We will go back into breakout rooms for a second round of discussion.
    - Finally, we'll go back to the main room to share brief takeaways as a full group.
- **Remind participants about slide packet that was sent prior to meeting (and link in chat)**
    - Pre-meeting packet
    - Remind people they can use the chat – notetaker will paste into notes document
- Full Group Report Back
    - Each group will have around 1-2 minutes. The notetaker should share out a high level recap of the discussion.

Meeting Discussion Summary

Meeting discussion included a recap of the previous meeting and update on work to date for both the Climate Element and MJHMP. Seismic hazards, wildfire, landslide, flood, and extreme heat hazard vulnerabilities were summarized for the Steering Committee. Opportunities to strengthen mapping data for earthquake shaking potential, wildfire, and landslide were discussed. Multiple stakeholders expressed an interest in documenting and addressing seasonal population flux throughout the County and how to include this into the hazard mitigation plan. Breakout discussions were held to discuss potential action items for the hazard mitigation plan. Breakout discussions were summarized along with an update on the Climate Element vulnerability assessment and engagement.

Detailed Meeting Notes

Introduce HMP Hazard Profiles Discussion:

- Question from Chip Keen (Clallam County Fire District 6):
  Is the County's critical facilities list available online?

- Answer from Noelle Anderson (Michael Baker, MJHMP Consultant): The list was not made available prior to the meeting, but can be distributed after this call.

HMP Hazard Profiles Discussion Full Group

- Keith & Blaine (Clallam County Fire District 3): The Mercalli chart appears wrong; it looks down level.
  - Answer from Noelle Anderson (Michael Baker, MJHMP Consultant): We pulled this from the DNR website; if you can pass off the updated data set, we can update it in the plan.
- Question from Dennis Burnett (Sequim Emergency Management): Do your population figures include seasonal visitation?
  - Answer from Noelle Anderson (Michael Baker, MJHMP Consultant): No, the figures do not include visitation (i.e. hotels, lodging, etc). The residential assumption is higher than the actual on-the-ground numbers, which allows for a conservative estimate. Vacancy rates were taken into account.
- Chip Keen (Clallam County Fire District 6): The vulnerable population estimates don't appear to include visitors (transients). The population of Forks more than doubles during the summer. I have to imagine that the rest of the county sees a similar increase.
  - Noelle Anderson (Michael Baker, MJHMP Consultant): The census data does not account for seasonal population flux, but we can workshop a way to include it in the plan.
- Keith & Blaine (Clallam County Fire District 3): We are going to have tens of thousands here for our festivals, lavender festival, etc. and we need to be able to capture that because we won't be able to handle an emergency response of this level.
  - Noelle Anderson (Michael Baker, MJHMP Consultant): If you know the numbers for your community during certain times of year, then we can use that to inform a specific mitigation action or infrastructure project to address it.
  - Keith & Blaine (Clallam County Fire District 3): My concern is that we only have one way in and out of here, so an additional 40,000 people would be a significant increased need for resources.

    - Noelle Anderson (Michael Baker, MJHMP Consultant): We can turn that into a mitigation action, but this plan is not as concerned with emergency response.
- Chip Keen (Clallam County Fire District 6): The area my district serves sees 4,000 visitors during Quileute Days. We have 1,100 residents.
- Question from Jim Buck (Strategic Advisor): Does that last map (tsunami) include the Quileute & other zones?
    - Answer from Noelle Anderson (Michael Baker, MJHMP Consultant): We did map the entirety of the county so yes those are included.
- Will Habel (City of Port Angeles): The county has extensive landslide hazards mapped, as does the city.
    - Answer from Noelle Anderson (Michael Baker, MJHMP Consultant): We can look at that afterward; past occurrences may not indicate areas of future occurrences, but we can look at that.
    - Will Habel (City of Port Angeles): It's not based on past occurrences, it's based on soil type and slope (I believe).
- Chip Keen (Clallam County Fire District 6): The Wildfire hazard potential looks inadequate.
    - Noelle Anderson (Michael Baker, MJHMP Consultant): I am going to be looking to this group to see which resources we should look into to map this hazard.
    - Diane Harvey (Project Lead): In the 2009 wildfire protection plan, we identified all of the areas; I can send that to you. I thought I put it into our file.
    - Noelle Anderson (Michael Baker, MJHMP Consultant): We have the plan, but not the GIS map files. We can connect on that.
- Karen Affeld (North Olympic Development Council): I think the challenge here is a lot of this is backward looking and doesn't account for precipitation and temperature changes with climate change going forward. The two community land trusts in Clallam and Jefferson counties together did a detailed GIS analysis of where in the county the soils will hold more water, where temperature gradients may change and be susceptible to fire, and that should be publicly available.
    - Lexi Wagor (North Olympic Land Trust): I am happy to share the climate data that Karen is citing!

  - Noelle Anderson (Michael Baker, MJHMP Consultant): We can merge the 2009 data set and merge it with the data set from the land trust.
  - Diane Harvey (Project Lead): I need to see if we have the GIS dataset, and I would like to see that land trust data set as well.

Climate Vulnerability Assessment Discussion

- Question from Diane Harvey (Project Lead): Under natural environment and water resources, do we also discuss the lack of or need to have more?
  - Answer from Mary Ann Rozance (Cascadia, Project Manager): Yes, we looked at water supply, water systems, stormwater, and wastewater management.
- Bruce Emery (Community Development Director): An undeniable nexus exists between built infrastructure and water systems.
- Question from Luke Strong-Cvetich (Jamestown S'Klallam Tribe): How do the Climate Vulnerability Assessment subsections relate to the rest of the project (non-climate elements of the comprehensive plan)?
  - Answer from Bruce Emery (Community Development Director): The comprehensive plan will be going through a broader public outreach process beginning early fall and going into next year. By spring, hope to have draft document and have climate components integrated in broader process.
- Jim Buck (Strategic Advisor): There is a distinction between water resources and water systems. If we are unable to distribute water, this would present a major concern.

Action Items:

Michael Baker International

- MBI to distribute critical facilities list.
- MBI to coordinate with Keith and Blaine on updated Modified Mercalli dataset (earthquake).
- MBI to workshop a way to include seasonal population flux into the plan.
- MBI to connect with Diane on 2009 CWPP GIS files.

Stakeholders

- Lexi Wagor (North Olympic Land Trust) to provide climate data referenced by Karen.

Breakout Room 1

General Notes

Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?

- No notes

Seismic Hazards

Seismic Hazards	Notes
Ground Shaking Movement of Earth's surface produced by seismic waves. ***Fault Rupture*** Slip or ground movement during an earthquake. ***Liquefaction*** Groundwater induced ground failure during an earthquake.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*** • Two county wastewater treatment plant faculties in the tsunami zone • Fall under weird spot in FEMA component • Operates large sewer system in Carlsburg • Treatment plants are not seismically retrofitted

	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
	• New school (House of Learning) built to latest seismic standard, put in a generator and a commercial kitchen
	  ○ Built up on a hill outside of the tsunami zone
	• PENCOM and EOC are being moved from area of liquefaction to more seismically sound location
	  ○ City and County are main partners in this effort with Lower Elwha Klallam Tribe

	What mitigation actions would you implement to address these vulnerabilities? • Tribal center is 1000 yards from the beach, last hazard mitigation plan includes goal to move center to higher ground out of tsunami zone and to avoid shaking • There has been no seismic retrofitting to this facility • Would take $ 25-50 million to move tribal center • In 10 to 12 years county will be replacing wastewater treatment plants • Prepping for disasters with 30+ day supplies, at the same time do not want to scare people they want them to take hazard prepping seriously

Tsunami

Tsunami	Notes
Distant Tsunami Series of waves caused by seismic activity, originating from a distant source, size and wave height is incident dependent ***Cascadia Tsunami*** Series of waves triggered by seismic activity on Cascadia Fault, estimated to arrive within 15 – 30 minutes sized 30 – 40 feet in height.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?***
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
	What mitigation actions would you implement to address these vulnerabilities?

Extreme Heat

Extreme Heat Temperatures significantly higher than seasonal averages across a region; often defined as 90° F for two to three days.	**Notes** ***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?***
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
	What mitigation actions would you implement to address these vulnerabilities?

Flood

Flood Hazards	Notes
When a waterway receives more water than capable of conveying, and overtops onto land that is normally dry.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?***
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
	What mitigation actions would you implement to address these vulnerabilities?

Landslide

Landslide	Notes
A movement of rock, earth, or debris down a slope. May be caused by earthquakes, oversaturated slopes, or removal of vegetation.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?***
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
	What mitigation actions would you implement to address these vulnerabilities?

Wildfire

Wildfire An unplanned, unwanted fire burning in an natural area with combustible vegetation. May be ignited by natural or human-related causes.	**Notes** ***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?***
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
	What mitigation actions would you implement to address these vulnerabilities?

Breakout Room 2

General Notes

Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?

Keith and Blaine (Clallam County Fire District 3)

- Approximately 15,000 people are expected each year for the Sequim Irrigation Festival and approximately 30,000 are expected for the Sequim Lavender Festival
  - This includes residents of Canada that must travel back home
- In the event of an emergency, Clallam County is on their own.
  - Neighboring Jefferson County may send units to support, but only if they are not facing the same emergency event as Clallam.
    - If units are sent to support the County, first units may take at least 30 minutes to arrive.
  - The County is focused on pre-positioning efforts to help alleviate potential vulnerabilities during hazard events.
    - Currently, the County only has enough food and water to sustain the local population for approximately 3.5 days.
- Storage locations are needed to store food, water, medical, and other emergency supplies.
  - Local food banks have some capacity to store supplies, but logistical challenges exist in moving the supplies across the County to the residents that need them.
    - Building local storage locations that are able to withstand potential hazard events would help to alleviate this issue.
- Would like funding to buy emergency equipment and associated materials.

- Fire district 6 and 3 support…
- Operational area disaster docs include down to discovery bay…
- Make sure storage locations can withstand potential hazards…
- Benefit cost analysis, etc must be taken into consideration, but recommendations can be made as appropriate…

Bruce Emery (Community Development Director)

- The County is geographically isolated, with one road in and out.

    - This positioning presents a heightened state of vulnerability for the County during an emergency.
- In the event of a drastic increase in population (such as during the Lavender Festival), an increased magnitude of need will be present.
    - Storage solutions will be critical in addressing this increased magnitude of need.
- Physical infrastructure projects or nature-based solutions would be welcomed.
- Tribes such as the Lower Elwha Klallam Tribe are in particularly vulnerable locations for hazard events.
    - Community partnerships will be required to address this vulnerability.

- Strategies for dealing with slow harm's way events (SLR)... (eventually have to move) …
- FEMA is funding coastal resiliency projects quite frequently to maximum grant amount…
- Need policies and ordinances in place (prevent new development) …
- 3 crabs' road, bluffs, …

Keith and Blaine (Clallam County Fire District 3)

- The substation located at the base of Discovery Bay would cut all power to the County if damaged or destroyed.
    - The substation is located approximately 32 feet above water level.
        - Potential relocation of this station has been suggested by Jim Buck.
- County vulnerabilities include highways, bridges, restricted access to hospitals, access to medical care.
    - Potential equipment needs are highlighted within these categories.
- ***Potential action item:*** Conduct study on where best storage location may be, commence planning and gather data resources, grant application to procure emergency equipment.

DISCUSSION 2

James Roubal (Quileute Tribe)

- The total land area of the Quileute Tribe is 1.5 square miles
  - The reservation is precariously located in the tsunami inundation zone.
  - The Tribe has been working on initiatives to relocate facilities to higher ground and out of the path of hazards, particularly the tsunami hazard.
    - Phase 1: relocating school that was previously located on the waterfront next to a U.S. Coast Guard station.
    - Phase 2: preservation of life, community, cultural resources
  - Relocating senior center, natural resources building, etc. from previous location on the waterfront.
    - Move to Higher Ground website: https://mthg.org/
- Flood, tsunami, and earthquake present greatest and most devastating risks for the Tribe
- Procuring contractor teams has also been a difficulty.

Jesse Waknitz (Port of Port Angeles)

- Localized flooding and high tide are concerns for the County.
  - Any new infrastructure must be located above estimated extreme high tide levels.
- Extreme heat becomes an issue in the summer months.

Lexi Wagor (North Olympic Land Trust)

- Much of the food produced in the County is sold elsewhere.
  - An effort to keep local products in the area to distribute to local residents may help reduce vulnerability to food shortages during an emergency.

Seismic Hazards

Seismic Hazards	Notes
Ground Shaking Movement of Earth's surface produced by seismic waves.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?***

<table>
<tr><td rowspan="3">Fault Rupture

Slip or ground movement during an earthquake.

Liquefaction

Groundwater induced ground failure during an earthquake.</td><td></td></tr>
<tr><td>What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?

Bruce (Community Development Director)
Agriculture Accessory Use ordinance (related to preserving local farmland) helps to strengthen the viability of agricultural operations in the County.
Keith and Blaine (Clallam County Fire District 3)
Microgrids
Want to see to generate backup power to critical facilities
Rhiana Barkie (Project Coordinator)
How resilient is irrigation system?
If irrigation system faces vulnerability, may be potential action item.
James Roubal (Quileute Tribe)
If Highway 110 or 112 is damaged, tribal access is cut off.
Discussion on moving critical facilities out of flood area.</td></tr>
<tr><td>What mitigation actions would you implement to address these vulnerabilities?

Keith and Blaine (Clallam County Fire District 3)
Would like to see localized/generator backup power to critical facilities.
<u>Potential action item</u>: transfer switch at gas stations (to access underground tanks).</td></tr>
</table>

Tsunami

Tsunami	Notes
Distant Tsunami Series of waves caused by seismic activity, originating from a distant source, size and wave height is incident dependent ***Cascadia Tsunami*** Series of waves triggered by seismic activity on Cascadia Fault, estimated to arrive within 15 – 30 minutes sized 30 – 40 feet in height.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?***
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
	What mitigation actions would you implement to address these vulnerabilities?

Extreme Heat

Extreme Heat Temperatures significantly higher than seasonal averages across a region; often defined as 90° F for two to three days.	**Notes** ***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?***
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk? **Bruce Emery (Community Development Director)** • New construction within the County generally has air conditioning. ○ The elderly often live in manufactured homes that are not equipped with air conditioning, which makes them a potentially vulnerable population.
	What mitigation actions would you implement to address these vulnerabilities?

Flood

Flood Hazards	Notes
When a waterway receives more water than capable of conveying, and overtops onto land that is normally dry.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?***
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?

	What mitigation actions would you implement to address these vulnerabilities?
	
	Keith and Blaine (Clallam County Fire District 3)
	• Elwha river bridge project is a good example of successful flood mitigation
	  ○ Coastal flooding has caused wear and tear on County bridges (including column supports)
	  • ***Potential action item***: Retrofits on aging bridge infrastructure
	Bruce Emery (Community Development Director)
	• Favor engineering designs that facilitate material deposition
	James Roubal (Quileute Tribe)
	• Installing engineered log stations on bank of local river may help to stabilize the area
	• Reinforce water main along Highway 110

Landslide

Landslide	Notes

A movement of rock, earth, or debris down a slope. May be caused by earthquakes, oversaturated slopes, or removal of vegetation.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?***
	
	Keith and Blaine (Clallam County Fire District 3)
	• Landslide locations rather than zones is preferrable.
	  • Vast historical information is available for the landslide hazard
	  ○ Widespread landslide zones along Highway 112
	  • Multiple slide zones exist in the City of Port Angeles
	  ○ Morris Creek is also a high risk area
	• Suggest relying on historical landslide data for future probability
	  ○ Happy to provide shape file
	  ○ Department of Natural Resources (DNR) has a good historical resource
	• To repair landslide damage, just more paving. Looking for better solution
	  ○ ***Action item recorded by Noelle***
	• Hard to estimate landslide recurrence interval
	Bruce Emery (Community Development Director)
	• Depending on slope and geology, 50 foot buffer may need to be expanded.
	• Do not have protection standards for liquefaction where materials shoot out across landscape (during earthquake event or landslide event)
	  ○ Not a primary concern, but worthy of exploration

	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
	What mitigation actions would you implement to address these vulnerabilities?

Wildfire

Wildfire An unplanned, unwanted fire burning in an natural area with combustible vegetation. May be ignited by natural or human-related causes.	**Notes** ***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*** **Keith and Blaine (Clallam County Fire District 3)** • DNR has a 90-day lookout on fire risk ○ The entire County faces some level of fire risk • In the event of a great Cascadia scenario, logistical challenges will delay response
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
	What mitigation actions would you implement to address these vulnerabilities? **Bruce Emery (Community Development Director)** • ***Potential action item***: Develop risk assessment map to map vulnerable areas to wildfire hazard.

Breakout Room 3

General Notes

Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?

- Estimates for earthquakes & tsunami
- Chip Keen - Number of people affected very low, needs to be reviewed
- Can't buy based on 10% of non-occupancy
- Parking spaces X2= 4,000 visitors
- Jim Buck - May be way it is because...Upper West(?) and Neah Bay Village- only major pop centers, rest is national forest
- Then some others, (e.g., Elwha Reservation, downtown Port Angeles, Jamestown, others…)
- Seismic Site Class slide- maybe covers that
- Lindsey - noted people per household
- Sequim, less than county average
- Q- is intent to use county wide average, and then municipalities will adapt, or is this the time to hash it out?
- CCG answer- initial thought is countywide, we will follow back up once we check in with Michael Baker
- Jim Buck – Yes, we will use county wide figure as starting point; when we get to the jurisdiction specific efforts, that's when we'll expect them to tailor
- Seismic- when looking at maps with faults and "seismic fault rupture vulnerability"
- This is ground displacement at surface
- That's the vulnerability being shown on next slide

Seismic Hazards

Seismic Hazards	Notes
Ground Shaking Movement of Earth's surface produced by seismic waves. ***Fault Rupture*** Slip or ground movement during an earthquake. ***Liquefaction*** Groundwater induced ground failure during an earthquake.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*** • Jim Buck - Following up on Lindsey's comment (county wide map); will you be able to provide more localized, detailed maps (e.g., Port Angeles, Sequim)? • Jim noted - Peabody and Lincoln St - how will they drain if reservoir would break beyond NP boundaries? Would look at it with William, says it is deceptive unless you know what looking for. • Chip Keen (CCFD6): Everyone is on a well, and after a Cascadia event, folks would have to use surface water. • William Habel (City of Port Angeles): If there is a bad quake, expects lots of pipe breaks- maybe something to examine.
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk? • Chip Keen (CCFD6): District has done a seismic retrofit of fire station, feasibility study at Quillayute Airport for solar, water supply. • Jim - CCFD4: engineered steel frame building, all with local funds. • Jesse Waknitz (Port of Port Angeles): Port Angeles has existing emergency operations plan which details which actions would be taken in emergency seismic events, resurfaced/repaired airport runway so in good condition for emergency (and general) operations. • Lindsey Sehmel (City of Sequim): Likes idea of more detail for smaller jurisdictions. • William Habel (City of Port Angeles): Updating wetlands protections, also updating critical areas ordinance as part of 2025 comp plan update, will be pushing for greater setbacks,

	also notes fire district and longer-term employees would have more ideas.
	What mitigation actions would you implement to address these vulnerabilities? • Jim Buck: Might want to consider seismic shut-off valves at reservoir- not cheap, would provide drinking water, but not fire flow. • Should talk to Public Works. • Alyssa Rodriguez (Cascadia): What is meant by resilience hub? • Jim Buck: Noted they built one with food, medical supplies, water purification, etc. to take care of 300 people for 30 days, plus set up command center- because we do not expect bridges to stay up. • Lindsey Sehmel (City of Sequim): Raised issue of bridges as an ongoing conversation in South Sound- transportation plan needed, maybe bring in DOT.

Tsunami

Tsunami	Notes
Distant Tsunami Series of waves caused by seismic activity, originating from a distant source, size and wave height is incident dependent ***Cascadia Tsunami*** Series of waves triggered by seismic activity on Cascadia Fault, estimated to arrive within 15 – 30 minutes sized 30 – 40 feet in height.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*** Sea level rise is not fully addressed in the flooding or tsunami maps. From hwy 112 out to Neah Bay would all be under water- flood hazards we have not considered.
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
	What mitigation actions would you implement to address these vulnerabilities?

Extreme Heat

Extreme Heat Temperatures significantly higher than seasonal averages across a region; often defined as 90° F for two to three days.	**Notes** ***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*** • Whose definition of extreme heat did we adopt? • 90 degrees seems low • Lindsey mentioned the extreme heat challenge may not be as difficult since we have community centers with A/C. • One suggestion to consider extreme heat as over 101? • Seems odd to have more folks impacted by heat than wildfires
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk? • Port Angeles: State requiring more heat pumps helps, locally we are planting trees, which reduces heat island. • Sequim: Low Impact Development -> reduced heat island
	What mitigation actions would you implement to address these vulnerabilities? • On demand extreme heat plan/approach for those who don't have infrastructure in their homes • Ensure power grid is up to snuff for increased demand with AC units going in + other electrical demand during hotter seasons

Flood

Flood Hazards	Notes
When a waterway receives more water than capable of conveying, and overtops onto land that is normally dry.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*** • Color scheme does not work - not enough contrast. • Sea level rise is not fully addressed in the flooding or tsunami maps. From hwy 112 out to Neah Bay would all be under water- flood hazards we have not considered.
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk? • Port Angeles: Updating floodplain development code to higher standards than prior, don't have a lot of people living in floodplains (though all of downtown is in tsunami zone). • Sequim: We have interest in a large development outside of the Bay, more greenery, drainage, etc.
	What mitigation actions would you implement to address these vulnerabilities? Building on new development near Sequim: Greenery in more flood prone areas, large need to make sure it drains as tides are rising

Landslide

Landslide
A movement of rock, earth, or debris down a slope. May be caused by earthquakes, oversaturated slopes, or removal of vegetation.

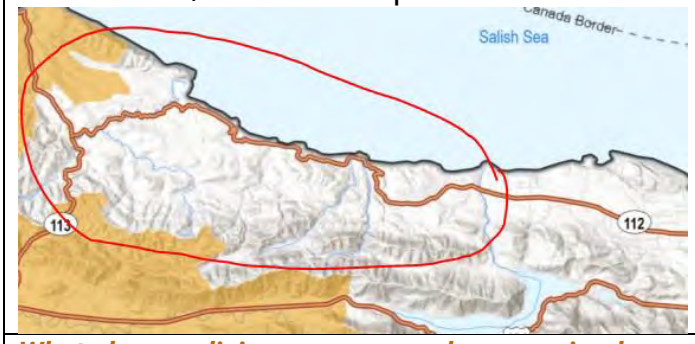
Notes

Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?

Port Angeles: Did not show a huge amount of the county that is mapped as landslide hazards by the County, there are areas that have previous slides and needs to be looked at more closely. Most of the map is showing National Park, which is not our top priority. Look at Clallam County landslide hazards mapping.

Jim Buck: Landslide map is "inadequate". We know there are landslide zones not shown, e.g., near Peninsula College, west along hwy 112

- No recognition of potential bluff problems in Port Angeles.
- Does not see any coastal hazards on there, and we have people living all along coast
- Historically – look at photos from past, you can see landslide issues
- Hwy 112 is biggest continuously moving highway, landslide/bluff erosion potential



What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?

What mitigation actions would you implement to address these vulnerabilities?

Wildfire

Wildfire An unplanned, unwanted fire burning in an natural area with combustible vegetation. May be ignited by natural or human-related causes.	**Notes** ***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*** Planning area is the area each jurisdiction has authority to plan for (e.g. city boundaries). Much of Pacific Coast is state or federal land, reservation land. When you look at forest fire map, almost all is in national forest/park. Chip Keen/William Habel : Concern this map is nowhere close to what it should be. Most of this county is forest; don't understand how only 7 people are expected to be impacted. Known history (past and recent) • 4th of July wildfire (Moved toward Forks, could have gone right into downtown Forks) • Forks burned down in the '20s. There is better data. Going to want to look at windflow, patterns of friction, summer lightning storms. DNR should be the main data source WUBI got removed from implementation Jim Buck: Wildfire Protection Plan does better job. Also, Makah does a decent job accounting for fuel, north or south slope, seasonal rain, steepness, how much you can see, have turned to Washington Fire to get comments.
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk? • CCFD6: Working with DNR, updated brush truck, bought a new one

	• We have a better idea of what is going on than federal officials out East
	What mitigation actions would you implement to address these vulnerabilities? Anne Chastain from Clallam County hosts County-wide presentation on wildfire preparedness – like 6 presentations

Breakout Room 4

General Notes

Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?

- Diane Harvey (Project Lead, Clallam County): Blaine was talking about the seasonal population changes for the City of Sequim, but we should also be talking about the county as we have a significant increase in population during the summer. At some points we may have near a half a million in the county, which changes what we should do in terms of emergency preparedness. Supplies, etc. I'm advocating that FEMA create a storage facility warehouse in our community. As of now, FEMA does not provide what should be provided so we want to include that in the plan to document that.
- Karen Affeld (North Olympic Development Council): Keep in mind that the population of visitors is likely to be dispersed. Some may be staying at lodges or hotels, but many will be camping, or in Airbnbs where they may be completely unprepared during an emergency/hazard. Dealing with that requires a different level of planning beyond neighborhood planning.

Seismic Hazards

Seismic Hazards	Notes
Ground Shaking Movement of Earth's surface produced by seismic waves. ***Fault Rupture*** Slip or ground movement during an earthquake. ***Liquefaction*** Groundwater induced ground failure during an earthquake.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*** • Karen Affeld (North Olympic Development Council): We should account for bridges and roads that may be impacted. Centralized locations will only help those in those urban areas. Ideally, there would be resilience hubs in each of the geographical islands that may be created by impacted roads/access barriers. • Diane Harvey (Project Lead, Clallam County): I estimate at least 20 micro-islands and then needing a plan to get the supplies to other micro-islands, which involves having the military to do that since we don't have helicopters.
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk? • Diane Harvey (Project Lead, Clallam County): We have the shakeout preparedness every year to make people aware of what they should do in case of an earthquake. We have also been trying to push the port to build microgrids at the airport. We have been able to use state money to get fuel generators, specifically at the county fairgrounds so that can be a mass staging area.
	What mitigation actions would you implement to address these vulnerabilities? • Diane Harvey (Project Lead, Clallam County): We need to identify resilience hubs and fortify those. Seismic retrofits in schools, Jim has tried to get that going. We have had difficulties getting money based on benefit cost analysis. • Karen Affeld (North Olympic Development Council): I know there are programs for wildfire risk, which tells homeowners how to fireproof. Something similar may exist to fund/identify seismic retrofits at the homeowner level.

	• Diane Harvey (Project Lead, Clallam County): That is kind of project would driven by the buildings. There could be a study done to identify buildings in need, but not sure of resources for that.

Tsunami

Tsunami	Notes
Distant Tsunami Series of waves caused by seismic activity, originating from a distant source, size and wave height is incident dependent ***Cascadia Tsunami*** Series of waves triggered by seismic activity on Cascadia Fault, estimated to arrive within 15 – 30 minutes sized 30 – 40 feet in height.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*** • Dennis Burnett (Sequim Emergency Management): Addressing tsunami would include the need for community centers as there would be a lot of people displaced. In Sequim we have identified 3 centers and coordinating with the red cross to staff those centers with volunteers. ***What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?*** • Diane Harvey (Project Lead, Clallam County): The county does a lot of public outreach with evacuation maps and practicing evacuation. We also have Everbridge for alerts, as long as we have computer, internet and electricity, that would reach almost all of our residents. We have generators and Starlink and we are looking to expand that and looking to get funding to expand that. The county has a generator if the county building is around after an earthquake. ***What mitigation actions would you implement to address these vulnerabilities?*** • Diane Harvey (Project Lead, Clallam County): We do need updated evacuation maps and we are working with the state for that. We also face the same problems with earthquake and tsunami in terms of adequate supplies, community centers, etc. especially with seasonal changes in population. I need a lot more generators, it is difficult to get funding for fuel generators. • Karen Affeld (North Olympic Development Council): We could use more tsunami sirens, I can't hear them when they go off.

Extreme Heat

Extreme Heat	Notes
Temperatures significantly higher than seasonal averages across a region; often defined as 90° F for two to three days.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*** • Diane Harvey (Project Lead, Clallam County): I'm concerned that we don't have data on a good portion of the map, and specifically Sequim. • Mary Ann Rozance (Cascadia, Project Manager): There are a lot of limitations in interpreting the county data at this level. We can apply some historical data, specifically to Sequim. Also, it might be that Forks has a hotter average temperature (as a baseline) but that the change in average (which is what is mapped) is expected to be lower than other areas. • Karen Affeld (North Olympic Development Council): We do have so many micro-climates so we need to take into account those when talking about increased temperature. • Luke Strong-Cvetich (Jamestown S'Klallam Tribe): This also isn't capturing the coastal influence on high temperatures. Forks specifically can get really hot. • Diane Harvey (Project Lead, Clallam County): Look into state hazard mitigation plan has a chart of the heat dome event 2021.
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk? • Diane Harvey (Project Lead, Clallam County): We have been trying to get different facilities to be available during heat events. There is one in Sequim that I'm aware of but nowhere else. Sometimes there are other facilities that are willing to do it, but we don't have a list of facilities that we can announce as cooling centers.

	• Karen Affeld (North Olympic Development Council): The resilience hubs that we have been talking about would include cooling centers, etc.
	What mitigation actions would you implement to address these vulnerabilities?

Flood

Flood Hazards	Notes
When a waterway receives more water than capable of conveying, and overtops onto land that is normally dry.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*** • Diane Harvey (Project Lead, Clallam County): We want to include sea level rise in these considerations because flooding in coastal areas is going to be an issue. People having to potentially leave their houses to relocate. From a land use perspective, will we continue to allow people to build in those areas? We will need to have a real analysis done so we can enforce this. • Karen Affeld (North Olympic Development Council): The FEMA maps tend to do a poor job identifying localized stream flooding, small river and creek flooding. That kind of modelling is not reflected in those maps.
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
	What mitigation actions would you implement to address these vulnerabilities? • Diane Harvey (Project Lead, Clallam County): We still need to be able to have a mass care ability, we have a significant amount of people on our coast. We may need to provide housing for them. That planning hasn't been done here. Also, outreach, policies, relocation policies, and land use regulations.

Landslide

Landslide	Notes
A movement of rock, earth, or debris down a slope. May be caused by earthquakes, oversaturated slopes, or removal of vegetation.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*** • Diane Harvey (Project Lead, Clallam County): I don't have an issue with the map, there are probably more areas that should be orange, even more towards the Makah reservation and east of 112. One of the things with landslide is that we get cutoff especially on 112, we need to have alternative routes, and some cases needing to use private logging roads, and that means committing people to allowing us to use those roads. • Dennis Burnett (Sequim Emergency Management): I wonder what can be gained by talking to California DOT. • Luke Strong-Cvetich (Jamestown S'Klallam Tribe): Does landslide not include erosion and coastal bluff erosion? • Casey Marchese (Hazard Mitigation Planner, MBI): Coastal erosion is included in sea level rise.
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?
	What mitigation actions would you implement to address these vulnerabilities? • Diane Harvey (Project Lead, Clallam County): I would like to have the library in Clallam Bay have sufficient backup generators so people can have electricity there in case landslides knock out electricity. We can look into providing energy, water, resources and even septic services to people. • Karen Affeld (North Olympic Development Council): I think in addition to road mapping,

	delivering supplies by sea might be a solution. The port has a proposal for spud barging. There may be plans to put in place for transporting people and goods along the sea highway when roads (112) are knocked out.

Wildfire

Wildfire	Notes
An unplanned, unwanted fire burning in an natural area with combustible vegetation. May be ignited by natural or human-related causes.	***Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*** • Diane Harvey (Project Lead, Clallam County): This map has problems, specifically near the City of Forks. • Luke Strong-Cvetich (Jamestown S'Klallam Tribe): This map is focused on federal lands, but it's the interfaces that were going to be worried about. Fire activity around lake crescent in recent years. Look at your data sources. • Diane Harvey (Project Lead, Clallam County): We had a fire last year in forks. We should at least circle the areas on the maps that we know we have vulnerability that might not be mapped.
	What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk? • Diane Harvey (Project Lead, Clallam County): We went out and got 125k dollar to do a community wildfire plan. We will be working with DNR and Parks service to do vegetation management. With that plan we can go out and get funding to implement those actions.
	What mitigation actions would you implement to address these vulnerabilities? • Karen Affeld (North Olympic Development Council): Identify in advance where you have dead-end roads, specifically in the wildland-urban interface where fire dept will have trouble getting to those areas. It's that urban wildland interface where the issues are worst.

Hazard Mitigation and Climate Resilience (HMCR) Steering Committee

Meeting #4

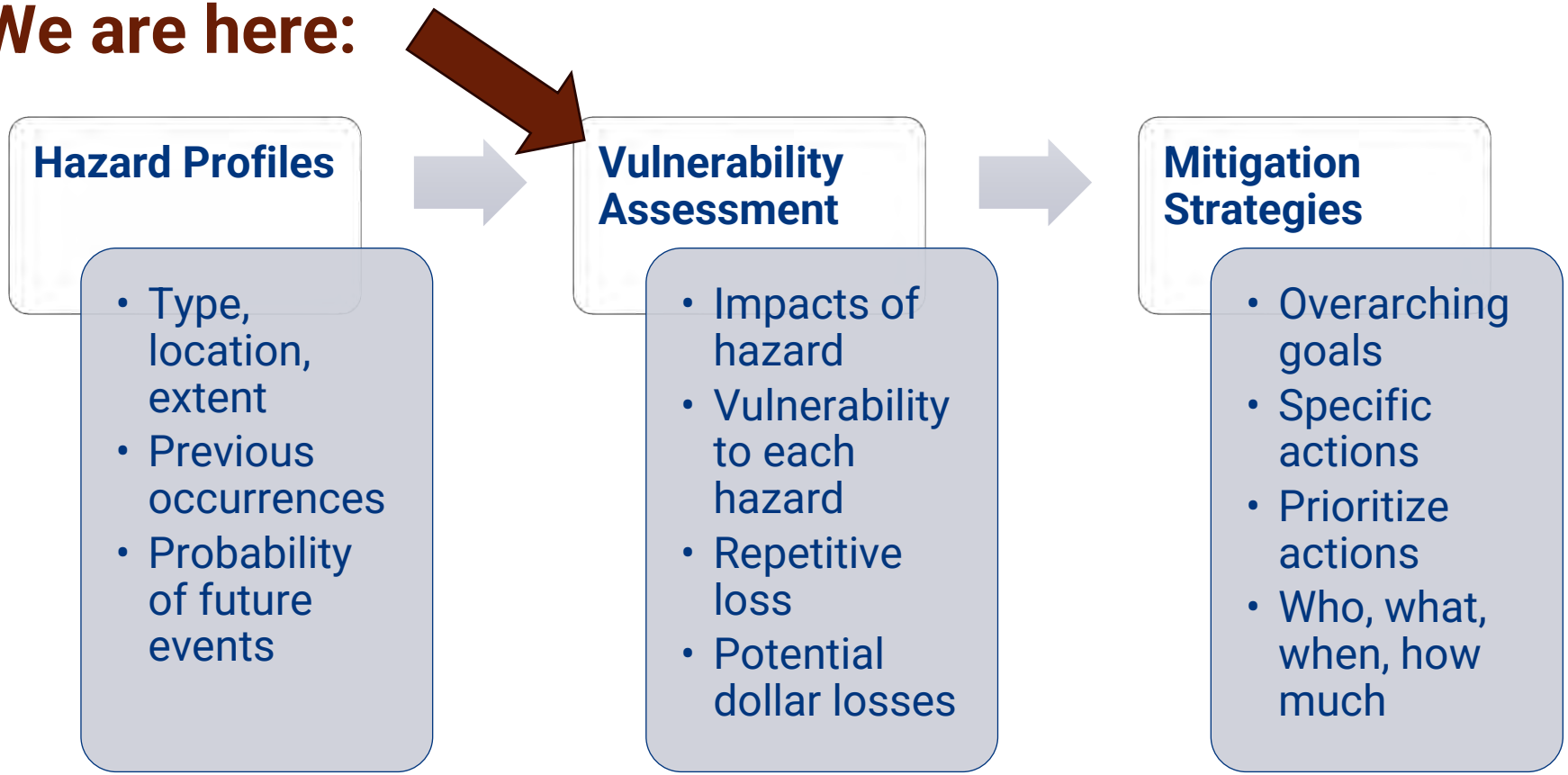
June 26th, 2024 | 1:00-3:00 PM |

HMP Hazard Profiles and VA

Introduction

HMP Development

We are here:



Summarize and Document Risk Assessment

HMP VA - Approach

People (including Socially Vulnerable Populations)

- **Data Source:**
  - CDC SVI Index, Supplemented by State Data
  - Clallam County Parcel Data
  - Risk maps for each hazard (i.e, FEMA flood maps)
- **Approach**
  - Overlay parcel data and SVI data with hazard zones to understand population size and distribution at risk on a hazard-by- hazard basis

Structures and Systems

- **Data Source:**
  - Critical Facilities, self identified by Clallam County + Jurisdictional Annexes
  - Risk maps for each hazard (i.e., FEMA Flood Maps)
- **Approach**
  - Overlay critical facilities database with hazard zones to understand structures/systems and asset distribution at risk on a hazard-by-hazard basis

HMP VA - Approach

Today's Discussion

- **People, Systems, Infrastructure VA for:**
  - Seismic – Fault Rupture, Liquefaction, Ground Shaking
  - Tsunami
  - Extreme Heat
  - Flood
  - Landslide
  - Wildfire
- **Data Output**
  - # of residential units
  - # of people
  - # of non-residential development SF

Meeting #5 and #6 Discussions

- **Additional Hazards:**
  - Dam/Reservoir Failure
  - Disease/Pandemic
  - Drought
  - Human-Caused
  - Sea Level Rise
  - Severe Weather – Windstorms, Winter Storm
- **Social Vulnerability**
  - CDC Social Vulnerability Index
  - Washington Department of Health
- **Mitigation Strategies for All Hazards After VA is Completed**

Methodology and Assumptions

Assumptions provide conservative estimates of vulnerability for a planning-level study

- **Parcel Data Analysis:**
  - Parcels with total or partial intersection with hazard zone are considered vulnerable.
  - Residential Unit Assumptions:
    - **2.23** Persons per Household
    - Data Gap: Housing Unit Vacancy Rate of **11%**
    - US Census ACS 2018 – 2023

- **Critical Facility Analysis:**
  - Facilities self identified by Clallam County and Annexes
  - Addresses/GPS points geo-coded in ArcGIS Pro and manually checked for locational accuracy

Community Lifelines

Community Lifelines Defined

A Construct for Community Impact Assessment and Analysis

A lifeline enables the continuous operation of **critical government and business functions** and is **essential to human health and safety or economic security**.

- Lifelines are the most fundamental services in the community that enable all other aspects of society to function.
- Lifelines are the integrated network of assets, services, and capabilities that are used day-to-day to support the recurring needs of the community.
- When disrupted, decisive intervention (e.g., rapid service re-establishment or employment of contingency response solutions) is required.

Questions?

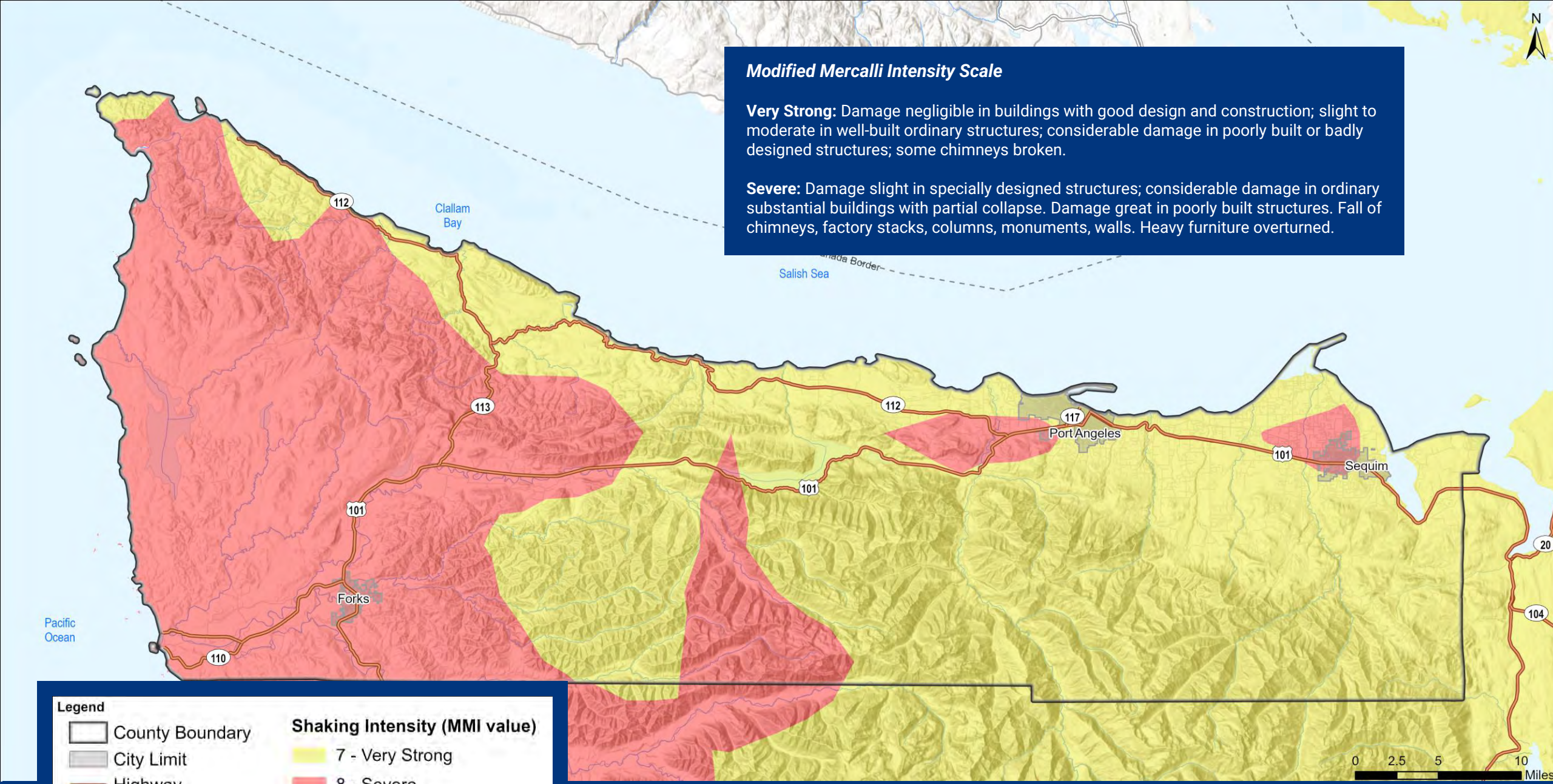
Type your comment or question into the Zoom chat

OR

Raise your virtual hand to comment or ask verbally

HMP Hazard Profiles and VA

Discussion #1



Modified Mercalli Intensity Scale

Very Strong: Damage negligible in buildings with good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.

Severe: Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.

Legend

- County Boundary
- City Limit
- Highway
- Local Road
- Stream

Shaking Intensity (MMI value)

- 7 - Very Strong
- 8 - Severe

Seismic Site Class

Data Source: Washington DNR
Cascadia Seismic Scenario

Seismic Site Class Vulnerability

People

77,616 (all)
People

38,876 (all)
Residential Units

1 billion + (all)
Non-Residential Square Footage

Systems & Infrastructure

Seismic Liquefaction

Data Source: Washington DNR
Ground Response –
Liquefaction Susceptibility

Seismic Liquefaction Vulnerability

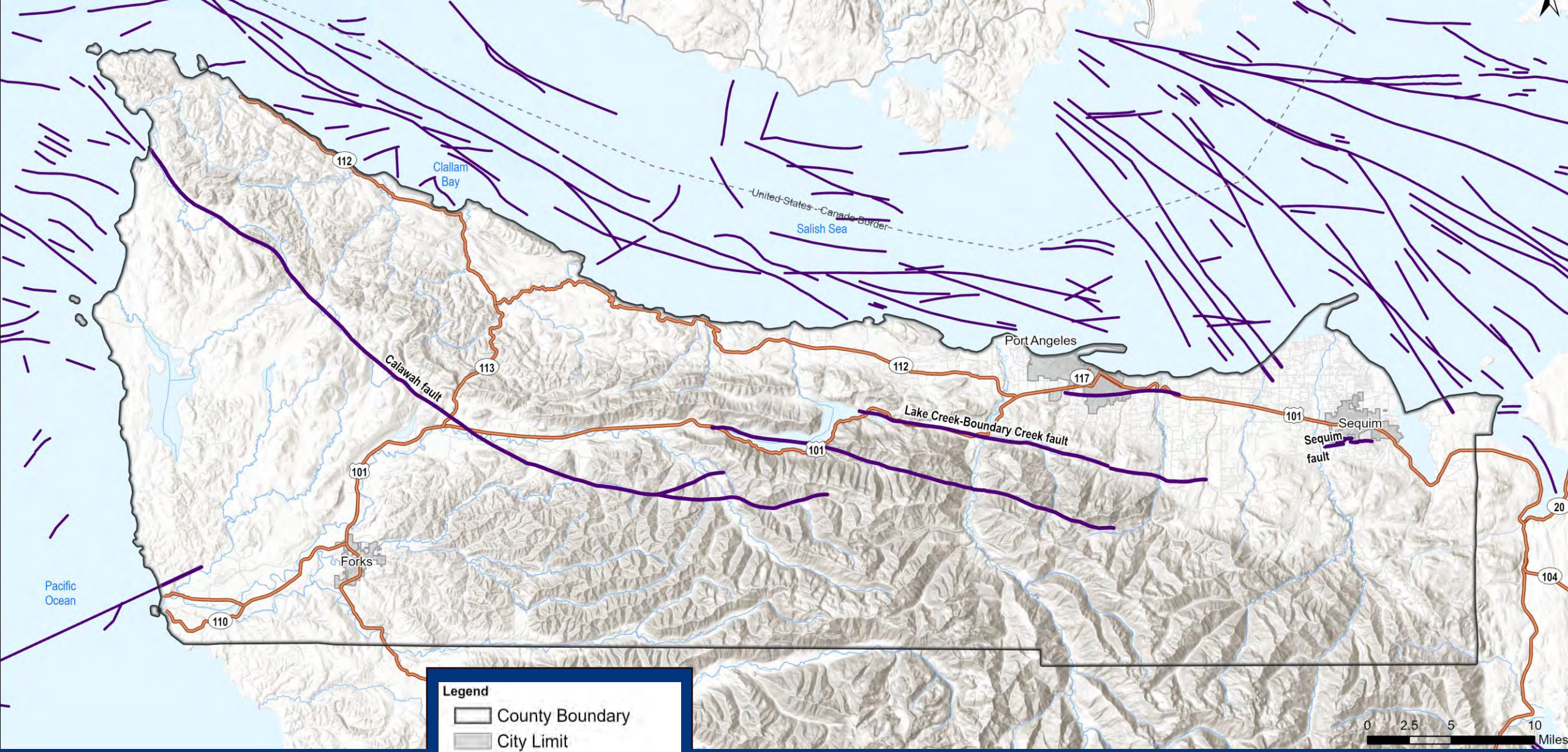
People

18,628
People

8,353
Residential Units

317 mil +
Non-Residential Square Footage

Systems & Infrastructure



Data Source: Washington DNR
500k Surface Geology, Faults

Methodology: 1,000 feet from mapped fault

Seismic Fault Rupture

Seismic Fault Rupture Vulnerability

People

4,804
People

2,154
Residential Units

93 mil +
Non-Residential Square Footage

Systems & Infrastructure

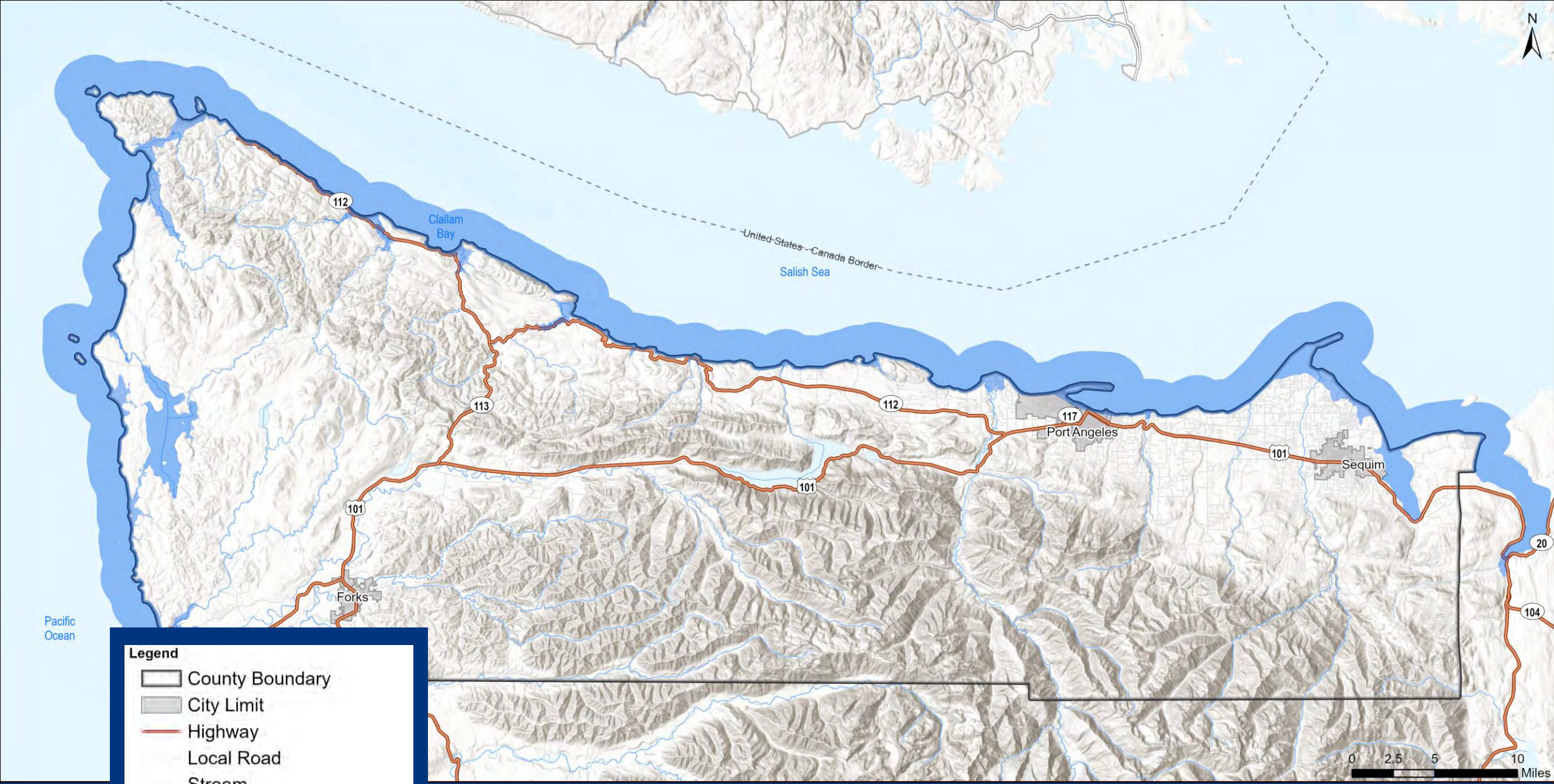
7
Facilities
Water Systems

5
Facilities
Food, Hydration, Shelter

5
Facilities
Safety and Security

4
Facilities
Communications

2
Facilities
Energy (Power & Fuel)



Tsunami Hazard

Data Source: Washington DNR
Tsunami Hazard Areas

Tsunami Hazard Vulnerability

People

3,528
People

1,582
Residential Units

232 mil +
Non-Residential Square Footage

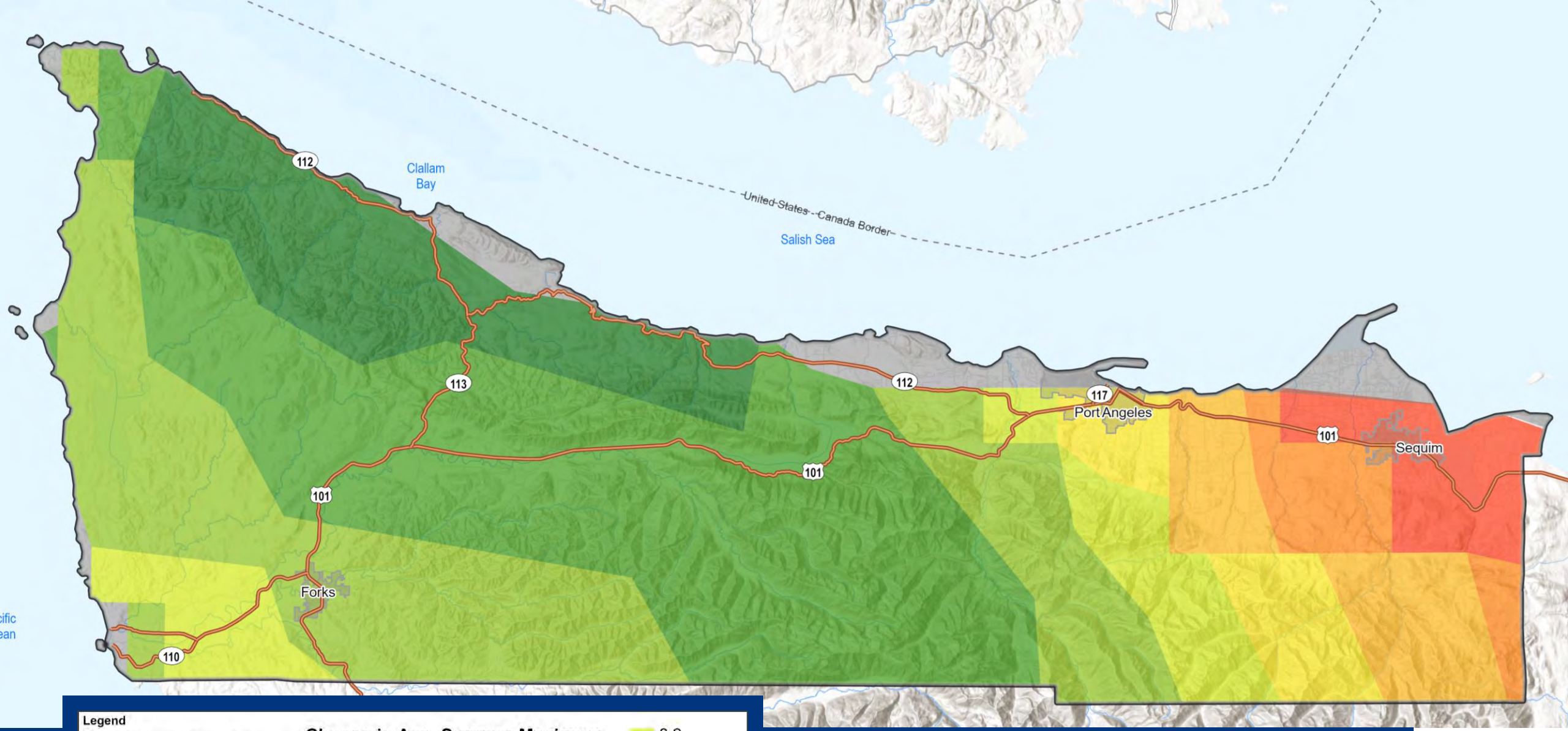
Systems & Infrastructure

Breakout Discussion #1

- *Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*
- *What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?*
- *What mitigation actions would you implement to address these vulnerabilities?*

HMP Hazard Profiles and VA

Discussion #2



Legend

- County Boundary
- City Limit
- Highway
- Local Road
- Streams

Change in Avg. Summer Maximum Temperature (2020-2049)

Degrees (F)

- 2.9
- 3.0
- 3.1
- 3.2
- 3.3
- 3.4
- 3.5
- 3.6
- No Data

Extreme Heat

Data Source:
University of Washington, Climate Mapping for a Resilient Washington

Methodology:
3.4 – 3.6°F Considered Highest Vulnerability (top 1/3rd)

Extreme Heat Vulnerability

People

33,360
People

15,094
Residential Units

538 mil +
Non-Residential Square Footage

Systems & Infrastructure

56 *Facilities* — Food, Hydration, Shelter

44 *Facilities* — Water Systems

21 *Facilities* — Safety and Security

17 *Facilities* — Energy (Power & Fuel)

9 *Facilities* — Health and Medical

8 *Facilities* — Communications

6 *Facilities* — Transportation

2 *Facilities* — Hazardous Materials

2 *Facilities* — Other

Legend

- County Boundary
- City Limit
- Highway
- Local Road
- Streams

Special Flood Hazard Area

Flood Zone

- A - 100 Year Flood Zone (with no Base Flood Elevations)
- AE - 100 Year Flood Zone (with Base Flood Elevations)
- AH - 100 Year Flood Zone (with Flood Depths of 1 to 3 Feet)
- VE - 100 Year Flood Zone (Coastal Flood Zone with Wave Action Velocity)

Flood Hazards

Data Source: Draft FEMA Risk Map DFRIM 2024

Flood Hazards Vulnerability

People

11,329
People

5,080
Residential Units

336 mil +
Non-Residential Square Footage

Systems & Infrastructure

7 *Facilities* — Hazardous Materials

4 *Facilities* — Food, Hydration, Shelter

3 *Facilities* — Safety and Security

3 *Facilities* — Transportation

2 *Facilities* — Communications

1 *Facilities* — Health and Medical

Landslide Hazards

Data Source: Washington DNR, Landslides Dataset (2021)

Landslide Hazards Vulnerability

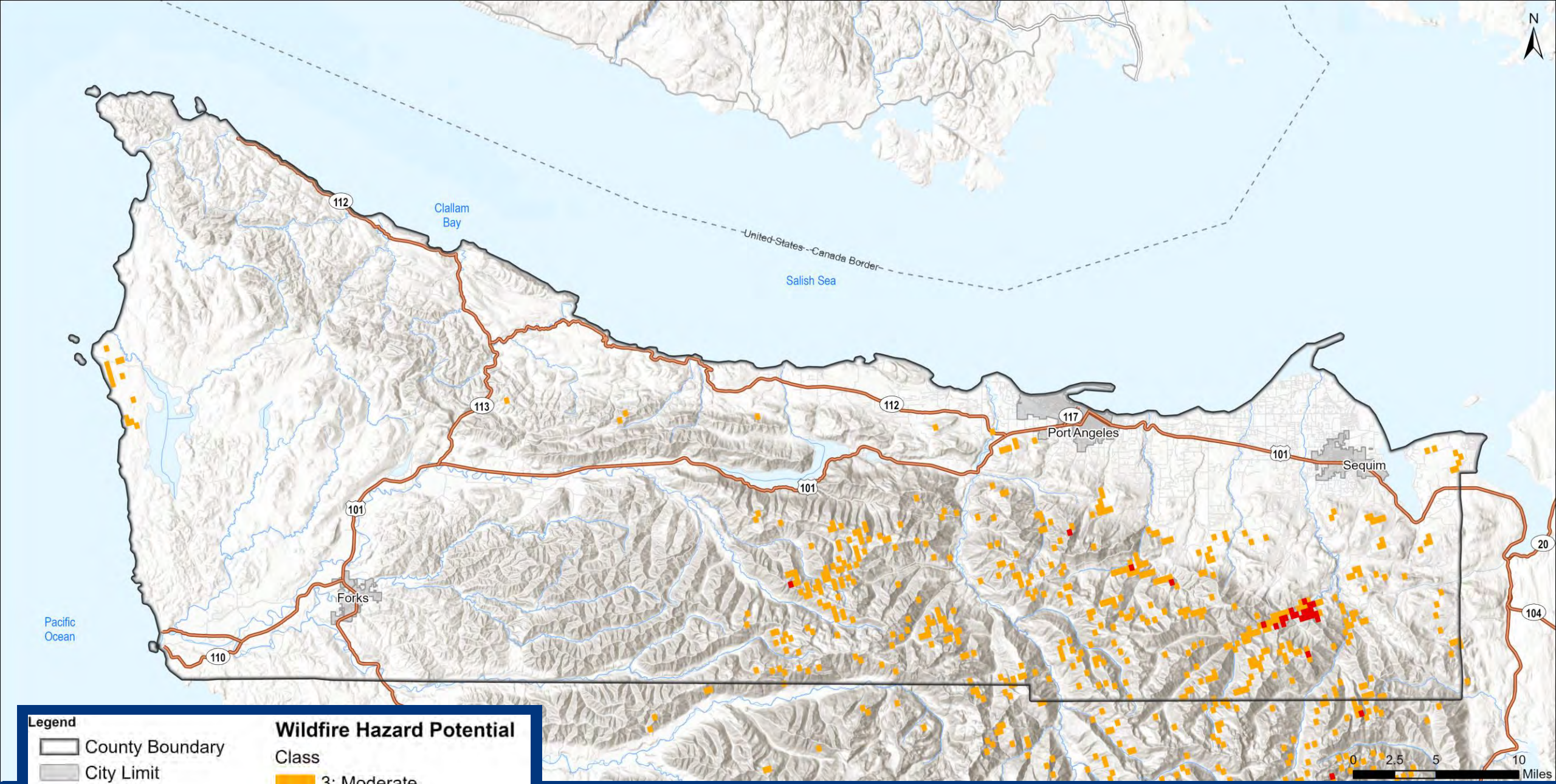
People

5,241
People

2,350
Residential Units

191 mil +
Non-Residential Square Footage

Systems & Infrastructure



Wildfire Hazard

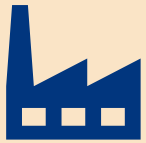
Data Source:
US Department of Agriculture, Wildfire Hazard Potential for the US (2023)

Wildfire Hazard Vulnerability

People

70
People

31
Residential Units



9.9 mil +
Non-Residential Square Footage

Systems & Infrastructure

0 ***Critical Facilities in Wildfire Hazard Zone***

Breakout Discussion #2

- *Do you have any additional comments or questions about draft hazard profiles and draft VA results? Is there anything surprising or missing from these profiles?*
- *What plans, policies or programs have you implemented to reduce risk? What plans, policies or programs existing in your community reduce risk?*
- *What mitigation actions would you implement to address these vulnerabilities?*

Climate Vulnerability Assessment

Defining Climate Vulnerability

Climate risks are the range of potential impacts a system would be affected by climate change and are dependent on exposure and sensitivity. To characterize risks, we will look at:

Exposure + **Sensitivity** − **Adaptive Capacity** = **Vulnerability**

The degree to which a system is stressed by the impacts of climate change

The degree to which that system is likely to be affected by climate impacts

Exposure and sensitivity increase vulnerability, while adaptive capacity decreases vulnerability.

The ability to cope and respond to the impacts of climate change. To characterize adaptive capacity, we will look at current and potential adaptation actions that could minimize the impacts of climate risks.

Climate Vulnerability Assessment (CVA)

The CVA outcomes can inform the Comprehensive Plan Climate Element and Hazard Mitigation Plan by:

- Informing us about **specific communities and locations** that will likely experience climate impacts.
- Using **future projections**, not only historical data.
- Illustrating **holistic and overlapping impacts** of climate changes.

Proposed Focus Areas

Public Health and Community Wellbeing	Natural Environment and Water Resources	Economic Development and Land Use	Built Infrastructure

Climate Vulnerability Assessment Focus Areas

Focus Area	Subsectors
Public Health and Community Wellbeing	Public Health
	Community Resources
	Emergency Management
Natural Environment and Water Resources	Ecosystems and Critical Areas
	Parks, Trails, and Open Space
	Water Systems
Economic Development and Land Use	Local Industries and Businesses
	Land Use and Resource Lands
Built Infrastructure	Transportation
	Housing
	Energy

Name (Original Name)	User Email	Join Time	Leave Time	Duration (Minut	Guest	Recording Disc	In Waiting Room
Abigail Lambert# Cascadia (she/hers) (Zoom Cascadia)	zoom@cascadi	6/26/2024 12:47	6/26/2024 13:32	46	No	OK	No
Alyssa Rodriguez (she/her) Cascadia		6/26/2024 12:53	6/26/2024 12:53	1	Yes	No Response	Yes
Bruce Emery, Clallam County DCD		6/26/2024 12:59	6/26/2024 12:59	1	Yes	No Response	Yes
Casey Marchese (Michael Baker)		6/26/2024 12:51	6/26/2024 12:51	1	Yes	No Response	Yes
Chip CCFD6 he/him (Chip Keen)		6/26/2024 12:59	6/26/2024 13:32	33	Yes	OK	No
Chip Keen		6/26/2024 12:59	6/26/2024 12:59	1	Yes	No Response	Yes
Cindy Jayne# she/her# Local 20/20 (Cindy Jayne)		6/26/2024 13:02	6/26/2024 13:31	29	Yes	OK	No
dburnett		6/26/2024 12:57	6/26/2024 12:59	2	Yes	No Response	Yes
Diane Harvey, Clallam County		6/26/2024 12:54	6/26/2024 12:59	5	Yes	No Response	Yes
Ellen Chappelka (EMD)		6/26/2024 13:01	6/26/2024 13:02	1	Yes	No Response	Yes
Glen Roggenbuck - Lower Elwha Klallam Tribe		6/26/2024 12:57	6/26/2024 12:59	3	Yes	No Response	Yes
Jake Patterson- Clallam 2 Fire Rescue		6/26/2024 13:00	6/26/2024 13:00	1	Yes	No Response	Yes
Jake Poland (Michael Baker Intl)		6/26/2024 12:55	6/26/2024 12:55	1	Yes	No Response	Yes
James Roubal (Quileute Tribe) (James R.)		6/26/2024 13:01	6/26/2024 13:32	32	Yes	OK	No
Jen Garcelon# Clallam County (Jen Garcelon)		6/26/2024 12:59	6/26/2024 13:32	33	Yes	OK	No
Jesse Waknitz - Port of Port Angeles		6/26/2024 12:58	6/26/2024 12:59	1	Yes	No Response	Yes
Jesse Waknitz (he/him) - Port of Port Angeles		6/26/2024 12:59	6/26/2024 13:31	32	Yes	No Response	No
Jim Buck		6/26/2024 12:59	6/26/2024 13:00	1	Yes	No Response	Yes
Karen Affeld - North Olympic Development Council		6/26/2024 13:05	6/26/2024 13:05	1	Yes	No Response	Yes
Keith & Blaine CCFD#3		6/26/2024 12:47	6/26/2024 12:59	12	Yes	No Response	Yes
Lexi Wagor (they/she), North Olympic Land Trust		6/26/2024 12:59	6/26/2024 12:59	1	Yes	No Response	Yes
Lindsey (She/Her) - City of Sequim (Lindsey Sehmel)		6/26/2024 13:01	6/26/2024 13:31	31	Yes	OK	No
Lindsey Sehmel		6/26/2024 13:00	6/26/2024 13:01	1	Yes	No Response	Yes
Luke Strong-Cvetich		6/26/2024 13:00	6/26/2024 13:00	1	Yes	No Response	Yes
Mary Ann Rozance (she/her)# Cascadia Consulting Group		6/26/2024 12:51	6/26/2024 14:12	82	Yes	OK	No
Meg Horst. Cascadia (she/her) (Megan Horst (she/her), PSU)		6/26/2024 12:51	6/26/2024 13:31	40	Yes	OK	No
Noelle Anderson - Michael Baker Intl (Noelle Steele)		6/26/2024 12:48	6/26/2024 13:30	43	Yes	No Response	No
Noelle Steele		6/26/2024 12:47	6/26/2024 12:48	2	Yes	No Response	Yes
Rhiana Barkie (Clallam Co Project Coordinator)(she/her)		6/26/2024 13:00	6/26/2024 13:31	31	Yes	OK	No
Ron Garcelon		6/26/2024 12:47	6/26/2024 12:59	12	Yes	No Response	Yes
tinker		6/26/2024 13:08	6/26/2024 13:08	1	Yes	No Response	Yes
Victoria Alvarez-Conn# Cascadia (she/her)		6/26/2024 12:47	6/26/2024 15:00	133	Yes	No Response	No
William Habel - City of Port Angeles		6/26/2024 13:00	6/26/2024 13:00	1	Yes	No Response	Yes

Zoom Meeting
You are viewing Abigail Lambert, Cascadia (she...'s screen
View Options
Sign in
View
Hazard Mitigation and Climate Resilience (HMCR) Steering Committee
Meeting #4
June 26th, 2024 | 1:00-3:00 PM |
Abigail Lambert, Casca...
Casey Marchese (Mich...
Bruce Emery, Cl...
Bruce Emery, Clallam ...
Noelle Anderson - Mic...
Mary Ann Rozance (she/h...
Marchese, Casey (Casey.Marchese@mbakerintl.com) is signed in
From Meg Horst. Cascadia (she/her) to Everyone
That's a great word!
Unmute
Stop Video
Security
Participants
25
Share Screen
Summary
AI Companion
Apps
Whiteboards
Notes
More
Leave
Participants (25)
Find a participant
Diane Harvey, Clallam County
Glen Roggenbuck - Lower Elwha Klallam Tribe
Jake Patterson- Clallam 2 Fire Rescue
Jake Poland (Michael Baker Intl)
James R.
Jen Garcelon
Jesse Waknitz - Port of Port Angeles
Jim Buck
Keith & Blaine CCFD#3
Lexi Wagor (they/she), North Olympic Land ...
Lindsey Sehmel
Luke Strong-Cvetich
Meg Horst. Cascadia (she/her)
Rhiana Barkie (Clallam County Project Coord...
William Habel - City of Port Angeles
Ron Garcelon
Invite
Mute All
1:01 PM
6/26/2024

Zoom Meeting

You are viewing Abigail Lambert, Cascadia (she...'s screen View Options

Sign in View

Meeting purpose

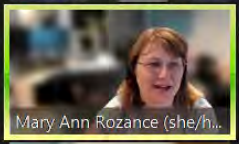
Review work to date, discuss draft hazard profiles and HMP vulnerability assessment approach, introduce climate vulnerability assessment.

Type in the chat: Name, organization

Icebreaker (in chat): What is one hazard mitigation project or policy that you think helps to build resilience to natural and human-caused hazards?

Please rename yourself with your first name, organization, and pronouns.

Bruce Emery, Cl...



Unmute | Stop Video | Security | Participants 25 | Share Screen | Summary | AI Companion | Apps | Whiteboards | Notes | More 2 | Leave

Participants (25)

Find a participant

- CM Casey Marchese (Michael Bak... (Co-host, me)
- MA Mary Ann Rozance (she/her), Cascadi... (Host)
- AL Abigail Lambert, Cascadia (sh... (Co-host)
- AR Alyssa Rodriguez (she/her) Cascad... (Co-host)
- NA Noelle Anderson - Michael Baker I... (Co-host)
- VA Victoria Alvarez-Conn, Cascadia (s... (Co-host)
- BE Bruce Emery, Clallam County DCD
- CK Chip Keen
- D dburnett
- DH Diane Harvey, Clallam County
- GR Glen Roggenbuck - Lower Elwha Klallam Tribe
- JP Jake Patterson- Clallam 2 Fire Rescue
- JP Jake Poland (Michael Baker Intl)
- JR James R.
- JG Jen Garcelon
- JW Jesse Waknitz - Port of Port Angeles

Invite | Mute All | ...

1:01 PM
6/26/2024

Zoom Meeting
Recording
Sign in

Flood Hazards Vulnerability

People

11,329
People

5,080
Residential Units

336 mil +
Non-Residential Square Footage

Systems & Infrastructure

7 *Facilities* — Hazardous Materials

4 *Facilities* — Food, Hydration, Shelter

3 *Facilities* — Safety and Security

3 *Facilities* — Transportation

2 *Facilities* — Communications

1 *Facilities* — Health and Medical

Noelle Anderson - Michae...
Casey Marchese (Mich...
Mary Ann Rozance (sh...
Bruce Emery, Clallam ...
Keith & Blaine CCFD#3
Jake Poland (Michael B...
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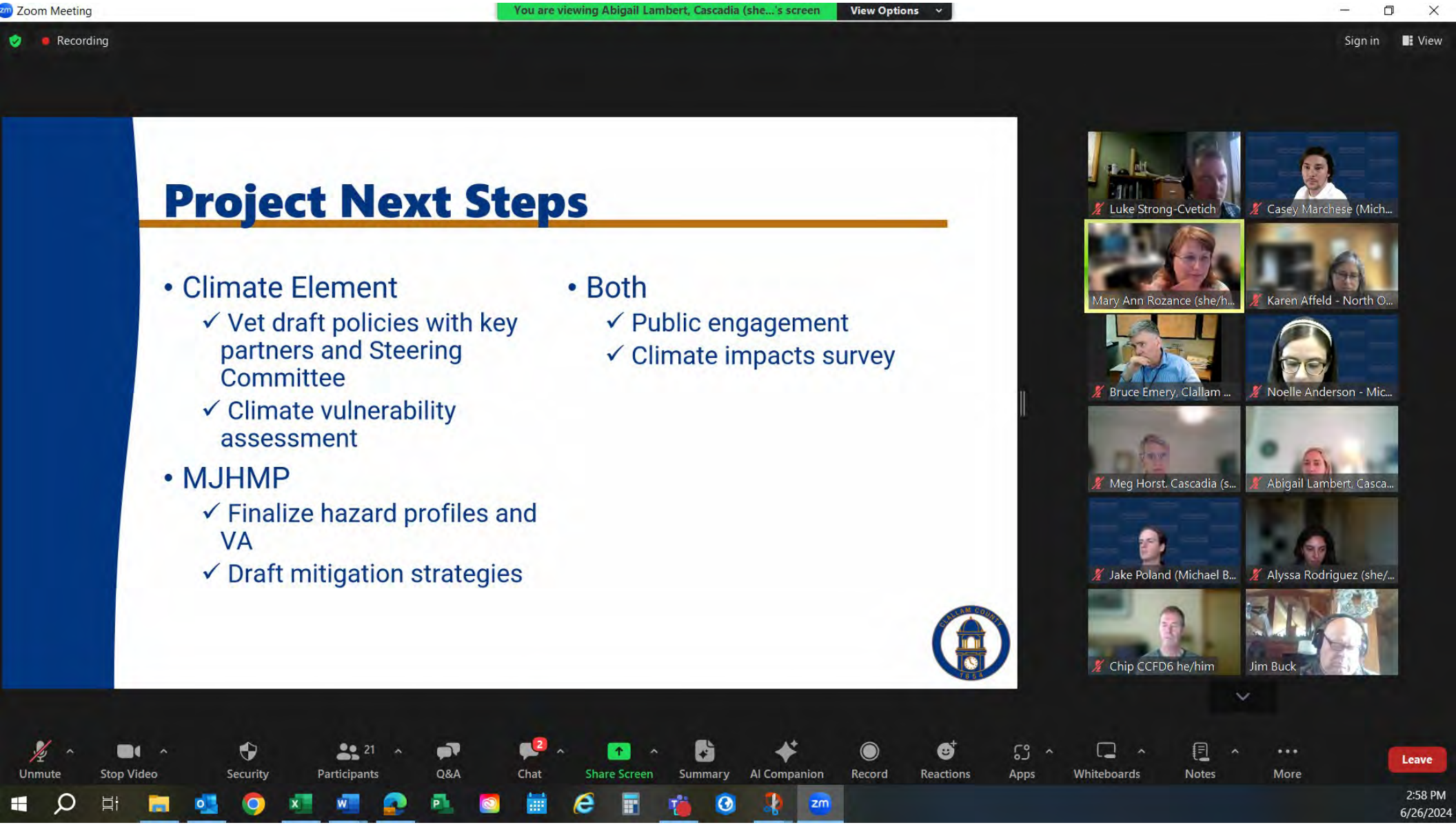
6/26/2024


Zoom Meeting
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Project Next Steps
• Climate Element
✓ Vet draft policies with key partners and Steering Committee
✓ Climate vulnerability assessment
• MJHMP
✓ Finalize hazard profiles and VA
✓ Draft mitigation strategies
• Both
✓ Public engagement
✓ Climate impacts survey
Luke Strong-Cvetich
Casey Marchese (Mich...
Mary Ann Rozance (she/h...
Karen Affeld - North O...
Bruce Emery, Clallam ...
Noelle Anderson - Mic...
Meg Horst, Cascadia (s...
Abigail Lambert, Casca...
Jake Poland (Michael B...
Alyssa Rodriguez (she/...
Chip CCFD6 he/him
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Casey Marchese (Michael Baker)
Bruce Emery, Clallam County DCD
Noelle Anderson - Michael Baker Intl
Meg Horst, Cascadia (she/her)
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Abigail Lambert, Cascadia (she/hers)
Jake Poland (Michael Baker Intl)
Alyssa Rodriguez (she/her) Cascadia
Chip CCFD6 he/him
Jim Buck
Diane Harvey, Clallam County
Lindsey (She/Her) - City of Sequim
James Roubal (...
James Roubal (Quileute Tribe)
Jesse Waknitz (h...
Jesse Waknitz (he/him) - Port of Port Angeles
Lexi Wagor (the...
Lexi Wagor (they/she), North Olympic Land Tr...
Rhiana Barkie (C...
Rhiana Barkie (Clallam Co Project Coordinator...
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APPENDIX B.6

HMCR Steering Committee Meeting #5

Hazard Mitigation and Climate Resilience Steering Committee

Steering Committee Meeting #5 Agenda | **Oct 10th, 2024** | 11:30 AM-1:30 PM | Zoom link

Agenda

Time	Agenda Item
11:30-11:40 AM	Introduction and Updates
11:40-11:55 AM	HMP Update
11:55-12:05 PM	Climate Element Policy Introduction
12:05-1:20 PM	Climate Element Policy Breakout Rooms
1:20-1:30 PM	Questions and Next Steps

Meeting #4 Objectives

- Provide update on work to date
- Hazard Mitigation Plan Draft update
- Review and Discuss draft Climate Element goals and policies
- Summarize next steps

Project Team

Clallam County	Role on Project
Diane Harvey, Sheriff's Office	Project Lead
Tim Havel, Planner, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Director, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
Mary Ann Rozance, Cascadia Consulting Group	Project Manager and Climate Resilience Lead
Alyssa Rodriguez, Cascadia Consulting Group	Engagement Lead
Mike Chang, Cascadia Consulting Group	Principal in Charge
Meg Horst, Cascadia Consulting Group	Climate Vulnerability Assessment Lead
Abigail Lambert, Cascadia Consulting Group	Climate Resilience Policy Lead

Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead
Casey Marchese, Michael Baker International	Hazard Mitigation Analyst and Notetaker
Jim Buck	Strategic Advisor

Detailed Agenda

Time	Topic	Notes
11:30-11:40 AM	Introduction and Updates	**Introduction** Name, organization, Icebreaker in chat: What is one climate-related project or policy that you think helps to build resilience to climate impacts? **Project Updates**
11:40-11:55 AM	Multi-jurisdiction Hazard Mitigation Plan Updates	**MJHMP Updates** ✓ Plan Maintenance ✓ Q&A
11:55-12:05 PM	Climate Element Development Update	**Climate Element Policy Development Introduction** ✓ Provide update on Climate Element development process and engagement to date ✓ Introduce breakout sessions
12:05-12:30 PM	Climate Element Breakout #1	**Climate Element Breakout Session #1** ✓ *Agriculture & Food Systems* ✓ *Ecosystems* ✓ *Water Resources* ✓ *Waste Management* *Breakout Group Discussion Questions:* • Are there any goals or policies that you would consider a must-have? • Are there crucial policies missing and/or do you have new ideas not currently reflected in this list? • Do you have any concerns about these policies or feel that edits need to be made to them? • Are there considerations we need to make for goals/policies for those who may be especially impacted

		(Elders, youth, low-income residents, people with existing health conditions, etc.)?
12:30-12:55 PM	Climate Element Breakout #2	**Climate Element Breakout Session #2** ✓ *Buildings & Energy* ✓ *Transportation* ✓ *Zoning & Development*
12:55-1:20 PM	Climate Element Breakout #3	**Climate Element Breakout Session #3** ✓ *Cultural Resources & Practices* ✓ *Economic Development* ✓ *Health & Well-being*
1:20-1:30 PM	Questions and Next Steps	**Summarize next steps** ✓ Climate Element ✓ Hazard Mitigation Plan ✓ Review timeline and workplan **Questions and Discussion**

Hazard Mitigation and Climate Resilience Steering Committee

Steering Committee Meeting #5 | **Oct 10th, 2024** | 11:30 AM-1:30 PM | Zoom

Agenda

Time	Agenda Item
11:30-11:40 AM	Introduction and Updates
11:40-11:55 AM	HMP Update
11:55-12:05 PM	Climate Element Policy Introduction
12:05-1:20 PM	Climate Element Policy Breakout Rooms
1:20-1:30 PM	Questions and Next Steps

Meeting #5 Objectives

- Provide update on work to date
- Hazard Mitigation Plan Draft update
- Review and Discuss draft Climate Element goals and policies
- Summarize next steps

Project Team

Clallam County	Role on Project
Diane Harvey, Sheriff's Office	Project Lead
Tim Havel, Planner, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Director, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
Mary Ann Rozance, Cascadia Consulting Group	Project Manager and Climate Resilience Lead
Alyssa Rodriguez, Cascadia Consulting Group	Engagement Lead
Mike Chang, Cascadia Consulting Group	Principal in Charge
Meg Horst, Cascadia Consulting Group	Climate Vulnerability Assessment Lead
Abigail Lambert, Cascadia Consulting Group	Climate Resilience Policy Lead

Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead
Casey Marchese, Michael Baker International	Hazard Mitigation Analyst and Notetaker
Jim Buck	Strategic Advisor

Detailed Agenda

Time	Topic	Lead	Notes
11:30-11:40 AM	Introduction and Updates 10 mins	Cascadia / Mary Ann	**Introduction** ✓ Ice breaker and introductions ✓ Share meeting objectives ✓ Work-to-date Name, organization, Icebreaker in chat: What is one climate-related project or policy that you think helps to build resilience to climate impacts? **Project Updates** ✓ Provide brief project updates and work to date.
11:40-11:55 AM	Multi-jurisdiction Hazard Mitigation Plan Updates 15 mins	MB	**MJHMP Updates** ✓ Plan Maintenance ✓ Q&A
11:55-12:05 PM	Climate Element Development Update 10 mins	Cascadia/ Abigail	**Climate Element Policy Development Introduction** ✓ Provide update on Climate Element development process and engagement to date ✓ Re-share Commerce requirements and goals of the Element ✓ Introduce breakout activity and discussion questions

Time	Topic	Lead	Notes
12:05-12:30 PM	Climate Element Breakout #1 25 mins	Cascadia/ MB	**Climate Element Breakout Session #1** ✓ *Agriculture & Food Systems* ✓ *Ecosystems* ✓ *Water Resources* ✓ *Waste Management* *Breakout Group Discussion Questions:* • Are there any goals or policies that you would consider a must-have? • Are there crucial policies missing and/or do you have new ideas not currently reflected in this list? • Do you have any concerns about these policies or feel that edits need to be made to them? • Are there considerations we need to make for goals/policies for those who may be especially impacted (Elders, youth, low-income residents, people with existing health conditions, etc.)? See below for detailed breakout room facilitation instructions.
12:30-12:55 PM	Climate Element Breakout #2 25 mins	Cascadia/ MB	**Climate Element Breakout Session #2** ✓ *Buildings & Energy* ✓ *Transportation* ✓ *Zoning & Development* *Breakout Group Discussion Questions:* • Are there any goals or policies that you would consider a must-have? • Are there crucial policies missing and/or do you have new ideas not currently reflected in this list? • Do you have any concerns about these policies or feel that edits need to be made to them? • Are there considerations we need to make for goals/policies for those who may be especially impacted (Elders, youth, low-income residents, people with existing health conditions, etc.)?

Time	Topic	Lead	Notes
12:55-1:20 PM	Climate Element Breakout #3 25 mins	Cascadia/ MB	**Climate Element Breakout Session #3** ✓ *Cultural Resources & Practices* ✓ *Economic Development* ✓ *Health & Well-being* *Breakout Group Discussion Questions:* • Are there any goals or policies that you would consider a must-have? • Are there crucial policies missing and/or do you have new ideas not currently reflected in this list? • Do you have any concerns about these policies or feel that edits need to be made to them? • Are there considerations we need to make for goals/policies for those who may be especially impacted (Elders, youth, low-income residents, people with existing health conditions, etc.)?
1:20-1:30 PM	Questions and Next Steps 10 mins	Cascadia / Mary Ann	**Summarize next steps** ✓ Climate Element ○ Consolidate and prioritize Climate Element Policies ○ Draft Vulnerability Assessment ○ Climate Resilience Survey ○ Climate and Energy Conference ✓ Hazard Mitigation Plan ✓ Review timeline and workplan **Questions and Discussion** ✓ Answer any final questions

Meeting Discussion Summary

The meeting included a recap and update on the progress to date for both the Climate Element (CE) and the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). It also provided an overview of the final phases of the planning process for the MJHMP and CE policies. The focus was on gathering feedback on the CE policies with three breakout discussions during the meeting. Each breakout session was designed to collect input on policies and goals from specific sectors. Additional feedback will be collected at the North Olympic Peninsula Summit on Energy & Climate Resilience.

Participants

- Bowen Kendrick, Clallam County PUD
- Bruce Emery, Clallam County DCD
- Blaine and Keith, CCFD3
- Chip Keen, CCFPD6
- Crystie Kisler, Chimacum Valley Grainery
- Culley Lehman, Cascadia Water
- Dennis Burnett, City of Sequim
- Diane Harvey, Clallam County
- Doug Adams, Clallam PUD
- Ellen Chappelka, Clallam Emergency Management
- George Drake, Clallam PUD
- Ian Miller, Washington Sea Grant
- James Roubal
- Jen Garcelon, Clallam County Health
- Jesse Waknitz, Port of Port Angeles
- Justine Chorley
- Lexi Wagor, North Olympic Land Trust
- Luke Strong-Cvetich
- Meggan Uecker, City of Sequim
- Rhiana Barkie, Clallam Co Project Coordinator
- Robert Knapp, Jamestown S'Klallam Tribe
- Shannen Cartmel
- Tim Havel, Clallam County

Detailed Meeting Notes

Multi-jurisdiction Hazard Mitigation Plan Updates

- The HMP draft should be completed in November 2024 and ready for public comment
    - **HMP Prioritization and Timeline**: Actions will be prioritized from **Low to High impact** and categorized by timelines spanning **Short-term to Ongoing efforts**. HMP, once approved by FEMA, will be active for a five-year period.
- The Climate Element is slowing down to be in more alignment with the overall Comprehensive Planning Process

- Draft VA and Climate Survey Report: Targeting delivery in November/December 2024.
- Comprehensive Plan Engagement: Survey launch set for Q1 2025, followed by an open house in Q2 2025 to gather community feedback and insights.

Climate Element Policy Development Introduction

- The consulting team will lead a workshop at the North Olympic Peninsula Summit on Energy & Climate Resilience on October 30th to gather additional feedback.
- The workshop will include three breakout sessions, each focused on different sectors. Participants will rotate through all three rooms in 25-minute intervals.
- Feedback from the NODC Energy and Climate meeting will be refined and aligned with ongoing engagement efforts, supporting the completion of the VA and HMP.
- After the meeting, participants will have until October 18th to provide comments and feedback on the Draft Climate Element worksheet.

Climate Element Policy Breakout Rooms

Room 1: Mary Ann

GENERAL COMMENTS

- Comment form Luke: First time we are taking over a CE and making more Clallam county goals to see benefit, and even if we get 15-20 % right
- Elaborate on the word Resilience throughout document in the goal or policy for each sector. Clarify what resilience means for each of the sectors.

AGRICULTURE & FOOD SYSTEMS

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.120 (6) Agricultural land users shall be encouraged to maintain water quality and sustainable water-storage practices, protect fish and wildlife consistent with commercial agriculture, prevent erosion of valuable agricultural soils, implement climate-smart agricultural practices, and prepare for a changing climate.	
31.02.120 (8) Clallam County shall enhance the food security of its citizens and develop the local farm economy by actively supporting producers of food and other agricultural products for local consumption and supporting policies that encourage local institutions to purchase local food. This includes exploring existing funding and tax incentives to support the local food economy and expanding partnerships to mitigate climate impacts and improve access to healthy, affordable, and climate-friendly foods.	

31.02.120 (10) Clallam County should actively pursue the preservation of farmland and promote carbon sequestration—capturing, securing and storing carbon dioxide from the atmosphere—through a purchase or transfer of development rights program, Conservation Futures, and Open Space Program strategies with the Climate Commitment Act. Promote voluntary carbon credit programs, incentives, or financial assistance programs to support the long-term sustainability and economic vitality of the agricultural industry in the County.	

NEW POLICIES

Goal Support a sustainable local and regional agriculture sector in Clallam County that sequesters carbon, provides local jobs and food supply, and is resilient to the impacts of climate change.

Policy	Policy Context	Notes
Transition away from use of industrial fertilizer on agriculture and forestry lands, which can exacerbate ocean acidification. Educate agricultural and forestry managers on alternatives to industrial fertilizer and provide technical assistance as feasible.	**Source:** NODC Climate Adaptation Strategies (E-21) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction	
Preserve land for long-term agricultural use and restore ecosystems such as wetlands and ponds on agriculturally zoned properties in order to preserve carbon sinks, promote water storage, and provide additional ecosystem services.	**Source:** Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Align with the County's Climate Action Plan to invest in the local agricultural sector of Clallam County, including food and materials producers, distributors, and sellers. Protect productive agricultural lands and expand sustainable food production in Clallam County by: • Seeking Washington State Department of Agriculture (WSDA) funding to support private landowners to implement practices that increase climate resilience through livestock	**Source:** Clallam Climate Action Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	

infrastructure improvements, soil health, equipment and technology upgrades, and habitat enhancement projects. • Modifying regulatory codes to preserve agricultural lands and prevent their conversion into residential, commercial, or industrial areas. • Facilitating increased land access for local farmers, protecting farmland, and maintaining open spaces.		
Ensure that the local agriculture sector is resilient to extreme weather and other current and future climate impacts by: • Supporting sustainable business opportunities that educate farmers on water storage and regenerative farming practices that enable agricultural producers to adapt to changing climate conditions, minimize production losses, and maintain ecosystem balance. • Providing education and technical assistance on meeting increasing challenges and demands around climate adaptation, especially for agricultural products most vulnerable to climate impacts. • Promoting financial assistance, carbon crediting, and incentive programs to support the economic vitality of this sector.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction, equity	Probably biased because I'm working on an off-channel reservoir, but yes I agree that sustainable water storage is pretty important.
Enhance local food security and the food economy to mitigate climate impacts and improve access to healthy, affordable, and climate-friendly foods by: • Encouraging and supporting farmers markets, community gardens, and urban agriculture activities in the county. • Developing education and outreach programs supporting food access and security, including a distributed model of local food sales and distribution. • Seeking state grants to boost local food supply and ensure rapid emergency food distribution to communities impacted by fire, flood, extreme heat, drought, and	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	

other climate and public health emergencies.		

ECOSYSTEMS

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
27.12.020 (9) Protect water quality by controlling erosion, by providing guidance in the siting of land uses and activities to prevent or reduce the of release chemical or bacterial pollutants into waters of the State, and by maintaining stream flows and habitat quality for fish and marine shellfish. Integrate climate change projections into shellfish hatchery planning and manage or enhance upstream watersheds to improve water quality and minimize pollution from new and existing sources, including climate change impacts.	
27.12.020 (16) Provide the regulatory framework to supplement adopted policies in the Clallam County Comprehensive Plan, CCC Title 31, and the Zoning Code, CCC Title 33, which set forth land use designations, open space preservation, natural resource protection, wildlife migration corridor preservation, fish and wildlife habitat protection, wetland protection and, overall, protects the natural features in Clallam County by promoting wise use of lands within Clallam County. Strive for no net loss of ecosystem composition, structure, and functions and net ecological gain to enhance ecosystem resiliency to climate impacts in Clallam County.	
31.02.320 [Policy No. 5] Clallam County shall work with other agencies, tribes and individuals to prevent additional listing of fish, wildlife and plants under the Endangered Species Act through pro-active (rather than reactive) planning and implementation of proper land use practices. The County should identify potential future climate impacts on habitats and protect species using or reliant on vulnerable habitats, including identifying the most drought tolerant, resilient plant species for the region.	
31.02.320 (3) Wetlands. [Policy No. 9] Clallam County shall work to achieve no net loss of regulated wetlands while allowing a	

reasonable use of property, with regard to their functions and values, in the short-term and should work to achieve a long-term net gain in these attributes through restoration and enhancement. The public acquisition of important wetland areas should be pursued, and the County should identify and quantify the ecosystem services benefits of wetlands and include these natural capital assets in cost-benefit assessments for community and development planning. Wetlands provide biological and hydrological connectivity that fosters resilience to climate impacts, and the natural abilities of wetlands to provide recreational, educational, historical and cultural values should also be protected.	
31.02.320 (4c) [Policy No. 12] To protect quality and quantity of essential aquifers for current and future needs, Clallam County should encourage water conservation measures for all land uses; support water conservation measures and educate residents on methods to conserve water; and promote the application and implementation of water-conserving landscaping plans. This may include boosting regional water storage to improve water system climate resilience by promoting rainwater harvesting, encouraging water-efficient appliances, improving stormwater retention in suitable areas, establishing reclaimed water systems, and collaborating with Clallam Public Utilities Department for widespread water conservation education. Clallam County should undertake further studies of the groundwater regime of the County so that the factors influencing the quantity, quality and flow patterns of groundwater are more precisely known.	
31.02.320 (7c) [Policy No. 20] Clallam County shall recognize the large number of salmon and steelhead stocks that have been classified as critical or depressed. The County shall work toward prevention of these stocks from being listed as threatened and endangered through habitat restoration and land use practices which cause no further degradation to habitat needs. The County should implement actions identified in restoration and salmon recovery plans to improve the climate resilience of streams and watersheds.	
31.02.320 (9a) [Policy No. 22] Flood control should be undertaken in the context of varied uses including agricultural and residential, fish and wildlife habitat, water supply, open space, and recreation. Land use and related regulations and zoning should reflect the natural constraints of floodplains, meander zones, riparian habitat zones, and projected impacts of climate change on flood-prone areas.	

NEW POLICIES

Goal	Ensure that forests, wetlands, shorelines, and other ecosystems are resilient to the impacts of extreme weather, invasive species, pests, diseases, and other impacts worsened by climate change.

Policy	Policy Context	Notes
Prepare ecosystems for climate impacts by implementing restoration and recovery actions for streams, wetlands, and watersheds, focusing on biological and hydrological connectivity, reducing aquatic invasive species, and improving watershed-scale processes. This includes: • Bolstering the resilience of aquatic ecosystems by restoring riparian vegetation, floodplains, and stream structures, conserving water, and maintaining habitats to protect native fish and other aquatic life. • Exploring innovative adaptation strategies to manage water quality and streamflow and reduce sedimentation in streams resulting from wildfire damage and the associated impacts of landslides and flooding.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Strengthen habitat and ecosystem resilience by inventorying and protecting climate refugia and critical habitats to strive for no net loss of ecosystem attributes, with a focus on achieving net ecological gains. Expand habitat protection, quality, and connectivity through designations such as conservation areas, buffers, and open space corridors. Incorporate climate considerations in determining permissible activities within wetlands and wildlife habitats.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	Better definition of "protection" land acquisition is the best way to protect something. (here and other places that "protection" is used. Link the word "protection" to the policy lever we are meaning)
Adopt integrated natural resource management practices and optimize management activities that enhance habitat integrity and function in the face of climate impacts. Proactively manage invasive species	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation, Planning & Partnerships	

and promote native, drought- and pest-resistant plants for restoration projects to boost ecosystem resilience to climate-related stressors. Quantify the benefits of ecosystem services to include these natural capital assets in community planning, climate action plans, and development of cost-benefit analyses.	**Climate and Equity Intersection:** Resilience, emissions reduction	
Protect and enhance urban forests by implementing climate-smart forest management, prioritizing efforts in more vulnerable areas of the community. This may include: • Implementing open space requirements for new developments, establishing green belts to connect communities, and enhancing urban forest management to optimize carbon storage and increase resilience. • Developing and implementing educational, incentive-based, and regulatory strategies to preserve and enhance private and urban forest lands for increased climate resilience, carbon sequestration, and ecosystem health. • Reducing financial impacts on landowners by advertising and encouraging participation in technical and financial assistance programs, such as Washington's cost-share program. • Focusing on proactive urban forestry management, emphasizing risk mitigation from pests, disease, and wildfires, while ensuring that tree planting and species selection are adaptive to future climate conditions and prioritize vulnerable communities. • Seeking state-funded grants to reduce wildfire risk for areas identified as the wildland-urban interface through improvements such as structural hardening, improved water storage capacity, and wildfire risk assessments for communities and critical infrastructure.	**Source:** Commerce Menu of Measures; Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation, Education & Incentives **Climate and Equity Intersection:** Resilience	
Promote forest stewardship education, tax incentive programs, carbon crediting, payment for ecosystems services programs, and other approaches to support landowners in	**Source:** Commerce Menu of Measures; NODC	

managing their lands for climate resilience and preventing conversion. Collaborate with State agencies, conservation districts, and the Washington State University Extension Forestry Program to make resources and information available to landowners and support sustainable working forests. Explore other jurisdictions' strategies to recognize the economic benefits of and monetize environmental services maintained on landowners' properties.	**Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	
Enhance the resilience of habitats and communities to climate change by protecting and restoring coastal ecosystems, taking into account sea-level rise in coastal and nearshore restoration projects. Focus on identifying, protecting, and restoring submerged aquatic vegetation that offer critical habitat, "blue" carbon storage, and other ecosystem services. In addition, evaluate and address sea level rise in local clean-up sites, address concerns related to Tribal cultural resources and sites on the shoreline, and conduct long-term cost-benefit analysis of shoreline armor repairs along key shoreline sites.	**Source:** Commerce Menu of Measures, Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	

WATER RESOURCES

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (6) Marine Resources.. (a) [Policy No. 16] Clallam County should work to achieve alternatives for sewage treatment plant discharges to marine waters. (b) [Policy No. 17] Clallam County shall preserve the scenic, aesthetic and ecological qualities of the marine shorelines of Clallam County, in harmony with those uses which are deemed essential to the life of its citizens. Clallam County shall implement marine resource goals through the Clallam County Shoreline Master Program and/or critical areas ordinance, as now or hereafter amended. • Reduce local land-based pollutants that enhance acidification in marine waters. • Protect and restore natural systems along the shoreline to enhance buffers between coastal storms and development, and prioritize shoreline and watershed areas appropriate	

for defense and retreat as sea-level rise and coastal storms worsen in the region. • Encourage soft armoring of shorelines to protect infrastructure and habitat, and implement native vegetation and other natural resource management practices to reduce landslides and coastal erosion	
31.02.320 (9) Floodplains. (a) [Policy No. 22] Flood control should be undertaken in the context of varied uses including agricultural and residential, fish and wildlife habitat, water supply, open space, and recreation. Land use and related regulations and zoning should reflect the natural constraints of floodplains, meander zones, and riparian habitat zones. Flood control measures should reserve to the fullest extent possible opportunities for other uses, including public access. • Increase resiliency to flooding events by protecting, and where possible, enhancing and restoring existing flood storage, conveyance, and ecological functions and values of floodplains, wetlands, and riparian corridors. • Use regulations, zoning, and incentives to maintain open space and limit development in floodplains, riparian corridors, high value wetlands, and unstable slopes vulnerable to degradation due to climate change impacts. • Work with the Department of Ecology on a Floodplains by Design program to seek technical assistance, grants, and coordination support to reduce flood risks, protect lives and property, and enhance and restore habitat and ecosystem services provided by floodplains.	

NEW POLICIES

Goal	Protect, conserve, and enhance water resources in Clallam County and create more climate resilient water systems.

Policy	Policy Context	Notes
Require the integration of water conservation methods and technologies in the development of irrigation infrastructure within parks and recreation areas to prepare for drought. Promote the adoption of advanced irrigation technologies and practices that minimize water use and mitigate environmental impacts.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Promote the creation of mechanisms for trading water rights to effectively allocate	**Source:** Commerce Menu of Measures,	

water resources and promote sustainable management practices.	NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	
Seek funding from the Department of Ecology to develop and implement a comprehensive drought resilience strategy that considers projected climate impacts and sets action levels for different drought stages. Incorporate climate projections into drought planning to enhance preparedness and mitigate the impacts of drought on water resources.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies, Ecology Climate Resilience Strategy (County recommendation) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Identify and implement strategies to prepare for and mitigate the effects of saltwater intrusion into aquifers and drainage systems. Explore existing grant opportunities to fund initiatives aimed at monitoring and preventing saltwater intrusion to ensure the reliability and sustainability of water supplies.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Evaluate the long-term adequacy of water delivery infrastructure to anticipate and effectively manage changes in hydrological patterns linked to climate change. Construct and maintain new water-storage systems, such as large cisterns, water towers, and reservoirs, to provide backup water supplies during droughts and enhance climate resilience. Promote bringing additional rural areas and failed wells into centralized and existing public water systems. Raise awareness about the DOH Office of Drinking Water's (ODW) guidance on integrating climate constraints, contingency planning, and sustainability in water treatment. Highlight their management of the Drinking Water State Revolving Fund (DWSRF), which funds infrastructure improvements and resilience, especially for smaller public water systems in underserved communities.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies, Ecology Climate Resilience Strategy (County recommendation) **Policy Lever:** Incentives & Education, Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	Update the Watershed Management Plan

Require the use of green infrastructure and low-impact development to manage increased storm intensities and reduce stormwater runoff.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Encourage residents to reduce water consumption by implementing smart grid water use and water reclamation systems, promoting smart irrigation technologies, updating water rates to discourage lawn watering, and promoting existing incentives for sustainable food cultivation.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	

WASTE MANAGEMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (b) [Policy No. 32] Treatment and disposal of biosolids should be undertaken locally to minimize transportation costs for waste disposal and to encourage the safe operation and timely maintenance of sewage disposal systems. Incorporate future climate change related hazards such as flooding and sea-level rise on the treatment and disposal of biosolids and affected sites.	
31.02.320 (c) [Policy No. 33] Education and incentive programs on solid and hazardous waste reduction, recycling, and disposal, including those for households and small businesses, should be made available. Opportunities for the collection and disposal of household, agricultural, and commercial hazardous waste should be provided. In addition, provide support to communities to manage debris cleanup and removal resulting from natural hazards exacerbated by climate change.	Debris addressed below.

NEW POLICIES:

Goal	Ensure that the County reduces, reuses, and recycles waste materials sustainably and prepares for climate change impacts to waste systems.

Policy	Policy Context	Notes

Develop and implement a strategy to quickly manage the collection, transport, sorting, and disposal of debris, such as downed tree limbs and buildings blocking roads and streams, after a disaster to reduce the risks of fire, flood, injury, and disease vectors.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	Update and approve Clallam County Debris Management Plan, integrating existing City Debris Management Plans.
Evaluate wastewater facilities to reduce greenhouse emissions and build resilience to climate impacts such as landslides and sea-level rise, including: • Maximizing on-site natural gas co-generation from anaerobic digesters to reduce emissions and vulnerability to power outages and fuel shortages. • Reducing vulnerability of access routes to treatment plants and identifying alternative routes if primary ones are compromised. • Enhancing management of septic water quality issues and evaluating alternative wastewater treatment solutions in vulnerable areas.	**Source:** Port Angeles Climate Resilience Plan **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience, emission reduction	Wastewater facilities are not regulated as waste management at the state level- this policy does not make sense here.
Pursue investment and partnerships on recovering local waste materials.		Local waste streams provide opportunities for innovative climate resiliency strategies such as food rescue for local consumption, energy production, production of soil amendments or biochar production, stormwater LID,

BUILDINGS & ENERGY

General Notes:

- Design and implement pilot projects, and encourage local governments, utilities, and public facilities to apply for solar and energy storage grants through the State Department of Commerce. " This should include smart grid grants.
- PUD is actively applying for solar plus storage grants.

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.510 (3) Measuring Housing Need: A Data Toolkit for Clallam County includes the following strategies for providing affordable housing and meeting the demand for diversity of housing choices: Encourage the development of infill development and "missing middle" housing by developing policies and codes to balance available funding to include a wider range of housing types in designated single-family zones that also experience fewer climate risks (e.g., flooding, wildfire, etc.), reduce displacement due to climate impacts, and improve equitable access to existing city transit systems and community services inside UGAs. Identify and expand climate-resilient anti-displacement strategies and infrastructure to mitigate housing insecurities exacerbated by climate-driven gentrification.	
31.02.285 (Goal 7, Policy 17) Essential Public Facilities. Essential public facilities are public capital facilities of a County-wide or State-wide nature which are typically difficult to site. Essential public facilities may be located in designated commercial forest or rural lands provided the County finds that such facilities cannot otherwise be located in urban areas, are largely self-contained or served by urban governmental services in a manner that adjacent rural or urban development is not promoted, and the facility does not cause nuisances (noise, dust, light, etc.) on adjacent properties that cannot be adequately mitigated. The siting of essential public facilities in resource lands should not interfere with resource management on adjacent resource lands. Additionally, the County should collaborate with energy utilities and seek available grants to enhance the resilience and reliability of infrastructure susceptible to climate change impacts, including planning and building facilities and utilities to avoid or withstand flooding from rising sea levels and associated climate impacts.	
31.02.720 (3) Utility lines shall be underground for new land divisions to reduce damage from storms and wildfire ignition risks. The County, cities, and service providers should work to place existing above-ground utility lines underground along major highway corridors inside urban growth areas.	

NEW POLICIES

Goal Increase the resilience of public utilities, facilities, and services by preparing for climate change impacts.

Policy	Policy Context	Notes
Ensure that energy infrastructure, including generation and transmission systems, can withstand and recover from the effects of extreme weather and other natural disasters intensified by climate change. Work with utilities to ensure infrastructure safety and reliability such as through undergrounding lines, establishing redundancies, and promoting small-scale energy generation systems.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	Clallam PUD is also doing this- looking for grants to implement (YES, would like to see this)
Encourage the deployment of emerging technologies to promote distributed energy generation, demand response, energy storage, energy efficiency, and smart grid technologies to increase grid reliability, flexibility, and capacity. Design and implement pilot projects, and encourage local governments, utilities, and public facilities to apply for solar and energy storage grants through the State Department of Commerce.	**Source:** Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	Clallam PUD is doing this- looking for these grant opportunities (YES, would like to see this)

Goal Promote building retrofits and new construction that is sustainably built to minimize environmental impacts and enhance resilience against extreme weather and other risks exacerbated by climate change.

Policy	Policy Context	Notes
Develop or modify building standards to reduce the impacts of climate change on indoor and outdoor buildings features. This may include requiring low-impact development and stormwater runoff mitigation systems, designing buildings for passive survivability in case of extended power loss, adopting fire resilience standards such as venting and features designed to prevent ember ignition, and promoting "green" or "cool" roofs. Prioritize the preservation and weatherization of housing in overburdened communities and	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Incentives & Education, Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction, equity	Blanket promoting of green roofs might not work for the area with larger rainfall

provide assistance for existing tenants at risk of displacement or additional cost burden from green gentrification.		
Align with the County's Climate Action Plan to collaborate with partners to incentivize building improvements and retrofits for residential and commercial buildings in the County to improve energy efficiency and resilience. Specific activities may include expanding low-income Energy Assistance programs, promoting existing weatherization incentives and assistance, upgrading cooling infrastructure in facilities serving vulnerable populations, and implementing alternatives like increasing tree cover and adding shade structures. Prioritize incentives and assistance programs for cost burdened communities and ensure outreach is targeted towards and benefits overburdened populations, such as those who live in multifamily and affordable housing units.	**Source:** Clallam Climate Action Plan, Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	

TRANSPORTATION

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.420 (k, iii, v) Bridges and other transportation facilities should not constrict the natural meander of river channels, should have the least possible adverse effects on the shoreline, should account for sea-level rise projections, should minimize loss of shoreline ecological functions, and should not adversely impact habitat restoration and enhancement projects.	
31.02.420 (k, 11,i) New transportation corridors shall minimize to the reasonable extent possible the disruption to wildlife and stream corridors and shall provide for maintaining connectivity between habitat areas with the application of buffers and other means. The County should incorporate hydrologic climate impacts into the design of water-crossing structures (i.e., climate-smart culverts and bridges) for fish passage and habitat quality.	
31.02.420 (29) The safety and quality of the travel experience for the non-motorized traveler shall be improved with a greater role in the transportation system.	

(a) Widely and prominently sign for the public the location of safe alternate bicycle routes and trails to separate motorized and non-motorized traffic when possible. (b) The Olympic Discovery Trail shall be developed as a priority transportation facility to bring non-motorized travelers from Jefferson County to the Port Angeles corridor and to the major towns and communities west to the Pacific Coast. (Cont…) Reduce pedestrian or bicycle and car collisions, beginning with communities with the highest rate of injury or death, by establishing a safe and welcoming environment that includes green corridors, lighting, shade, visibility, sustainable landscaping, and active uses.	

NEW POLICIES:

Goal	Ensure the local transportation system, including infrastructure, routes, and travel modes, can withstand and recover from extreme weather events and other climate change-related hazards.

Policy	Policy Context	Notes
Design and site new and expanded roads to minimize adverse effects on the shoreline, accommodate sea-level rise projections, preserve shoreline ecological functions, and avoid negative impacts on water-oriented uses, public access, and habitat restoration projects. Incorporate hydrologic climate impacts into the design of water-crossing structures, such as climate-smart culverts and bridges, to support fish passage and habitat quality. The County should identify existing roads and bridges susceptible to flooding and work with the Washington Department of Transportation to improve resilience of vulnerable assets in conjunction with repairs.	**Source:** Jamestown S'Klallam Adaptation Plan, Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Improve street connectivity and walkability to expand potential evacuation routes, and reduce stormwater impacts from transportation and development through watershed planning, redevelopment, retrofits, and low-impact development.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation	

	Climate and Equity Intersection: Resilience, emissions reduction	
Enhance the resilience of parks and recreational trails by assessing and addressing climate hazards and impacts, and advocate to expand the Washington State Department of Transportation (WSDOT) climate vulnerability assessment to include non-state roads and other transportation systems. Work with the Department of Natural Resource (DNR) to establish roadside vegetation management to reduce wildfire risk along Highway 101 and Highway 112.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	Include other transportation partners like cities and tribes Flagging redundant routing, for one road in one road out
Continue to partner and support Clallam Transit to identify barriers to using transit, understand climate vulnerability of transit systems, expand transit use and equity, and ensure routes are convenient, safe, and accessible for travelers/commuters. Develop strategies that promote transit equity and community safety by considering the needs of the most vulnerable populations, and design and implement transit to support pedestrians, bicycles, and public transit.	**Source:** Clallam Climate Action Plan, Port Angeles Resilience Plan **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	

ZONING & DEVELOPMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.410 (k, iv, vii) The amount of impervious surfaces should be minimized to allow for maximum infiltration, reduced quantity of runoff and potential reduction for flooding. Additionally, utilize the environmental services provided by trees to mini**mize** the negative effects of impervious surfaces and vehicular traffic such as increased temperatures, airborne particulates, carbon dioxide, noise, and stormwater runoff.	
27.12.020 (18) Promote harmonious co-existence between the ongoing use of pre-existing development sites in critical areas, and the functional protection of those critical areas. Preserve unique or major physical features such as marine shorelines, bluffs, ravines, streams, wetlands, wildlife habitat and other	

environmentally sensitive areas and those vulnerable to climate change impacts as designated open space. Maintain and update a critical areas ordinance that incorporates climate change considerations.	
31.02.420 (Policy No. 31) Clallam County should require new development to mitigate impacts on transportation facilities which are insufficient to safely handle transportation demands. The County should require new development to rectify and/or compensate for impacts to transportation facilities not meeting minimum safety standards, when reasonable and capable of being accomplished. Additionally, the County should consider future climate conditions during siting and design of transportation facilities, including changes to temperature, rainfall, and sea level, to help ensure they function as intended over their planned life cycle.	
31.02.263 Policy 4 (e). In order to maintain rural character, infill development and redevelopment within LAMIRDs should minimize impervious surfaces in order to maintain a more "open" or "rural" atmosphere; should have increased setbacks, buffers, and screening to separate land uses from adjacent rural residential zones; should incorporate measures to reduce the impacts of noise, odor, and traffic; and should require high-quality landscaping designed to protect rural character. The County should also develop regulations for elevating or setting back new and substantially improved structures to reduce the risk of damage caused by sea level rise, and establish new minimums, if necessary, so that improvements are not required to protect structures during their expected life.	

NEW POLICIES

Goal	Establish development patterns that increase the resilience of Clallam County's built environment, natural areas, and communities to climate impacts.

Policy	Policy Context	Notes
Utilize best available science and updates codes as necessary to establish overlays, special zoning districts, and design standards to increase resilience to climate hazards and direct new development away from high-risk areas. Continue to update vulnerability assessment of climate impacts and use this information to determine if and where zoning	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	

changes are needed. Additionally, conduct an environmental justice audit prior to creating new zoning designations or rezoning to ensure that decisions center environmental justice and do not further harm overburdened communities.		
Restore, maintain, and protect natural resources and open space areas, shorelines, agricultural lands, and forested lands to maximize climate resilience benefits and prevent their conversion to developed land. Protect undeveloped areas from conversion and encourage development within UGAs and already developed areas to improve resilience. Consider adopting concepts including conservation design and a land-first approach to development to prioritize healthy ecological functions, while still permitting development in appropriate locations. Center external partnerships with Tribes, nonprofits, and others to help implement this policy.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Implement development regulations and best practices to reduce risks from wildfires, extreme heat, flooding, and climate-related hazards. Include documentation of potential climate-related risks in property records to enhance transparency regarding on-site development vulnerabilities and retrofit infrastructure for hazards such as coastal flooding and sea level rise. Consider financial safeguards for any development that proceeds in these high-risk zones and explore the feasibility of requiring long-term financial bonds for projects in vulnerable locations.	**Source:** Commerce Menu of Measures, Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	
Integrate future climate conditions into the siting and design of capital facilities, parks, and community assets. Support long-term visioning for vulnerable areas through equitable community engagement, including managed retreat and relocation of hazardous industries and essential services.	Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	
Relocate hazardous industries and essential public services away from the 500-year floodplain and develop regulations to elevate or set back new structures to mitigate sea level rise damage. Require shoreline	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies	Educate potential buyers and load entities on climate hazards

stabilization to use soft methods, assess vulnerability of natural assets like wetlands and beaches, and ensure new developments are sited outside of sea-level rise hazard areas.	**Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Acquire properties or easements vulnerable to climate hazards and work with local communities to establish a development rights program to transfer rights from these areas to promote conservation and climate resilience while encouraging denser development in suitable locations.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	

CULTURAL RESOURCES & PRACTICES

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.330 (1) All jurisdictions should work individually and cooperatively to identify, record, study and encourage the preservation, maintenance and use of lands, sites, and structures that have historical and archaeological significance. The early identification and resolution of conflicts between preservation of historical or archaeological resources and competing land uses should be promoted and facilitated. Ensure that lands, sites, and structures that have cultural and archaeological significance are prioritized for protection from and resilient to the effects of extreme weather and natural disasters exacerbated by climate change.	

NEW POLICIES

Goal	Ensure that cultural resources and practices, such as historic, archaeological, and sacred sites, traditional foods, and natural resources, are resilient to the effects of extreme weather and other natural disasters exacerbated by climate change.

Policy	Policy Context	Notes
Restore and protect ecosystems to uphold Tribal Treaty Rights and preserve culturally significant resources including but not limited to historic, archaeological, and scared sites, traditional foods, plants, and resources at risk from climate change impacts. Re-evaluate	**Source:** HMP, Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience,	Committed to Gov Order 2105 for cultural resources for capital projects – Question: is this covered for capital projects? Or do we

collaboration with appropriate partners (Tribes, local communities) to integrate Traditional Ecological Knowledge and Western science to identify significant resources and places, assess vulnerability to climate impacts, and co-develop plans to increase resilience.	emissions reduction, equity	expand beyond capital projects? More examples/description of what "projects mean" or types of initiatives that would have gov-gov conversations beyond capital projects
Reassess and mend government-to-government relations with local Tribes to protect archaeological and sacred sites and cultural properties from climate-related threats, and work to safeguard these sites from floods and other natural hazards.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	This goes beyond state/federal laws- try to understand what partners need
Evaluate current practices around the protection of salmonid habitats by incorporating riparian and stream habitat conservation measures into land use and infrastructure plans (transportation, water, sewer, electricity) developed by the County in partnership with cities, Tribes, service providers, and state agencies.	**Source:** Jamestown S'Klallam Adaptation Plan, Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	

Goal	Provide all community members an equitable opportunity to learn about climate impacts, influence policy decisions, and take actions to enhance community well-being and resilience.

Policy	Policy Context	Notes
Develop and implement culturally relevant educational programs to communicate and provide targeted engagement around immediate and future climate change threats and methods for enhancing resilience. This may include building and strengthening partnerships with local organizations and entities (such as non-profits, Tribes, and schools) to educate, engage, and empower diverse groups in implementing resilience strategies, linking local issues to broader regional issues. Equitably distribute funds for climate resilience engagement	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:**	

Policy	Policy Context	Notes
opportunities in overburdened communities, with a focus on equity and underrepresented groups.	Resilience, equity	

ECONOMIC DEVELOPMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.620 (3) Environmental Stewardship. Encourage economic development that fosters protection of the natural environment and water resources that are vital to sustaining the County's tourism, natural resource-based industries, and quality of life. Recognize the environment as a key economic value in the community that must be protected in the face of current and future climate impacts. (b) Policy 2. Protect the natural environment and utilize renewable resources for long-term sustainable economic development and ecosystem resilience, including protection of existing farmland. (c) Policy 3. Implement cooperative and coordinated surface and groundwater management policies to ensure the future availability and quality of water throughout the County. Protect and preserve water quality and quantity from drought, extreme heat, and other hazards exacerbated by climate change.	
31.02.620 (4) (a) Policy 1. Participate with local business leaders and organizations like the Economic Development Council, chambers of commerce, real estate professionals, permit advisory boards, downtown associations, industry cluster teams, and other groups to address current and changing business and job requirements and bolster the County's local green economy, focusing efforts on the County's more vulnerable communities.	

NEW POLICIES

Goal	Ensure Clallam County's local economy is resilient to climate-related disruptions and encourage a green local economy and business opportunities.

Policy	Policy Context	Notes

Identify and monetize environmental services that promote climate resilience by creating a mechanism for compensating landowners for the environmental services maintained on their property. Utilize best available science to better understand the economic context of project planning and decision-making particular to shoreline and forest ecosystems affected by climate change throughout the county, such as No Net Loss policy and buffer setbacks. Specific mechanisms to compensate landowners for promoting eco-resiliency may include available tax incentives, carbon crediting, and financial assistance programs.	**Source:** NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction, equity	What commitment are we obligating ourselves with identify and monetize environmental services? What services: Wetland buffers? Streamside buffers? Compensating may not work here- we have this system in place? Carbon credits? Can't monetize critical areas We have a Public Benefit Rating System in place, is this something that could be reviewed/updated re: climate conditions that may expand that system? (e.g., carbon crediting as a tax-break for open-space?) Deprioritize generally b/c county wouldn't start a new market for funding this- but could potentially build from PBRS
Develop a green jobs strategy in Clallam County through collaboration with community groups and businesses that:	**Source:** Commerce Menu of Measures	

• Facilitates the transition of impacted industries to low-carbon operations; • Creates opportunities for youth and affected workers to move into green jobs; • Offers training and continuing education in green jobs for economically vulnerable individuals or those with limited skills and experience in this sector; • Ensures opportunities for local employment in these jobs.	**Policy Lever:** Incentives & Education, Partnerships & Planning **Climate and Equity Intersection:** Resilience, emissions reduction, equity	
Support the efforts of local businesses in bolstering climate preparedness and continuity of operations before, during, and after extreme weather events. This may include collaborating with community partners to create emergency plans that maintain business continuity during extreme weather events and promoting existing incentives and grants for businesses to install rooftop solar panels, batteries, and other renewable energy systems to ensure backup power and operational resilience.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Education & Incentives **Climate and Equity Intersection:** Resilience	
Assess the impacts of climate migration in Clallam County during Comprehensive Plan update periods. Integrate these findings into Comprehensive Plan updates, infrastructure plans, revenue and expense forecasting, and housing assessments.	**Source:** Port Angeles **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	

HEALTH & WELL-BEING

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (27) Clallam County should promote a high level of air quality for maximum visibility for scenic views, elimination of pollutant transport, reduction in adverse health impacts, resilience to wildfire smoke events, and minimization of noxious effects of airborne particulates.	

NEW POLICIES

Goal	Protect community health and well-being from the impacts of climate change and focus on overburdened communities in the County to ensure that the most vulnerable people do not experience disproportionate health impacts.

Policy	Policy Context	Notes
Promote health impact assessments and other tools to address health, equity, and climate change impacts on vulnerable communities in the County. Review land use maps to identify opportunities and barriers for responding to rapid population changes and rebuilding after disasters and other extreme climate impacts, and prioritize anti-displacement programs in overburdened communities when increasing densities and making zoning changes.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	
Identify communities disproportionately impacted by extreme heat events or low air quality and prioritize equitable access to emergency preparedness resources for overburdened and unsheltered communities. Develop an urban heat resilience strategy and wildfire smoke resilience strategy in partnership with local residents, Tribes, emergency management officials, regional clean air agency officials, and other partners that includes land use, urban design, waste heat reduction, and urban greening actions. This may include providing tools and resources for the community to stay safe during extreme heat events such as a community notification alert to reduce exposure to wildfire smoke and particulate matter. Prioritize at-risk community members by providing personal protective equipment and support for infrastructure updates (e.g., HVAC upgrades with MERV 13 filters) for facilities serving vulnerable populations.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	Currently underway, received grant funding. So decision re: having this policy since it's happening, include or exclude? "Re-word: As part of an awarded grant..." or something like that.
Develop messaging on climate change's impacts on health and safety with guidance for residents to plan and protect themselves and involve overburdened communities using multiple formats and languages for outreach. Co-create climate communications with Clallam County communities, especially Tribes, to ensure	**Source:** Commerce Menu of Measures, **Source:** Clallam Climate Action Plan **Policy Lever:** Incentives & Education	

their input on climate impacts, health impacts, and emergency resources during extreme events, focusing on culturally relevant transcreation to reach specific communities.	**Climate and Equity Intersection:** Resilience, equity	

EMERGENCY MANAGEMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.720 (4) The County should support expansion of the telecommunication network. Fiber optic cables and cellular service should be enhanced to serve the economic development goals of the County. Cellular sites should be placed in locations which provide required service without significantly impacting scenic qualities of the area. The County should factor climate impacts into the planning of emergency communications and coordination of preparedness, response, and recovery activities among first responders and partners.	
31.02.420 (10) Road safety should continually increase as population growth occurs. (x) Map road and other transportation infrastructure such as marinas and port facilities that are vulnerable to repeated floods, landslides, and other natural hazards exacerbated by climate change, and designate alternative travel routes for critical transportation corridors when roads must be closed. (i) Prioritize safety deficiencies using both statistical measures (e.g., accidents and road geometrics) and public input. Periodically, review the process for effectiveness of prioritizing road segment and intersection deficiencies.	
31.02.320 (26) The public should be protected from personal injury, loss of life, or property damage from environmental hazards and climate change impacts. Land use practices in hazard areas should not cause or exacerbate natural processes which endanger the lives, property and resources of citizens. Undevelopable hazardous areas should be utilized as open space whenever possible. The County should support enhanced data collection for hazard events of all magnitudes to provide a fuller understanding of the community's hazard characteristics — including those affected by climate change.	

NEW POLICIES

Goal	Promote and implement preparedness, response, and recovery efforts to ensure that all members of the Clallam County community are ready for climate emergencies. Anticipate and be ready to accommodate the rise in demand for emergency services due to climate change impacts and understand community needs when preparing for emergency situations.

Policy	Policy Context	Notes
Enhance local government staff's expertise in climate change and environmental justice to improve policy implementation, equity, and resilience. Staff should seek State Department of Health funding and other grant opportunities to create comprehensive wildfire and flood resilience strategies to boost emergency response, promote fire and flood-resilient landscapes, and support fire and flood-adapted communities. Encourage participation in incentive-based emergency preparedness programs such as the Community Rating System (FEMA's National Flood Insurance Program), Firewise (National Fire Protection Association), and StormReady (National Weather Service).	**Source:** NODC Adaptation Strategies, Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	
Conduct a sea level rise evaluation and resilience plan to assess the vulnerability of County assets, including motorized and non-motorized roads, sewage treatment and water infrastructure, buildings, and marine access. This includes: • Aligning with the Multi-jurisdictional Hazard Mitigation Plan to identify vulnerable infrastructure. • Analyzing sewer system capacity and vulnerability to sea level rise and proposing actions to enhance resilience. • Evaluating roads and structures along bluff crests for erosion threats due to sea level rise, considering planned retreat and ecosystem restoration, while minimizing realignment and protection efforts.	**Source:** Port Angeles Resilience Plan **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Develop a comprehensive strategy to map vulnerable transportation infrastructure,	**Source:** Commerce Menu of Measures	

designate alternative routes for critical corridors during closures, and incorporate sea-level rise and tsunami hazard data into critical area delineation for infrastructure siting and land-use planning. Enhance data collection to better understand community hazard characteristics, including those influenced by climate change, and support informed decision-making in emergency management.	**Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Develop resilience hubs as community-serving facilities to support residents, coordinate communication, distribute resources, and enhance quality of life while reducing carbon emissions. Identify community resilience hubs for each of the County's twenty micro-islands, seek funding to make these sites resilient, communicate the locations of these sites for public use during an emergency, and coordinate all plans to serve these hubs effectively in an emergency.	**Source:** Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	
Integrate climate impacts into the planning and coordination of operations for preparedness, response, and recovery activities among first responders and partners, including public health, law enforcement, fire, school, and emergency medical services (EMS) personnel. This may include updating emergency services communications equipment; enhancing training of emergency personnel and other responders; taking regular inventory of emergency facility needs (e.g., home emergency kits, cooling centers and temporary shelters); and assessing and improving the adaptive capacity of people who are most vulnerable to climate change-exacerbated hazards, such as Elders or people living in high-risk areas.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	
Develop and improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Operations Plan, and other plans to mitigate the impact of emergencies and hazards affected by climate change. Expand disaster training programs like CERT to equip Tribal members and the local	**Source:** Clallam MJHMP, Makah HMP **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience	

community with emergency response skills, and partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions. Additionally, continue to align climate impacts risk assessment and policies with the Multi-jurisdictional Hazard Mitigation Plan (MJHMP) update efforts.		
Establish a County-led climate resilience committee and identify grant opportunities and partners to jointly apply for grants that benefit the community, especially the most at-risk populations. Seek funding and technical assistance from the Department of Ecology to plan and prepare for climate hazards.	**Source:** Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	Question: Which DOE funding and tech assistance-add commerce, etc. We can expand to other State & Federal resources

Room 2: Aylssa

ECOSYSTEMS

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
27.12.020 (9) Protect water quality by controlling erosion, by providing guidance in the siting of land uses and activities to prevent or reduce the of release chemical or bacterial pollutants into waters of the State, and by maintaining stream flows and habitat quality for fish and marine shellfish. Integrate climate change projections into shellfish hatchery planning and manage or enhance upstream watersheds to improve water quality and minimize pollution from new and existing sources, including climate change impacts.	
27.12.020 (16) Provide the regulatory framework to supplement adopted policies in the Clallam County Comprehensive Plan, CCC Title 31, and the Zoning Code, CCC Title 33, which set forth land use designations, open space preservation, natural resource protection, wildlife migration corridor preservation, fish and wildlife habitat protection, wetland protection and, overall, protects the natural features in Clallam County by promoting wise use of lands within Clallam County. Strive for no net loss of ecosystem composition, structure, and functions and net ecological gain to enhance ecosystem resiliency to climate impacts in Clallam County.	

31.02.320 [Policy No. 5] Clallam County shall work with other agencies, tribes and individuals to prevent additional listing of fish, wildlife and plants under the Endangered Species Act through pro-active (rather than reactive) planning and implementation of proper land use practices. The County should identify potential future climate impacts on habitats and protect species using or reliant on vulnerable habitats, including identifying the most drought tolerant, resilient plant species for the region.	
31.02.320 (3) Wetlands. [Policy No. 9] Clallam County shall work to achieve no net loss of regulated wetlands while allowing a reasonable use of property, with regard to their functions and values, in the short-term and should work to achieve a long-term net gain in these attributes through restoration and enhancement. The public acquisition of important wetland areas should be pursued, and the County should identify and quantify the ecosystem services benefits of wetlands and include these natural capital assets in cost-benefit assessments for community and development planning. Wetlands provide biological and hydrological connectivity that fosters resilience to climate impacts, and the natural abilities of wetlands to provide recreational, educational, historical and cultural values should also be protected.	
31.02.320 (4c) [Policy No. 12] To protect quality and quantity of essential aquifers for current and future needs, Clallam County should encourage water conservation measures for all land uses; support water conservation measures and educate residents on methods to conserve water; and promote the application and implementation of water-conserving landscaping plans. This may include boosting regional water storage to improve water system climate resilience by promoting rainwater harvesting, encouraging water-efficient appliances, improving stormwater retention in suitable areas, establishing reclaimed water systems, and collaborating with Clallam Public Utilities Department for widespread water conservation education. Clallam County should undertake further studies of the groundwater regime of the County so that the factors influencing the quantity, quality and flow patterns of groundwater are more precisely known.	
31.02.320 (7c) [Policy No. 20] Clallam County shall recognize the large number of salmon and steelhead stocks that have been classified as critical or depressed. The County shall work toward prevention of these stocks from being listed as threatened and endangered through habitat restoration and land use practices which cause no further degradation to habitat needs. The County should implement actions identified in restoration and salmon recovery plans to improve the climate resilience of streams and watersheds.	

31.02.320 (9a) [Policy No. 22] Flood control should be undertaken in the context of varied uses including agricultural and residential, fish and wildlife habitat, water supply, open space, and recreation. Land use and related regulations and zoning should reflect the natural constraints of floodplains, meander zones, riparian habitat zones, and projected impacts of climate change on flood-prone areas.	

NEW POLICIES

Goal	Ensure that forests, wetlands, shorelines, and other ecosystems are resilient to the impacts of extreme weather, invasive species, pests, diseases, and other impacts worsened by climate change.

Policy	Policy Context	Notes
Prepare ecosystems for climate impacts by implementing restoration and recovery actions for streams, wetlands, and watersheds, focusing on biological and hydrological connectivity, reducing aquatic invasive species, and improving watershed-scale processes. This includes: • Bolstering the resilience of aquatic ecosystems by restoring riparian vegetation, floodplains, and stream structures, conserving water, and maintaining habitats to protect native fish and other aquatic life. • Exploring innovative adaptation strategies to manage water quality and streamflow and reduce sedimentation in streams resulting from wildfire damage and the associated impacts of landslides and flooding.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Strengthen habitat and ecosystem resilience by inventorying and protecting climate refugia and critical habitats to strive for no net loss of ecosystem attributes, with a focus on achieving net ecological gains. Expand habitat protection, quality, and connectivity through designations	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	

Policy	Policy Context	Notes
such as conservation areas, buffers, and open space corridors. Incorporate climate considerations in determining permissible activities within wetlands and wildlife habitats.		
Adopt integrated natural resource management practices and optimize management activities that enhance habitat integrity and function in the face of climate impacts. Proactively manage invasive species and promote native, drought- and pest-resistant plants for restoration projects to boost ecosystem resilience to climate-related stressors. Quantify the benefits of ecosystem services to include these natural capital assets in community planning, climate action plans, and development of cost-benefit analyses.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	- Wildlife corridors and establishing green belts - Definition of invasive species, maybe not previously. Better to monitor as what species do well? Natural invasion - Shellfish: bringing in non-native species without knowing impact on ecosystem
Protect and enhance urban forests by implementing climate-smart forest management, prioritizing efforts in more vulnerable areas of the community. This may include: • Implementing open space requirements for new developments, establishing green belts to connect communities, and enhancing urban forest management to optimize carbon storage and increase resilience. • Developing and implementing educational, incentive-based, and regulatory strategies to preserve and enhance private and urban forest lands for increased climate resilience, carbon sequestration, and ecosystem health. • Reducing financial impacts on landowners by advertising and encouraging participation in technical and financial assistance	**Source:** Commerce Menu of Measures; Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation, Education & Incentives **Climate and Equity Intersection:** Resilience	-Why is there a need to differentiate urban and rural lands? -Private and public lands? -seeking federal and state funded grants

Policy	Policy Context	Notes
programs, such as Washington's cost-share program. • Focusing on proactive urban forestry management, emphasizing risk mitigation from pests, disease, and wildfires, while ensuring that tree planting and species selection are adaptive to future climate conditions and prioritize vulnerable communities. • Seeking state-funded grants to reduce wildfire risk for areas identified as the wildland-urban interface through improvements such as structural hardening, improved water storage capacity, and wildfire risk assessments for communities and critical infrastructure.		
Promote forest stewardship education, tax incentive programs, carbon crediting, payment for ecosystems services programs, and other approaches to support landowners in managing their lands for climate resilience and preventing conversion. Collaborate with State agencies, conservation districts, and the Washington State University Extension Forestry Program to make resources and information available to landowners and support sustainable working forests. Explore other jurisdictions' strategies to recognize the economic benefits of and monetize environmental services maintained on landowners' properties.	**Source:** Commerce Menu of Measures; NODC **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	- County, city or state basis? Carbon crediting could be difficult/authority
Enhance the resilience of habitats and communities to climate change by protecting and restoring coastal ecosystems, taking into account sea-level rise in coastal and nearshore restoration projects. Focus on identifying, protecting, and restoring submerged aquatic vegetation that offer critical habitat, "blue" carbon	**Source:** Commerce Menu of Measures, Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	

Policy	Policy Context	Notes
storage, and other ecosystem services. In addition, evaluate and address sea level rise in local clean-up sites, address concerns related to Tribal cultural resources and sites on the shoreline, and conduct long-term cost-benefit analysis of shoreline armor repairs along key shoreline sites.		

WATER RESOURCES

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (6) Marine Resources.. (a) [Policy No. 16] Clallam County should work to achieve alternatives for sewage treatment plant discharges to marine waters. (b) [Policy No. 17] Clallam County shall preserve the scenic, aesthetic and ecological qualities of the marine shorelines of Clallam County, in harmony with those uses which are deemed essential to the life of its citizens. Clallam County shall implement marine resource goals through the Clallam County Shoreline Master Program and/or critical areas ordinance, as now or hereafter amended. • Reduce local land-based pollutants that enhance acidification in marine waters. • Protect and restore natural systems along the shoreline to enhance buffers between coastal storms and development, and prioritize shoreline and watershed areas appropriate for defense and retreat as sea-level rise and coastal storms worsen in the region. • Encourage soft armoring of shorelines to protect infrastructure and habitat, and implement native vegetation and other natural resource management practices to reduce landslides and coastal erosion	
31.02.320 (9) Floodplains. (a) [Policy No. 22] Flood control should be undertaken in the context of varied uses including agricultural and residential, fish and wildlife habitat, water supply, open space, and recreation. Land use and related regulations and zoning should reflect the natural constraints of floodplains, meander zones, and riparian habitat zones. Flood control measures should reserve to the fullest extent possible opportunities for other uses, including public access. • Increase resiliency to flooding events by protecting, and where possible, enhancing and restoring existing flood storage, conveyance, and ecological functions and values of floodplains, wetlands, and riparian corridors.	

• Use regulations, zoning, and incentives to maintain open space and limit development in floodplains, riparian corridors, high value wetlands, and unstable slopes vulnerable to degradation due to climate change impacts. • Work with the Department of Ecology on a Floodplains by Design program to seek technical assistance, grants, and coordination support to reduce flood risks, protect lives and property, and enhance and restore habitat and ecosystem services provided by floodplains.	

NEW POLICIES

Goal	Protect, conserve, and enhance water resources in Clallam County and create more climate resilient water systems.

Policy	Policy Context	Notes
Require the integration of water conservation methods and technologies in the development of irrigation infrastructure within parks and recreation areas to prepare for drought. Promote the adoption of advanced irrigation technologies and practices that minimize water use and mitigate environmental impacts.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Promote the creation of mechanisms for trading water rights to effectively allocate water resources and promote sustainable management practices.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	- Political worries, who decides what is a fair trade? Tribes would have a lot - Clarification on who and what, bulk of water starts in park and forest federal lands - Do the benefits out weigh the costs?
Seek funding from the Department of Ecology to develop and implement a comprehensive drought resilience strategy that considers projected	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies, Ecology	

Policy	Policy Context	Notes
climate impacts and sets action levels for different drought stages. Incorporate climate projections into drought planning to enhance preparedness and mitigate the impacts of drought on water resources.	Climate Resilience Strategy (County recommendation) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Identify and implement strategies to prepare for and mitigate the effects of saltwater intrusion into aquifers and drainage systems. Explore existing grant opportunities to fund initiatives aimed at monitoring and preventing saltwater intrusion to ensure the reliability and sustainability of water supplies.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Evaluate the long-term adequacy of water delivery infrastructure to anticipate and effectively manage changes in hydrological patterns linked to climate change. Construct and maintain new water-storage systems, such as large cisterns, water towers, and reservoirs, to provide backup water supplies during droughts and enhance climate resilience. Promote bringing additional rural areas and failed wells into centralized and existing public water systems. Raise awareness about the DOH Office of Drinking Water's (ODW) guidance on integrating climate constraints, contingency planning, and sustainability in water treatment. Highlight their management of the Drinking Water State Revolving Fund (DWSRF), which funds infrastructure improvements and resilience, especially for smaller public water systems in underserved communities.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies, Ecology Climate Resilience Strategy (County recommendation) **Policy Lever:** Incentives & Education, Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	Water storage would also benefit Em and resilience A must do
Require the use of green infrastructure and low-impact development to manage increased storm intensities and reduce stormwater runoff.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation	Consider long term planning for water availability for both people & ecosystems. Other policies for buildings/development

Policy	Policy Context	Notes
	Climate and Equity Intersection: Resilience, emissions reduction	should consider water resources. Need more visibility from water purveyors on sourcing DOH would have that info Climate change not accounted for in planning projections
Encourage residents to reduce water consumption by implementing smart grid water use and water reclamation systems, promoting smart irrigation technologies, updating water rates to discourage lawn watering, and promoting existing incentives for sustainable food cultivation.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	Add Non-traditional septic systems

WASTE MANAGEMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (b) [Policy No. 32] Treatment and disposal of biosolids should be undertaken locally to minimize transportation costs for waste disposal and to encourage the safe operation and timely maintenance of sewage disposal systems. Incorporate future climate change related hazards such as flooding and sea-level rise on the treatment and disposal of biosolids and affected sites.	
31.02.320 (c) [Policy No. 33] Education and incentive programs on solid and hazardous waste reduction, recycling, and disposal, including those for households and small businesses, should be made available. Opportunities for the collection and disposal of household, agricultural, and commercial hazardous waste should be provided. In addition, provide support to communities to manage debris cleanup and removal resulting from natural hazards exacerbated by climate change.	

NEW POLICIES:

Goal	Ensure that the County reduces, reuses, and recycles waste materials sustainably and prepares for climate change impacts to waste systems.

Policy	Policy Context	Notes
Develop and implement a strategy to quickly manage the collection, transport, sorting, and disposal of debris, such as downed tree limbs and buildings blocking roads and streams, after a disaster to reduce the risks of fire, flood, injury, and disease vectors.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	Moved to DCD, debris removal plan. Was HHS, moved to public works (roads/facilities)
Evaluate wastewater facilities to reduce greenhouse emissions and build resilience to climate impacts such as landslides and sea-level rise, including: • Maximizing on-site natural gas co-generation from anaerobic digesters to reduce emissions and vulnerability to power outages and fuel shortages. • Reducing vulnerability of access routes to treatment plants and identifying alternative routes if primary ones are compromised. • Enhancing management of septic water quality issues and evaluating alternative wastewater treatment solutions in vulnerable areas.	**Source:** Port Angeles Climate Resilience Plan **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience, emission reduction	

AGRICULTURE & FOOD SYSTEMS

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.120 (6) Agricultural land users shall be encouraged to maintain water quality and sustainable water-storage practices, protect fish and wildlife consistent with commercial agriculture, prevent erosion of valuable agricultural soils, implement climate-smart agricultural practices, and prepare for a changing climate.	
31.02.120 (8) Clallam County shall enhance the food security of its citizens and develop the local farm economy by actively supporting producers of food and other agricultural products for local consumption and supporting policies that encourage local institutions to purchase local food. This includes exploring existing funding and tax incentives to support the local food economy and expanding partnerships to mitigate climate impacts and improve access to healthy, affordable, and climate-friendly foods.	

31.02.120 (10) Clallam County should actively pursue the preservation of farmland and promote carbon sequestration—capturing, securing and storing carbon dioxide from the atmosphere—through a purchase or transfer of development rights program, Conservation Futures, and Open Space Program strategies with the Climate Commitment Act. Promote voluntary carbon credit programs, incentives, or financial assistance programs to support the long-term sustainability and economic vitality of the agricultural industry in the County.	

NEW POLICIES

Goal Support a sustainable local and regional agriculture sector in Clallam County that sequesters carbon, provides local jobs and food supply, and is resilient to the impacts of climate change.

Policy	Policy Context	Notes
Transition away from use of industrial fertilizer on agriculture and forestry lands, which can exacerbate ocean acidification. Educate agricultural and forestry managers on alternatives to industrial fertilizer and provide technical assistance as feasible.	**Source:** NODC Climate Adaptation Strategies (E-21) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction	
Preserve land for long-term agricultural use and restore ecosystems such as wetlands and ponds on agriculturally zoned properties in order to preserve carbon sinks, promote water storage, and provide additional ecosystem services.	**Source:** Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Align with the County's Climate Action Plan to invest in the local agricultural sector of Clallam County, including food and materials producers, distributors, and sellers. Protect productive agricultural lands and expand sustainable food production in Clallam County by: • Seeking Washington State Department of Agriculture (WSDA) funding to support private landowners to implement practices that increase climate resilience through livestock	**Source:** Clallam Climate Action Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	

Policy	Policy Context	Notes
infrastructure improvements, soil health, equipment and technology upgrades, and habitat enhancement projects. • Modifying regulatory codes to preserve agricultural lands and prevent their conversion into residential, commercial, or industrial areas. • Facilitating increased land access for local farmers, protecting farmland, and maintaining open spaces.		
Ensure that the local agriculture sector is resilient to extreme weather and other current and future climate impacts by: • Supporting sustainable business opportunities that educate farmers on water storage and regenerative farming practices that enable agricultural producers to adapt to changing climate conditions, minimize production losses, and maintain ecosystem balance. • Providing education and technical assistance on meeting increasing challenges and demands around climate adaptation, especially for agricultural products most vulnerable to climate impacts. • Promoting financial assistance, carbon crediting, and incentive programs to support the economic vitality of this sector.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction, equity	
Enhance local food security and the food economy to mitigate climate impacts and improve access to healthy, affordable, and climate-friendly foods by: • Encouraging and supporting farmers markets, community gardens, and urban agriculture activities in the county. • Developing education and outreach programs supporting food access and security, including a distributed model of local food sales and distribution. • Seeking state grants to boost local food supply and ensure rapid emergency food	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	

Policy	Policy Context	Notes
distribution to communities impacted by fire, flood, extreme heat, drought, and other climate and public health emergencies.		

TRANSPORTATION

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.420 (k, iii, v) Bridges and other transportation facilities should not constrict the natural meander of river channels, should have the least possible adverse effects on the shoreline, should account for sea-level rise projections, should minimize loss of shoreline ecological functions, and should not adversely impact habitat restoration and enhancement projects.	
31.02.420 (k, 11,i) New transportation corridors shall minimize to the reasonable extent possible the disruption to wildlife and stream corridors and shall provide for maintaining connectivity between habitat areas with the application of buffers and other means. The County should incorporate hydrologic climate impacts into the design of water-crossing structures (i.e., climate-smart culverts and bridges) for fish passage and habitat quality.	
31.02.420 (29) The safety and quality of the travel experience for the non-motorized traveler shall be improved with a greater role in the transportation system. (a) Widely and prominently sign for the public the location of safe alternate bicycle routes and trails to separate motorized and non-motorized traffic when possible. (b) The Olympic Discovery Trail shall be developed as a priority transportation facility to bring non-motorized travelers from Jefferson County to the Port Angeles corridor and to the major towns and communities west to the Pacific Coast. (Cont…) Reduce pedestrian or bicycle and car collisions, beginning with communities with the highest rate of injury or death, by	

establishing a safe and welcoming environment that includes green corridors, lighting, shade, visibility, sustainable landscaping, and active uses.	

NEW POLICIES:

Goal	Ensure the local transportation system, including infrastructure, routes, and travel modes, can withstand and recover from extreme weather events and other climate change-related hazards.

Policy	Policy Context	Notes
Design and site new and expanded roads to minimize adverse effects on the shoreline, accommodate sea-level rise projections, preserve shoreline ecological functions, and avoid negative impacts on water-oriented uses, public access, and habitat restoration projects. Incorporate hydrologic climate impacts into the design of water-crossing structures, such as climate-smart culverts and bridges, to support fish passage and habitat quality. The County should identify existing roads and bridges susceptible to flooding and work with the Washington Department of Transportation to improve resilience of vulnerable assets in conjunction with repairs.	**Source:** Jamestown S'Klallam Adaptation Plan, Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	Make sure we state that County does not have control over state routes in Clallam County (SR 110 and 112)
Improve street connectivity and walkability to expand potential evacuation routes, and reduce stormwater impacts from transportation and development through watershed planning, redevelopment, retrofits, and low-impact development.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	Good idea to use PA as an example of too much encroachment on ROW. Opportunity to explore allow people to pass on foot to evacuate Building trails to support weighted vehicles to support alternative evacuation routes
Enhance the resilience of parks and recreational trails by assessing and addressing climate hazards and impacts, and advocate to expand the Washington	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan, Ecology Climate	Clallam transit does a good job some sort of survey to see why people

Policy	Policy Context	Notes
State Department of Transportation (WSDOT) climate vulnerability assessment to include non-state roads and other transportation systems. Work with the Department of Natural Resource (DNR) to establish roadside vegetation management to reduce wildfire risk along Highway 101 and Highway 112.	Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	are driving rundown cars versus taking public transit?
Continue to partner and support Clallam Transit to identify barriers to using transit, understand climate vulnerability of transit systems, expand transit use and equity, and ensure routes are convenient, safe, and accessible for travelers/commuters. Develop strategies that promote transit equity and community safety by considering the needs of the most vulnerable populations, and design and implement transit to support pedestrians, bicycles, and public transit.	**Source:** Clallam Climate Action Plan, Port Angeles Resilience Plan **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	

ZONING & DEVELOPMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.410 (k, iv, vii) The amount of impervious surfaces should be minimized to allow for maximum infiltration, reduced quantity of runoff and potential reduction for flooding. Additionally, utilize the environmental services provided by trees to mini**mize** the negative effects of impervious surfaces and vehicular traffic such as increased temperatures, airborne particulates, carbon dioxide, noise, and stormwater runoff.	
27.12.020 (18) Promote harmonious co-existence between the ongoing use of pre-existing development sites in critical areas, and the functional protection of those critical areas. Preserve unique or major physical features such as marine shorelines, bluffs, ravines, streams, wetlands, wildlife habitat and other environmentally sensitive areas and those vulnerable to climate change impacts as designated open space. Maintain and update a critical areas ordinance that incorporates climate change considerations.	
31.02.420 (Policy No. 31) Clallam County should require new development to mitigate impacts on transportation facilities which	

are insufficient to safely handle transportation demands. The County should require new development to rectify and/or compensate for impacts to transportation facilities not meeting minimum safety standards, when reasonable and capable of being accomplished. Additionally, the County should consider future climate conditions during siting and design of transportation facilities, including changes to temperature, rainfall, and sea level, to help ensure they function as intended over their planned life cycle.	
31.02.263 Policy 4 (e). In order to maintain rural character, infill development and redevelopment within LAMIRDs should minimize impervious surfaces in order to maintain a more "open" or "rural" atmosphere; should have increased setbacks, buffers, and screening to separate land uses from adjacent rural residential zones; should incorporate measures to reduce the impacts of noise, odor, and traffic; and should require high-quality landscaping designed to protect rural character. The County should also develop regulations for elevating or setting back new and substantially improved structures to reduce the risk of damage caused by sea level rise, and establish new minimums, if necessary, so that improvements are not required to protect structures during their expected life.	

NEW POLICIES

Goal	Establish development patterns that increase the resilience of Clallam County's built environment, natural areas, and communities to climate impacts.

Policy	Policy Context	Notes
Utilize best available science and updates codes as necessary to establish overlays, special zoning districts, and design standards to increase resilience to climate hazards and direct new development away from high-risk areas. Continue to update vulnerability assessment of climate impacts and use this information to determine if and where zoning changes are needed. Additionally, conduct an environmental justice audit prior to creating new zoning	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	**1. EJ assessment** a. Is the EJ assessment separate? What does that mean for every zoning update? b. If the City was adopting this policy, this would

Policy	Policy Context	Notes
designations or rezoning to ensure that decisions center environmental justice and do not further harm overburdened communities.		require county to do more than CEPA for even a 1 acre parcel c. A lot of burdens as local govt, trying to make sure not adding more d. Framing as associated with comp plan revision to do an EJ assessment, versus every time a rezone
Restore, maintain, and protect natural resources and open space areas, shorelines, agricultural lands, and forested lands to maximize climate resilience benefits and prevent their conversion to developed land. Protect undeveloped areas from conversion and encourage development within UGAs and already developed areas to improve resilience. Consider adopting concepts including conservation design and a land-first approach to development to prioritize healthy ecological functions, while still permitting development in appropriate locations. Center external partnerships with Tribes, nonprofits, and others to help implement this policy.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	1. **Concerned about preventing conversation to developed land** **a.** Prevent is an absolute, sometimes there is a time when un developed **b.** Add "Designated" forest lands or commercial **c.** Doesn't like prevent, but maybe change to discourage

Policy	Policy Context	Notes
		d. Nervous about the absolute e. Read them as someone will use against in litigation f. Incentivize preventing or continuation of
Implement development regulations and best practices to reduce risks from wildfires, extreme heat, flooding, and climate-related hazards. Include documentation of potential climate-related risks in property records to enhance transparency regarding on-site development vulnerabilities and retrofit infrastructure for hazards such as coastal flooding and sea level rise. Consider financial safeguards for any development that proceeds in these high-risk zones and explore the feasibility of requiring long-term financial bonds for projects in vulnerable locations.	**Source:** Commerce Menu of Measures, Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	Financial bonds - for repairs/recovery if the event occurred? Or for what?
Integrate future climate conditions into the siting and design of capital facilities, parks, and community assets. Support long-term visioning for vulnerable areas through equitable community engagement, including managed retreat and relocation of hazardous industries and essential services.	Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	
Relocate hazardous industries and essential public services away from the 500-year floodplain and develop regulations to elevate or set back new structures to mitigate sea level rise damage. Require shoreline	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation	1. Relocate hazardous change to "Assess and encourage relocation" a. Opportunity to review

Policy	Policy Context	Notes
stabilization to use soft methods, assess vulnerability of natural assets like wetlands and beaches, and ensure new developments are sited outside of sea-level rise hazard areas.	**Climate and Equity Intersection:** Resilience	b. 500 year flood plain hardly used rn c. Should it be required in all cases? Does it create another obligation d. Don't regulate to that e. Do more assessment work around streams f. Implies that the primary hazard is flooding, but could apply to other hazards like wildfire. Might want to support movement away for any hazard
Acquire properties or easements vulnerable to climate hazards and work with local communities to establish a development rights program to transfer rights from these areas to promote conservation and climate resilience while encouraging denser development in suitable locations.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	1. Acquire a. Haven't been sued before b. Looking at this one, can't possibly do this one. c. Untenable obligation d. Soften to "work towards or

Policy	Policy Context	Notes
		collaborate to obtain properties" e. Overall soften language f. Visions goals and policies, which or all subject to lawsuit ? If language too strong?

BUILDINGS & ENERGY

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.510 (3) Measuring Housing Need: A Data Toolkit for Clallam County includes the following strategies for providing affordable housing and meeting the demand for diversity of housing choices: Encourage the development of infill development and "missing middle" housing by developing policies and codes to balance available funding to include a wider range of housing types in designated single-family zones that also experience fewer climate risks (e.g., flooding, wildfire, etc.), reduce displacement due to climate impacts, and improve equitable access to existing city transit systems and community services inside UGAs. Identify and expand climate-resilient anti-displacement strategies and infrastructure to mitigate housing insecurities exacerbated by climate-driven gentrification.	
31.02.285 (Goal 7, Policy 17) Essential Public Facilities. Essential public facilities are public capital facilities of a County-wide or State-wide nature which are typically difficult to site. Essential public facilities may be located in designated commercial forest or rural lands provided the County finds that such facilities cannot otherwise be located in urban areas, are largely self-contained or served by urban governmental services in a manner that adjacent rural or urban development is not promoted, and the facility does not cause nuisances (noise, dust, light, etc.) on adjacent properties that cannot be adequately mitigated. The siting of essential public facilities in resource lands should not interfere with resource management on adjacent resource lands. Additionally, the County	

should collaborate with energy utilities and seek available grants to enhance the resilience and reliability of infrastructure susceptible to climate change impacts, including planning and building facilities and utilities to avoid or withstand flooding from rising sea levels and associated climate impacts.	
31.02.720 (3) Utility lines shall be underground for new land divisions to reduce damage from storms and wildfire ignition risks. The County, cities, and service providers should work to place existing above-ground utility lines underground along major highway corridors inside urban growth areas.	

NEW POLICIES

Goal	Increase the resilience of public utilities, facilities, and services by preparing for climate change impacts.

Policy	Policy Context	Notes
Ensure that energy infrastructure, including generation and transmission systems, can withstand and recover from the effects of extreme weather and other natural disasters intensified by climate change. Work with utilities to ensure infrastructure safety and reliability such as through undergrounding lines, establishing redundancies, and promoting small-scale energy generation systems.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Encourage the deployment of emerging technologies to promote distributed energy generation, demand response, energy storage, energy efficiency, and smart grid technologies to increase grid reliability, flexibility, and capacity. Design and implement pilot projects, and encourage local governments, utilities, and public facilities to apply for solar and energy storage grants through the State Department of Commerce.	**Source:** Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	

Goal	Promote building retrofits and new construction that is sustainably built to minimize environmental impacts and enhance resilience against extreme weather and other risks exacerbated by climate change.

Policy	Policy Context	Notes

Develop or modify building standards to reduce the impacts of climate change on indoor and outdoor buildings features. This may include requiring low-impact development and stormwater runoff mitigation systems, designing buildings for passive survivability in case of extended power loss, adopting fire resilience standards such as venting and features designed to prevent ember ignition, and promoting "green" or "cool" roofs. Prioritize the preservation and weatherization of housing in overburdened communities and provide assistance for existing tenants at risk of displacement or additional cost burden from green gentrification.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Incentives & Education, Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction, equity	
Align with the County's Climate Action Plan to collaborate with partners to incentivize building improvements and retrofits for residential and commercial buildings in the County to improve energy efficiency and resilience. Specific activities may include expanding low-income Energy Assistance programs, promoting existing weatherization incentives and assistance, upgrading cooling infrastructure in facilities serving vulnerable populations, and implementing alternatives like increasing tree cover and adding shade structures. Prioritize incentives and assistance programs for cost burdened communities and ensure outreach is targeted towards and benefits overburdened populations, such as those who live in multifamily and affordable housing units.	**Source:** Clallam Climate Action Plan, Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	

ECONOMIC DEVELOPMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.620 (3) Environmental Stewardship. Encourage economic development that fosters protection of the natural environment and water resources that are vital to sustaining the County's tourism, natural resource-based industries, and quality of life. Recognize the environment as a key economic value in the	

community that must be protected in the face of current and future climate impacts. (b) Policy 2. Protect the natural environment and utilize renewable resources for long-term sustainable economic development and ecosystem resilience, including protection of existing farmland. (c) Policy 3. Implement cooperative and coordinated surface and groundwater management policies to ensure the future availability and quality of water throughout the County. Protect and preserve water quality and quantity from drought, extreme heat, and other hazards exacerbated by climate change.	
31.02.620 (4) (a) Policy 1. Participate with local business leaders and organizations like the Economic Development Council, chambers of commerce, real estate professionals, permit advisory boards, downtown associations, industry cluster teams, and other groups to address current and changing business and job requirements and bolster the County's local green economy, focusing efforts on the County's more vulnerable communities.	

NEW POLICIES

Goal	Ensure Clallam County's local economy is resilient to climate-related disruptions and encourage a green local economy and business opportunities.

Policy	Policy Context	Notes
Identify and monetize environmental services that promote climate resilience by creating a mechanism for compensating landowners for the environmental services maintained on their property. Utilize best available science to better understand the economic context of project planning and decision-making particular to shoreline and forest ecosystems affected by climate change throughout the county, such as No Net Loss policy and buffer setbacks. Specific mechanisms to compensate landowners for	**Source:** NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction, equity	1. Clarification of compensation of preserving ecosystems? For what? a. Do other areas of the country have protecting ecosystems as a part of tourism and economic development? b. One looking at environment stops doing something,

Policy	Policy Context	Notes
promoting eco-resiliency may include available tax incentives, carbon crediting, and financial assistance programs.		versus having to pay for advanced stormwater treatment c. Communities who have invested in preserving scenic corridors, also should be compensated d. Connection between the two, healthy ecosystems would contribute
Develop a green jobs strategy in Clallam County through collaboration with community groups and businesses that: • Facilitates the transition of impacted industries to low-carbon operations; • Creates opportunities for youth and affected workers to move into green jobs; • Offers training and continuing education in green jobs for economically vulnerable individuals or those with limited skills and experience in this sector; • Ensures opportunities for local employment in these jobs.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Partnerships & Planning **Climate and Equity Intersection:** Resilience, emissions reduction, equity	1. Green jobs a. Could remove green b. Just says job c. Goal is to encourage a green local economy, what is the definition of green i. Could look very different ii. What is a green job? Would that slow it down or make it difficult. Make it broader and

Policy	Policy Context	Notes
		more flexible d. Refine definitions wherever possible. Defining resilience as it applies in that policy
Support the efforts of local businesses in bolstering climate preparedness and continuity of operations before, during, and after extreme weather events. This may include collaborating with community partners to create emergency plans that maintain business continuity during extreme weather events and promoting existing incentives and grants for businesses to install rooftop solar panels, batteries, and other renewable energy systems to ensure backup power and operational resilience.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Education & Incentives **Climate and Equity Intersection:** Resilience	1. Not just limit to extreme weather events a. Any climate hazard. Any type of disaster
Assess the impacts of climate migration in Clallam County during Comprehensive Plan update periods. Integrate these findings into Comprehensive Plan updates, infrastructure plans, revenue and expense forecasting, and housing assessments.	**Source:** Port Angeles **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	

HEALTH & WELL-BEING

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes

31.02.320 (27) Clallam County should promote a high level of air quality for maximum visibility for scenic views, elimination of pollutant transport, reduction in adverse health impacts, resilience to wildfire smoke events, and minimization of noxious effects of airborne particulates.	

NEW POLICIES

Goal	Protect community health and well-being from the impacts of climate change and focus on overburdened communities in the County to ensure that the most vulnerable people do not experience disproportionate health impacts.

Policy	Policy Context	Notes
Promote health impact assessments and other tools to address health, equity, and climate change impacts on vulnerable communities in the County. Review land use maps to identify opportunities and barriers for responding to rapid population changes and rebuilding after disasters and other extreme climate impacts, and prioritize anti-displacement programs in overburdened communities when increasing densities and making zoning changes.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	1. Valuable to be able to use those tools to progress the health of everyone, particularly vulnerable communities. a. Definition that would apply to agencies that don't apply to others b. By definition would be overall Clallam county disadvantaged technically. In a comp plan want a clear concise language for funding, care for the housing in secure elderly etc c. Who do we mean by overburdened and where

Policy	Policy Context	Notes
		d. All of clallam technically is EPA overburdened e. Common english and definitions all at once
Identify communities disproportionately impacted by extreme heat events or low air quality and prioritize equitable access to emergency preparedness resources for overburdened and unsheltered communities. Develop an urban heat resilience strategy and wildfire smoke resilience strategy in partnership with local residents, Tribes, emergency management officials, regional clean air agency officials, and other partners that includes land use, urban design, waste heat reduction, and urban greening actions. This may include providing tools and resources for the community to stay safe during extreme heat events such as a community notification alert to reduce exposure to wildfire smoke and particulate matter. Prioritize at-risk community members by providing personal protective equipment and support for infrastructure updates (e.g., HVAC upgrades with MERV 13 filters) for facilities serving vulnerable populations.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	1. Prioritize at - risk members? a. At risk due to proximity to a hazard or financial b. Or due to health ? c. Make more clallam county centric d. Could apply at the national level e. Across the board, the poor aren't pushed towards f. Infrastructure upgrades and at-risk suggest a nursing home, resilience center that makes sure they have HVAC
Develop messaging on climate change's impacts on health and safety with guidance for residents to plan and protect themselves and involve overburdened communities using multiple	**Source:** Commerce Menu of Measures, **Source:** Clallam Climate Action Plan **Policy Lever:** Incentives & Education	

Policy	Policy Context	Notes
formats and languages for outreach. Co-create climate communications with Clallam County communities, especially Tribes, to ensure their input on climate impacts, health impacts, and emergency resources during extreme events, focusing on culturally relevant transcreation to reach specific communities.	**Climate and Equity Intersection:** Resilience, equity	

CULTURAL RESOURCES & PRACTICES

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.330 (1) All jurisdictions should work individually and cooperatively to identify, record, study and encourage the preservation, maintenance and use of lands, sites, and structures that have historical and archaeological significance. The early identification and resolution of conflicts between preservation of historical or archaeological resources and competing land uses should be promoted and facilitated. Ensure that lands, sites, and structures that have cultural and archaeological significance are prioritized for protection from and resilient to the effects of extreme weather and natural disasters exacerbated by climate change.	

NEW POLICIES

Goal	Ensure that cultural resources and practices, such as historic, archaeological, and sacred sites, traditional foods, and natural resources, are resilient to the effects of extreme weather and other natural disasters exacerbated by climate change.

Policy	Policy Context	Notes
Restore and protect ecosystems to uphold Tribal Treaty Rights and preserve culturally significant resources including but not limited to historic, archaeological, and sacred sites, traditional foods,	**Source:** HMP, Commerce Menu of Measures **Policy Lever:** Planning & Partnerships	1. Important that the language is there, to fine tune a bit. Uphold treaty rights for the **whole** ecosystem,

Policy	Policy Context	Notes
plants, and resources at risk from climate change impacts. Re-evaluate collaboration with appropriate partners (Tribes, local communities) to integrate Traditional Ecological Knowledge and Western science to identify significant resources and places, assess vulnerability to climate impacts, and co-develop plans to increase resilience.	**Climate and Equity Intersection:** Resilience, emissions reduction, equity	important to have the whole ecosystem in tact 2. Luke provided feedback already 3. Historic sites, and not "key" "including but not limited to" and a. national historic preservation act b. Would do us a disserve to equate historic to sacred tribal site c. Luke had sent more detailed feedback for this section Spelling sacred and not scared
Reassess and mend government-to-government relations with local Tribes to protect archaeological and sacred sites and cultural properties from climate-related threats, and work to safeguard these sites from floods and other natural hazards.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	1. There are sites around the world that are being lost to SLR (inundation and erosion) language is oriented to safe guard a. Preserve b. In concept makes sense, in the context of climate change. What that means for

Policy	Policy Context	Notes
		culturally significant
Evaluate current practices around the protection of salmonid habitats by incorporating riparian and stream habitat conservation measures into land use and infrastructure plans (transportation, water, sewer, electricity) developed by the County in partnership with cities, Tribes, service providers, and state agencies.	**Source:** Jamestown S'Klallam Adaptation Plan, Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	

Goal	Provide all community members an equitable opportunity to learn about climate impacts, influence policy decisions, and take actions to enhance community well-being and resilience.

Policy	Policy Context	Notes
Develop and implement culturally relevant educational programs to communicate and provide targeted engagement around immediate and future climate change threats and methods for enhancing resilience. This may include building and strengthening partnerships with local organizations and entities (such as non-profits, Tribes, and schools) to educate, engage, and empower diverse groups in implementing resilience strategies, linking local issues to broader regional issues. Equitably distribute funds for climate resilience engagement opportunities in overburdened communities, with a focus on equity and underrepresented groups.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	

EMERGENCY MANAGEMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.720 (4) The County should support expansion of the telecommunication network. Fiber optic cables and cellular service should be enhanced to serve the economic development goals of the County. Cellular sites should be placed in locations which	

provide required service without significantly impacting scenic qualities of the area. The County should factor climate impacts into the planning of emergency communications and coordination of preparedness, response, and recovery activities among first responders and partners.	
31.02.420 (10) Road safety should continually increase as population growth occurs. (x) Map road and other transportation infrastructure such as marinas and port facilities that are vulnerable to repeated floods, landslides, and other natural hazards exacerbated by climate change, and designate alternative travel routes for critical transportation corridors when roads must be closed. (i) Prioritize safety deficiencies using both statistical measures (e.g., accidents and road geometrics) and public input. Periodically, review the process for effectiveness of prioritizing road segment and intersection deficiencies.	
31.02.320 (26) The public should be protected from personal injury, loss of life, or property damage from environmental hazards and climate change impacts. Land use practices in hazard areas should not cause or exacerbate natural processes which endanger the lives, property and resources of citizens. Undevelopable hazardous areas should be utilized as open space whenever possible. The County should support enhanced data collection for hazard events of all magnitudes to provide a fuller understanding of the community's hazard characteristics — including those affected by climate change.	

NEW POLICIES

Goal	Promote and implement preparedness, response, and recovery efforts to ensure that all members of the Clallam County community are ready for climate emergencies. Anticipate and be ready to accommodate the rise in demand for emergency services due to climate change impacts and understand community needs when preparing for emergency situations.

Policy	Policy Context	Notes
Enhance local government staff's expertise in climate change and environmental justice to improve policy implementation, equity, and resilience. Staff should seek State Department of Health funding and other grant opportunities to create comprehensive wildfire and flood resilience strategies to boost emergency response, promote fire	**Source:** NODC Adaptation Strategies, Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion)	

Policy	Policy Context	Notes
and flood-resilient landscapes, and support fire and flood-adapted communities. Encourage participation in incentive-based emergency preparedness programs such as the Community Rating System (FEMA's National Flood Insurance Program), Firewise (National Fire Protection Association), and StormReady (National Weather Service).	**Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	
Conduct a sea level rise evaluation and resilience plan to assess the vulnerability of County assets, including motorized and non-motorized roads, sewage treatment and water infrastructure, buildings, and marine access. This includes: • Aligning with the Multi-jurisdictional Hazard Mitigation Plan to identify vulnerable infrastructure. • Analyzing sewer system capacity and vulnerability to sea level rise and proposing actions to enhance resilience. • Evaluating roads and structures along bluff crests for erosion threats due to sea level rise, considering planned retreat and ecosystem restoration, while minimizing realignment and protection efforts.	**Source:** Port Angeles Resilience Plan **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Develop a comprehensive strategy to map vulnerable transportation infrastructure, designate alternative routes for critical corridors during closures, and incorporate sea-level rise and tsunami hazard data into critical area delineation for infrastructure siting and land-use planning. Enhance data collection to better understand community hazard characteristics, including those influenced by climate change, and support informed decision-making in emergency management.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Develop resilience hubs as community-serving facilities to support residents, coordinate communication, distribute resources, and enhance quality of life while reducing carbon emissions. Identify community resilience hubs for each of the County's twenty micro-islands, seek funding to make these sites resilient, communicate	**Source:** Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education	

Policy	Policy Context	Notes
the locations of these sites for public use during an emergency, and coordinate all plans to serve these hubs effectively in an emergency.	**Climate and Equity Intersection:** Resilience, equity	
Integrate climate impacts into the planning and coordination of operations for preparedness, response, and recovery activities among first responders and partners, including public health, law enforcement, fire, school, and emergency medical services (EMS) personnel. This may include updating emergency services communications equipment; enhancing training of emergency personnel and other responders; taking regular inventory of emergency facility needs (e.g., home emergency kits, cooling centers and temporary shelters); and assessing and improving the adaptive capacity of people who are most vulnerable to climate change-exacerbated hazards, such as Elders or people living in high-risk areas.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	
Develop and improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Operations Plan, and other plans to mitigate the impact of emergencies and hazards affected by climate change. Expand disaster training programs like CERT to equip Tribal members and the local community with emergency response skills, and partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions. Additionally, continue to align climate impacts risk assessment and policies with the Multi-jurisdictional Hazard Mitigation Plan (MJHMP) update efforts.	**Source:** Clallam MJHMP, Makah HMP **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Establish a County-led climate resilience committee and identify grant opportunities and partners to jointly apply for grants that benefit the community, especially the most at-risk populations. Seek funding and technical assistance from the Department of Ecology to plan and prepare for climate hazards.	**Source:** Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Planning & Partnerships	

Policy	Policy Context	Notes
	Climate and Equity Intersection: Resilience, equity	

Room 3: Abigail

WATER RESOURCES

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (6) Marine Resources.. (a) [Policy No. 16] Clallam County should work to achieve alternatives for sewage treatment plant discharges to marine waters. (b) [Policy No. 17] Clallam County shall preserve the scenic, aesthetic and ecological qualities of the marine shorelines of Clallam County, in harmony with those uses which are deemed essential to the life of its citizens. Clallam County shall implement marine resource goals through the Clallam County Shoreline Master Program and/or critical areas ordinance, as now or hereafter amended. • Reduce local land-based pollutants that enhance acidification in marine waters. • Protect and restore natural systems along the shoreline to enhance buffers between coastal storms and development, and prioritize shoreline and watershed areas appropriate for defense and retreat as sea-level rise and coastal storms worsen in the region. • Encourage soft armoring of shorelines to protect infrastructure and habitat, and implement native vegetation and other natural resource management practices to reduce landslides and coastal erosion	Have the impacts of SLR on septic systems been considered?
31.02.320 (9) Floodplains. (a) [Policy No. 22] Flood control should be undertaken in the context of varied uses including agricultural and residential, fish and wildlife habitat, water supply, open space, and recreation. Land use and related regulations and zoning should reflect the natural constraints of floodplains, meander zones, and riparian habitat zones. Flood control measures should reserve to the fullest extent possible opportunities for other uses, including public access. • Increase resiliency to flooding events by protecting, and where possible, enhancing and restoring existing flood storage, conveyance, and ecological functions and values of floodplains, wetlands, and riparian corridors. • Use regulations, zoning, and incentives to maintain open space and limit development in floodplains, riparian corridors, high	For "…the context of varied uses" Can this be more clear? I'm assuming that this is trying to say that flood control should minimize impacts to these uses? Consider enhancing the amount of required freeboard and

value wetlands, and unstable slopes vulnerable to degradation due to climate change impacts. • Work with the Department of Ecology on a Floodplains by Design program to seek technical assistance, grants, and coordination support to reduce flood risks, protect lives and property, and enhance and restore habitat and ecosystem services provided by floodplains.	shoreline setbacks for construction. Should be expanded to address erosion control as well? On shorelines, and maybe on rivers, flood control structures are more difficult to permit as compared to erosion control structures, so a statement about how the use of those structures can impact other uses would be valuable Erosion control also influences water resources, but is not covered in this policy. Should it be?

NEW POLICIES

Goal	Protect, conserve, and enhance water resources in Clallam County and create more climate resilient water systems.

Policy	Policy Context	Notes
Require the integration of water conservation methods and technologies in the development of irrigation infrastructure within parks and recreation areas to prepare for drought. Promote the adoption of advanced irrigation technologies and	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	• Watershed management plans – Dungeness and Elwha • Covers irrigation

practices that minimize water use and mitigate environmental impacts.		
Promote the creation of mechanisms for trading water rights to effectively allocate water resources and promote sustainable management practices.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	
Seek funding from the Department of Ecology to develop and implement a comprehensive drought resilience strategy that considers projected climate impacts and sets action levels for different drought stages. Incorporate climate projections into drought planning to enhance preparedness and mitigate the impacts of drought on water resources.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies, Ecology Climate Resilience Strategy (County recommendation) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Identify and implement strategies to prepare for and mitigate the effects of saltwater intrusion into aquifers and drainage systems. Explore existing grant opportunities to fund initiatives aimed at monitoring and preventing saltwater intrusion to ensure the reliability and sustainability of water supplies.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience	Flood plain development requirements – Add coastal setback requirements and elevating free board requirements. FEMA base flood projections may be inadequate.
Evaluate the long-term adequacy of water delivery infrastructure to anticipate and effectively manage changes in hydrological patterns linked to climate change. Construct and maintain new water-storage systems, such as large cisterns, water towers, and reservoirs, to provide backup water supplies during droughts and enhance climate resilience. Promote bringing additional rural areas and failed wells into centralized and existing public water systems. Raise awareness about the DOH Office of Drinking Water's (ODW) guidance on integrating climate constraints, contingency planning, and	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies, Ecology Climate Resilience Strategy (County recommendation) **Policy Lever:** Incentives & Education, Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	• Need a callout of septic systems – flooding and waste. • "Coordinate with water purveyors to..." to note that there's a policy share here between organizations.

sustainability in water treatment. Highlight their management of the Drinking Water State Revolving Fund (DWSRF), which funds infrastructure improvements and resilience, especially for smaller public water systems in underserved communities.		
Require the use of green infrastructure and low-impact development to manage increased storm intensities and reduce stormwater runoff.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	Reluctance that mandates this without further evaluation – need more practical guidance. Consider changing to "where it's been evaluated/explore and where appropriate…"
Encourage residents to reduce water consumption by implementing smart grid water use and water reclamation systems, promoting smart irrigation technologies, updating water rates to discourage lawn watering, and promoting existing incentives for sustainable food cultivation.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	

WASTE MANAGEMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (b) [Policy No. 32] Treatment and disposal of biosolids should be undertaken locally to minimize transportation costs for waste disposal and to encourage the safe operation and timely maintenance of sewage disposal systems. Incorporate future climate change related hazards such as flooding and sea-level rise on the treatment and disposal of biosolids and affected sites.	"as flooding" could be more specific, maybe specify "surface and groundwater"
31.02.320 (c) [Policy No. 33] Education and incentive programs on solid and hazardous waste reduction, recycling, and disposal, including those for households and small businesses, should be made available. Opportunities for the collection and disposal of household, agricultural, and commercial hazardous waste should be provided. In addition, provide support to communities to manage debris cleanup and removal resulting from natural hazards exacerbated by climate change.	In addition, explore mechanisms to provide support...

NEW POLICIES:

Goal	Ensure that the County reduces, reuses, and recycles waste materials sustainably and prepares for climate change impacts to waste systems.

COMMENT: Worthwhile to develop a goal focused on encouraging development of local recycling capacity and contributing to market development?

Policy	Policy Context	Notes
Develop and implement a strategy to quickly manage the collection, transport, sorting, and disposal of debris, such as downed tree limbs and buildings blocking roads and streams, after a disaster to reduce the risks of fire, flood, injury, and disease vectors.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	• County has a draft debris management plan and noting alignment with hazardous waste plan. • Education element (for jurisdictions and for the community – what to do in this scenario) about windstorms and debris cleanup from compounding/successive events.
Evaluate wastewater facilities to reduce greenhouse emissions and build resilience to climate impacts such as landslides and sea-level rise, including: • Maximizing on-site natural gas co-generation from anaerobic digesters to reduce emissions and vulnerability to power outages and fuel shortages. • Reducing vulnerability of access routes to treatment plants and identifying alternative routes if primary ones are compromised. • Enhancing management of septic water quality issues and evaluating alternative wastewater treatment	**Source:** Port Angeles Climate Resilience Plan **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience, emission reduction	Where wastewater treatment plants are located in terms of climate impacts. It might also be worth adding language in here clarifying how these facilities can/should be protected in light of hazards like flooding.

solutions in vulnerable areas.		

AGRICULTURE & FOOD SYSTEMS

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.120 (6) Agricultural land users shall be encouraged to maintain water quality and sustainable water-storage practices, protect fish and wildlife consistent with commercial agriculture, prevent erosion of valuable agricultural soils, implement climate-smart agricultural practices, and prepare for a changing climate.	Is there a guidance for climate-smart agriculture practices?
31.02.120 (8) Clallam County shall enhance the food security of its citizens and develop the local farm economy by actively supporting producers of food and other agricultural products for local consumption and supporting policies that encourage local institutions to purchase local food. This includes exploring existing funding and tax incentives to support the local food economy and expanding partnerships to mitigate climate impacts and improve access to healthy, affordable, and climate-friendly foods.	
31.02.120 (10) Clallam County should actively pursue the preservation of farmland and promote carbon sequestration—capturing, securing and storing carbon dioxide from the atmosphere—through a purchase or transfer of development rights program, Conservation Futures, and Open Space Program strategies with the Climate Commitment Act. Promote voluntary carbon credit programs, incentives, or financial assistance programs to support the long-term sustainability and economic vitality of the agricultural industry in the County.	

NEW POLICIES

Goal	Support a sustainable local and regional agriculture sector in Clallam County that sequesters carbon, provides local jobs and food supply, and is resilient to the impacts of climate change.

Policy	Policy Context	Notes
Transition away from use of industrial fertilizer on agriculture and forestry lands, which can exacerbate ocean acidification. Educate agricultural and forestry managers on alternatives to industrial fertilizer and provide technical assistance as feasible.	**Source:** NODC Climate Adaptation Strategies (E-21) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction	Encourage and incentivize to aid in the transition way from...
Preserve land for long-term agricultural use and restore ecosystems such as wetlands and ponds on agriculturally zoned properties in order to preserve carbon sinks, promote water storage, and provide additional ecosystem services.	**Source:** Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Align with the County's Climate Action Plan to invest in the local agricultural sector of Clallam County, including food and materials producers, distributors, and sellers. Protect productive agricultural lands and expand sustainable food production in Clallam County by: • Seeking Washington State Department of Agriculture (WSDA) funding to support private landowners to implement practices that increase climate resilience through livestock infrastructure improvements, soil health, equipment and technology upgrades, and habitat enhancement projects. • Modifying regulatory codes to preserve agricultural lands and prevent their conversion into residential, commercial, or industrial areas. • Facilitating increased land access for local farmers, protecting farmland, and maintaining open spaces.	**Source:** Clallam Climate Action Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	

Ensure that the local agriculture sector is resilient to extreme weather and other current and future climate impacts by: • Supporting sustainable business opportunities that educate farmers on water storage and regenerative farming practices that enable agricultural producers to adapt to changing climate conditions, minimize production losses, and maintain ecosystem balance. • Providing education and technical assistance on meeting increasing challenges and demands around climate adaptation, especially for agricultural products most vulnerable to climate impacts. • Promoting financial assistance, carbon crediting, and incentive programs to support the economic vitality of this sector.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction, equity	Ushering in succession to new farmers – in addition to protecting existing farmers. Supporting climate resilient crops.
Enhance local food security and the food economy to mitigate climate impacts and improve access to healthy, affordable, and climate-friendly foods by: • Encouraging and supporting farmers markets, community gardens, and urban agriculture activities in the county. • Developing education and outreach programs supporting food access and security, including a distributed model of local food sales and distribution. • Seeking state grants to boost local food supply and ensure rapid emergency food distribution to communities impacted by fire, flood, extreme heat, drought, and other climate and public health emergencies.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	

ECOSYSTEMS

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes

27.12.020 (9) Protect water quality by controlling erosion, by providing guidance in the siting of land uses and activities to prevent or reduce the of release chemical or bacterial pollutants into waters of the State, and by maintaining stream flows and habitat quality for fish and marine shellfish. Integrate climate change projections into shellfish hatchery planning and manage or enhance upstream watersheds to improve water quality and minimize pollution from new and existing sources, including climate change impacts.	
27.12.020 (16) Provide the regulatory framework to supplement adopted policies in the Clallam County Comprehensive Plan, CCC Title 31, and the Zoning Code, CCC Title 33, which set forth land use designations, open space preservation, natural resource protection, wildlife migration corridor preservation, fish and wildlife habitat protection, wetland protection and, overall, protects the natural features in Clallam County by promoting wise use of lands within Clallam County. Strive for no net loss of ecosystem composition, structure, and functions and net ecological gain to enhance ecosystem resiliency to climate impacts in Clallam County.	
31.02.320 [Policy No. 5] Clallam County shall work with other agencies, tribes and individuals to prevent additional listing of fish, wildlife and plants under the Endangered Species Act through pro-active (rather than reactive) planning and implementation of proper land use practices. The County should identify potential future climate impacts on habitats and protect species using or reliant on vulnerable habitats, including identifying the most drought tolerant, resilient plant species for the region.	
31.02.320 (3) Wetlands. [Policy No. 9] Clallam County shall work to achieve no net loss of regulated wetlands while allowing a reasonable use of property, with regard to their functions and values, in the short-term and should work to achieve a long-term net gain in these attributes through restoration and enhancement. The public acquisition of important wetland areas should be pursued, and the County should identify and quantify the ecosystem services benefits of wetlands and include these natural capital assets in cost-benefit assessments for community and development planning. Wetlands provide biological and hydrological connectivity that fosters resilience to climate impacts, and the natural abilities of wetlands to provide recreational, educational, historical and cultural values should also be protected.	
31.02.320 (4c) [Policy No. 12] To protect quality and quantity of essential aquifers for current and future needs, Clallam County should encourage water conservation measures for all land uses; support water conservation measures and educate residents on methods to conserve water; and promote the application and	

implementation of water-conserving landscaping plans. This may include boosting regional water storage to improve water system climate resilience by promoting rainwater harvesting, encouraging water-efficient appliances, improving stormwater retention in suitable areas, establishing reclaimed water systems, and collaborating with Clallam Public Utilities Department for widespread water conservation education. Clallam County should undertake further studies of the groundwater regime of the County so that the factors influencing the quantity, quality and flow patterns of groundwater are more precisely known.	
31.02.320 (7c) [Policy No. 20] Clallam County shall recognize the large number of salmon and steelhead stocks that have been classified as critical or depressed. The County shall work toward prevention of these stocks from being listed as threatened and endangered through habitat restoration and land use practices which cause no further degradation to habitat needs. The County should implement actions identified in restoration and salmon recovery plans to improve the climate resilience of streams and watersheds.	
31.02.320 (9a) [Policy No. 22] Flood control should be undertaken in the context of varied uses including agricultural and residential, fish and wildlife habitat, water supply, open space, and recreation. Land use and related regulations and zoning should reflect the natural constraints of floodplains, meander zones, riparian habitat zones, and projected impacts of climate change on flood-prone areas.	

NEW POLICIES

Goal	Ensure that forests, wetlands, shorelines, and other ecosystems are resilient to the impacts of extreme weather, invasive species, pests, diseases, and other impacts worsened by climate change.

Policy	Policy Context	Notes
Prepare ecosystems for climate impacts by implementing restoration and recovery actions for streams, wetlands, and watersheds, focusing on biological and hydrological connectivity, reducing aquatic invasive species, and improving watershed-scale processes. This includes: • Bolstering the resilience of aquatic ecosystems by restoring riparian vegetation, floodplains, and stream	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	Interest in wildlife bridges and wildlife corridors? This is a gap. Bridges instead of culverts on 101 – continuing to do this.

structures, conserving water, and maintaining habitats to protect native fish and other aquatic life. • Exploring innovative adaptation strategies to manage water quality and streamflow and reduce sedimentation in streams resulting from wildfire damage and the associated impacts of landslides and flooding.		
Strengthen habitat and ecosystem resilience by inventorying and protecting climate refugia and critical habitats to strive for no net loss of ecosystem attributes, with a focus on achieving net ecological gains. Expand habitat protection, quality, and connectivity through designations such as conservation areas, buffers, and open space corridors. Incorporate climate considerations in determining permissible activities within wetlands and wildlife habitats.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Adopt integrated natural resource management practices and optimize management activities that enhance habitat integrity and function in the face of climate impacts. Proactively manage invasive species and promote native, drought- and pest-resistant plants for restoration projects to boost ecosystem resilience to climate-related stressors. Quantify the benefits of ecosystem services to include these natural capital assets in community planning, climate action plans, and development of cost-benefit analyses.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	
Protect and enhance urban forests by implementing climate-smart forest management, prioritizing efforts in more vulnerable areas of the community. This may include: • Implementing open space requirements for new developments, establishing green belts to connect communities, and enhancing urban forest management to optimize carbon storage and increase resilience. • Developing and implementing educational, incentive-based, and regulatory strategies to preserve and enhance private and urban forest lands for increased climate	**Source:** Commerce Menu of Measures; Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation, Education & Incentives **Climate and Equity Intersection:** Resilience	

resilience, carbon sequestration, and ecosystem health. • Reducing financial impacts on landowners by advertising and encouraging participation in technical and financial assistance programs, such as Washington's cost-share program. • Focusing on proactive urban forestry management, emphasizing risk mitigation from pests, disease, and wildfires, while ensuring that tree planting and species selection are adaptive to future climate conditions and prioritize vulnerable communities. • Seeking state-funded grants to reduce wildfire risk for areas identified as the wildland-urban interface through improvements such as structural hardening, improved water storage capacity, and wildfire risk assessments for communities and critical infrastructure.		
Promote forest stewardship education, tax incentive programs, carbon crediting, payment for ecosystems services programs, and other approaches to support landowners in managing their lands for climate resilience and preventing conversion. Collaborate with State agencies, conservation districts, and the Washington State University Extension Forestry Program to make resources and information available to landowners and support sustainable working forests. Explore other jurisdictions' strategies to recognize the economic benefits of and monetize environmental services maintained on landowners' properties.	**Source:** Commerce Menu of Measures; NODC **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	
Enhance the resilience of habitats and communities to climate change by protecting and restoring coastal ecosystems, taking into account sea-level rise in coastal and nearshore restoration projects. Focus on identifying, protecting, and restoring submerged aquatic vegetation that offer critical habitat, "blue" carbon storage, and other ecosystem services. In addition, evaluate and address sea level rise in local clean-up sites, address concerns related to Tribal cultural resources and sites	**Source:** Commerce Menu of Measures, Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	

on the shoreline, and conduct long-term cost-benefit analysis of shoreline armor repairs along key shoreline sites.		

ZONING & DEVELOPMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.410 (k, iv, vii) The amount of impervious surfaces should be minimized to allow for maximum infiltration, reduced quantity of runoff and potential reduction for flooding. Additionally, utilize the environmental services provided by trees to mini**mize** the negative effects of impervious surfaces and vehicular traffic such as increased temperatures, airborne particulates, carbon dioxide, noise, and stormwater runoff.	
27.12.020 (18) Promote harmonious co-existence between the ongoing use of pre-existing development sites in critical areas, and the functional protection of those critical areas. Preserve unique or major physical features such as marine shorelines, bluffs, ravines, streams, wetlands, wildlife habitat and other environmentally sensitive areas and those vulnerable to climate change impacts as designated open space. Maintain and update a critical areas ordinance that incorporates climate change considerations.	
31.02.420 (Policy No. 31) Clallam County should require new development to mitigate impacts on transportation facilities which are insufficient to safely handle transportation demands. The County should require new development to rectify and/or compensate for impacts to transportation facilities not meeting minimum safety standards, when reasonable and capable of being accomplished. Additionally, the County should consider future climate conditions during siting and design of transportation facilities, including changes to temperature, rainfall, and sea level, to help ensure they function as intended over their planned life cycle.	
31.02.263 Policy 4 (e). In order to maintain rural character, infill development and redevelopment within LAMIRDs should minimize impervious surfaces in order to maintain a more “open” or “rural” atmosphere; should have increased setbacks, buffers, and screening to separate land uses from adjacent rural residential zones; should incorporate measures to reduce the impacts of noise, odor, and traffic; and should require high-quality landscaping designed to protect rural character. The County should also develop regulations for elevating or setting back new and substantially improved structures to reduce the risk of	

damage caused by sea level rise, and establish new minimums, if necessary, so that improvements are not required to protect structures during their expected life.	

NEW POLICIES

Goal	Establish development patterns that increase the resilience of Clallam County's built environment, natural areas, and communities to climate impacts.

Policy	Policy Context	Notes
Utilize best available science and updates codes as necessary to establish overlays, special zoning districts, and design standards to increase resilience to climate hazards and direct new development away from high-risk areas. Continue to update vulnerability assessment of climate impacts and use this information to determine if and where zoning changes are needed. Additionally, conduct an environmental justice audit prior to creating new zoning designations or rezoning to ensure that decisions center environmental justice and do not further harm overburdened communities.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	Some developments are County owned and some will not be – making sure the County has jurisdiction or think about ways to support/encourage other entities that manage/own this infrastructure. Re: Environmental justice audit. Could this could be framed as establishing environmental justice standards that should be applied to re-zoning
Restore, maintain, and protect natural resources and open space areas, shorelines, agricultural lands, and forested lands to maximize climate resilience benefits and prevent their conversion to developed land. Protect undeveloped areas from conversion and encourage development within UGAs and already developed areas to improve resilience. Consider adopting concepts including conservation design and a land-first approach to development to prioritize healthy ecological functions, while still permitting development in appropriate	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	Thinking about data beyond the 500-year floodplain – using alternative data sources/supplementing.

locations. Center external partnerships with Tribes, nonprofits, and others to help implement this policy.		
Implement development regulations and best practices to reduce risks from wildfires, extreme heat, flooding, and climate-related hazards. Include documentation of potential climate-related risks in property records to enhance transparency regarding on-site development vulnerabilities and retrofit infrastructure for hazards such as coastal flooding and sea level rise. Consider financial safeguards for any development that proceeds in these high-risk zones and explore the feasibility of requiring long-term financial bonds for projects in vulnerable locations.	**Source:** Commerce Menu of Measures, Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	
Integrate future climate conditions into the siting and design of capital facilities, parks, and community assets. Support long-term visioning for vulnerable areas through equitable community engagement, including managed retreat and relocation of hazardous industries and essential services.	Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	First line “integrate "risks associated with" future climate conditions”
Relocate hazardous industries and essential public services away from the 500-year floodplain and develop regulations to elevate or set back new structures to mitigate sea level rise damage. Require shoreline stabilization to use soft methods, assess vulnerability of natural assets like wetlands and beaches, and ensure new developments are sited outside of sea-level rise hazard areas.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	Subject to obtaining grant funding – needs a qualification that ensures funding. For relocation, need substantial funding from state or federal government. Think about this for real infrastructure changes. The use of a 500-year floodplain as a standard here should be carefully assessed. The delineation of that floodplain is notoriously problematic, and doesn’t integrate

		projected climate changes This implies that flooding is the primary hazard of concern that might drive relocation, whereas something like fire risk might also motivate it. It might be about encouraging or supporting the relocation of the most vulnerable infrastructure?
Acquire properties or easements vulnerable to climate hazards and work with local communities to establish a development rights program to transfer rights from these areas to promote conservation and climate resilience while encouraging denser development in suitable locations.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	Subject to obtaining grant funding – needs a qualification that ensures funding.

BUILDINGS & ENERGY

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.510 (3) Measuring Housing Need: A Data Toolkit for Clallam County includes the following strategies for providing affordable housing and meeting the demand for diversity of housing choices: Encourage the development of infill development and "missing middle" housing by developing policies and codes to balance available funding to include a wider range of housing types in designated single-family zones that also experience fewer climate risks (e.g., flooding, wildfire, etc.), reduce displacement due to climate impacts, and improve equitable access to existing city transit systems and community services inside UGAs. Identify and expand climate-resilient anti-displacement strategies and infrastructure to mitigate housing insecurities exacerbated by climate-driven gentrification.	
31.02.285 (Goal 7, Policy 17) Essential Public Facilities. Essential public facilities are public capital facilities of a County-wide or State-wide nature which are typically difficult to site. Essential public facilities may be located in designated commercial forest or rural lands provided the County finds that such facilities cannot	

otherwise be located in urban areas, are largely self-contained or served by urban governmental services in a manner that adjacent rural or urban development is not promoted, and the facility does not cause nuisances (noise, dust, light, etc.) on adjacent properties that cannot be adequately mitigated. The siting of essential public facilities in resource lands should not interfere with resource management on adjacent resource lands. Additionally, the County should collaborate with energy utilities and seek available grants to enhance the resilience and reliability of infrastructure susceptible to climate change impacts, including planning and building facilities and utilities to avoid or withstand flooding from rising sea levels and associated climate impacts.	
31.02.720 (3) Utility lines shall be underground for new land divisions to reduce damage from storms and wildfire ignition risks. The County, cities, and service providers should work to place existing above-ground utility lines underground along major highway corridors inside urban growth areas.	

NEW POLICIES

Goal Increase the resilience of public utilities, facilities, and services by preparing for climate change impacts.

Policy	Policy Context	Notes
Ensure that energy infrastructure, including generation and transmission systems, can withstand and recover from the effects of extreme weather and other natural disasters intensified by climate change. Work with utilities to ensure infrastructure safety and reliability such as through undergrounding lines, establishing redundancies, and promoting small-scale energy generation systems.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Encourage the deployment of emerging technologies to promote distributed energy generation, demand response, energy storage, energy efficiency, and smart grid technologies to increase grid reliability, flexibility, and capacity. Design and implement pilot projects, and encourage local governments, utilities, and public facilities to apply for	**Source:** Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	Expand to include other funding sources beyond Dept of Commerce – FEMA, Dept of Energy, Public Works. Make energy storage grants more broad – to include other strategies listed here (energy efficiency

solar and energy storage grants through the State Department of Commerce.		and resiliency projects/infrastructure, DEG, etc.)

Goal	Promote building retrofits and new construction that is sustainably built to minimize environmental impacts and enhance resilience against extreme weather and other risks exacerbated by climate change.

Policy	Policy Context	Notes
Develop or modify building standards to reduce the impacts of climate change on indoor and outdoor buildings features. This may include requiring low-impact development and stormwater runoff mitigation systems, designing buildings for passive survivability in case of extended power loss, adopting fire resilience standards such as venting and features designed to prevent ember ignition, and promoting "green" or "cool" roofs. Prioritize the preservation and weatherization of housing in overburdened communities and provide assistance for existing tenants at risk of displacement or additional cost burden from green gentrification.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Incentives & Education, Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction, equity	Definition of a resilience center – what are requirements to be one – how to make this actionable.
Align with the County's Climate Action Plan to collaborate with partners to incentivize building improvements and retrofits for residential and commercial buildings in the County to improve energy efficiency and resilience. Specific activities may include expanding low-income Energy Assistance programs, promoting existing weatherization incentives and assistance, upgrading cooling infrastructure in facilities serving vulnerable populations, and implementing alternatives like increasing tree cover and adding shade structures. Prioritize incentives and assistance programs for cost burdened communities and ensure outreach is targeted towards and benefits overburdened populations,	**Source:** Clallam Climate Action Plan, Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	

such as those who live in multifamily and affordable housing units.		

TRANSPORTATION

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.420 (k, iii, v) Bridges and other transportation facilities should not constrict the natural meander of river channels, should have the least possible adverse effects on the shoreline, should account for sea-level rise projections, should minimize loss of shoreline ecological functions, and should not adversely impact habitat restoration and enhancement projects.	Is "other transportation facilities" intended to include ports and marinas given that the proposed language is very shoreline focused? It may be worth considering a separate marine transportation goal. Maybe just "establish overlays, special zoning districts, and land-owner outreach zones to direct new development away from current and future high-risk areas AND reduce risk in those areas"
31.02.420 (k, 11,i) New transportation corridors shall minimize to the reasonable extent possible the disruption to wildlife and stream corridors and shall provide for maintaining connectivity between habitat areas with the application of buffers and other means. The County should incorporate hydrologic climate impacts into the design of water-crossing structures (i.e., climate-smart culverts and bridges) for fish passage and habitat quality.	
31.02.420 (29) The safety and quality of the travel experience for the non-motorized traveler shall be improved with a greater role in the transportation system. (a) Widely and prominently sign for the public the location of safe alternate bicycle routes and trails to separate motorized and non-motorized traffic when possible. (b) The Olympic Discovery Trail shall be developed as a priority transportation facility to bring non-motorized travelers from Jefferson County to the Port Angeles corridor and to the major towns and communities west to the Pacific Coast. (Cont…)	

Reduce pedestrian or bicycle and car collisions, beginning with communities with the highest rate of injury or death, by establishing a safe and welcoming environment that includes green corridors, lighting, shade, visibility, sustainable landscaping, and active uses.	

NEW POLICIES

Goal	Ensure the local transportation system, including infrastructure, routes, and travel modes, can withstand and recover from extreme weather events and other climate change-related hazards.

Policy	Policy Context	Notes
Design and site new and expanded roads to minimize adverse effects on the shoreline, accommodate sea-level rise projections, preserve shoreline ecological functions, and avoid negative impacts on water-oriented uses, public access, and habitat restoration projects. Incorporate hydrologic climate impacts into the design of water-crossing structures, such as climate-smart culverts and bridges, to support fish passage and habitat quality. The County should identify existing roads and bridges susceptible to flooding and work with the Washington Department of Transportation to improve resilience of vulnerable assets in conjunction with repairs.	**Source:** Jamestown S'Klallam Adaptation Plan, Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	One of the biggest impacts of flooding of roads during disasters is associated with access by first responders and/or individuals driving into hazardous areas...I feel like neither of these is really called out specifically in the language, though I'm wondering if it should be? Add landslides. Mapping and having agreements in place with alternate transportation routes in parks, private land, forest roads, etc. to ensure public safety and use in emergencies.

		Does the county have sufficient data to issue warnings? If not, do warning systems need to be considered (e.g. what data is missing)
Improve street connectivity and walkability to expand potential evacuation routes, and reduce stormwater impacts from transportation and development through watershed planning, redevelopment, retrofits, and low-impact development.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	Add something in here about encouraging evacuation route marking and awareness? Language about multimodal transportation – and improving resilience for people without cars/vehicles – and how storms can exacerbate this. Existing airports capable of serving more customers – and people from outside of the area. This would support local transportation and Clallam transit – and reduce cars/congestion on 101.
Enhance the resilience of parks and recreational trails by assessing and addressing climate hazards and impacts, and advocate to expand the Washington State Department of Transportation (WSDOT) climate vulnerability assessment to include non-state roads and other transportation systems. Work with the Department of Natural Resource (DNR) to establish roadside vegetation management	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	Intersections on evacuation routes with other jurisdictions – working with other entities besides WSDOT.

to reduce wildfire risk along Highway 101 and Highway 112.		
Continue to partner and support Clallam Transit to identify barriers to using transit, understand climate vulnerability of transit systems, expand transit use and equity, and ensure routes are convenient, safe, and accessible for travelers/commuters. Develop strategies that promote transit equity and community safety by considering the needs of the most vulnerable populations, and design and implement transit to support pedestrians, bicycles, and public transit.	**Source:** Clallam Climate Action Plan, Port Angeles Resilience Plan **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	

HEALTH & WELL-BEING

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (27) Clallam County should promote a high level of air quality for maximum visibility for scenic views, elimination of pollutant transport, reduction in adverse health impacts, resilience to wildfire smoke events, and minimization of noxious effects of airborne particulates.	

NEW POLICIES

Goal	Protect community health and well-being from the impacts of climate change and focus on overburdened communities in the County to ensure that the most vulnerable people do not experience disproportionate health impacts.

Policy	Policy Context	Notes
Promote health impact assessments and other tools to address health, equity, and climate change impacts on vulnerable communities in the County. Review land use maps to identify opportunities and barriers for responding to rapid population changes and rebuilding after disasters and other extreme climate impacts, and prioritize anti-displacement programs in overburdened	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	

communities when increasing densities and making zoning changes.		
Identify communities disproportionately impacted by extreme heat events or low air quality and prioritize equitable access to emergency preparedness resources for overburdened and unsheltered communities. Develop an urban heat resilience strategy and wildfire smoke resilience strategy in partnership with local residents, Tribes, emergency management officials, regional clean air agency officials, and other partners that includes land use, urban design, waste heat reduction, and urban greening actions. This may include providing tools and resources for the community to stay safe during extreme heat events such as a community notification alert to reduce exposure to wildfire smoke and particulate matter. Prioritize at-risk community members by providing personal protective equipment and support for infrastructure updates (e.g., HVAC upgrades with MERV 13 filters) for facilities serving vulnerable populations.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	Health challenges – limited hospitals and access and capacity. One major event can overwhelm these systems. Funding issue. Worried about fundamental issues collapsing – need to deal with underlying issues. First responder infrastructure.
Develop messaging on climate change's impacts on health and safety with guidance for residents to plan and protect themselves and involve overburdened communities using multiple formats and languages for outreach. Co-create climate communications with Clallam County communities, especially Tribes, to ensure their input on climate impacts, health impacts, and emergency resources during extreme events, focusing on culturally relevant transcreation to reach specific communities.	**Source:** Commerce Menu of Measures, **Source:** Clallam Climate Action Plan **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	Should I know what "transcreation" means?

CULTURAL RESOURCES & PRACTICES

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes

31.02.330 (1) All jurisdictions should work individually and cooperatively to identify, record, study and encourage the preservation, maintenance and use of lands, sites, and structures that have historical and archaeological significance. The early identification and resolution of conflicts between preservation of historical or archaeological resources and competing land uses should be promoted and facilitated. Ensure that lands, sites, and structures that have cultural and archaeological significance are prioritized for protection from and resilient to the effects of extreme weather and natural disasters exacerbated by climate change.	

NEW POLICIES

Goal	Ensure that cultural resources and practices, such as historic, archaeological, and sacred sites, traditional foods, and natural resources, are resilient to the effects of extreme weather and other natural disasters exacerbated by climate change.

Policy	Policy Context	Notes
Restore and protect ecosystems to uphold Tribal Treaty Rights and preserve culturally significant resources including but not limited to historic, archaeological, and scared sites, traditional foods, plants, and resources at risk from climate change impacts. Re-evaluate collaboration with appropriate partners (Tribes, local communities) to integrate Traditional Ecological Knowledge and Western science to identify significant resources and places, assess vulnerability to climate impacts, and co-develop plans to increase resilience.	**Source:** HMP, Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	
Reassess and mend government-to-government relations with local Tribes to protect archaeological and sacred sites and cultural properties from climate-related threats, and work to safeguard these sites from floods and other natural hazards.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	Make more actionable.
Evaluate current practices around the protection of salmonid habitats by incorporating riparian and stream habitat conservation measures into land use and	**Source:** Jamestown S'Klallam Adaptation Plan, Commerce Menu	

infrastructure plans (transportation, water, sewer, electricity) developed by the County in partnership with cities, Tribes, service providers, and state agencies.	of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	

Goal	Provide all community members an equitable opportunity to learn about climate impacts, influence policy decisions, and take actions to enhance community well-being and resilience.

Policy	Policy Context	Notes
Develop and implement culturally relevant educational programs to communicate and provide targeted engagement around immediate and future climate change threats and methods for enhancing resilience. This may include building and strengthening partnerships with local organizations and entities (such as non-profits, Tribes, and schools) to educate, engage, and empower diverse groups in implementing resilience strategies, linking local issues to broader regional issues. Equitably distribute funds for climate resilience engagement opportunities in overburdened communities, with a focus on equity and underrepresented groups.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	

ECONOMIC DEVELOPMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.620 (3) Environmental Stewardship. Encourage economic development that fosters protection of the natural environment and water resources that are vital to sustaining the County's tourism, natural resource-based industries, and quality of life. Recognize the environment as a key economic value in the community that must be protected in the face of current and future climate impacts. (b) Policy 2. Protect the natural environment and utilize renewable resources for long-term sustainable economic development and ecosystem resilience, including protection of existing farmland. (c) Policy 3. Implement cooperative and coordinated surface and	

groundwater management policies to ensure the future availability and quality of water throughout the County. Protect and preserve water quality and quantity from drought, extreme heat, and other hazards exacerbated by climate change.	
31.02.620 (4) (a) Policy 1. Participate with local business leaders and organizations like the Economic Development Council, chambers of commerce, real estate professionals, permit advisory boards, downtown associations, industry cluster teams, and other groups to address current and changing business and job requirements and bolster the County's local green economy, focusing efforts on the County's more vulnerable communities.	

NEW POLICIES

Goal	Ensure Clallam County's local economy is resilient to climate-related disruptions and encourage a green local economy and business opportunities.

Policy	Policy Context	Notes
Identify and monetize environmental services that promote climate resilience by creating a mechanism for compensating landowners for the environmental services maintained on their property. Utilize best available science to better understand the economic context of project planning and decision-making particular to shoreline and forest ecosystems affected by climate change throughout the county, such as No Net Loss policy and buffer setbacks. Specific mechanisms to compensate landowners for promoting eco-resiliency may include available tax incentives, carbon crediting, and financial assistance programs.	**Source:** NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction, equity	
Develop a green jobs strategy in Clallam County through collaboration with community groups and businesses that: • Facilitates the transition of impacted industries to low-carbon operations; • Creates opportunities for youth and affected workers to move into green jobs; • Offers training and continuing education in green jobs for economically vulnerable	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Partnerships & Planning **Climate and Equity Intersection:** Resilience, emissions reduction, equity	Green jobs needs more specificity. Also is it worth having this policy be broader than the individual jobs, to make a statement on the types of industries that

individuals or those with limited skills and experience in this sector; • Ensures opportunities for local employment in these jobs.		Clallam County would encourage support and even incentivize. Green jobs implies removing jobs (forestry) – jobs need to be available to folks who lose jobs and are qualified for, paid equitably, and interest. Strengthen policy to be more explicit around this.
Support the efforts of local businesses in bolstering climate preparedness and continuity of operations before, during, and after extreme weather events. This may include collaborating with community partners to create emergency plans that maintain business continuity during extreme weather events and promoting existing incentives and grants for businesses to install rooftop solar panels, batteries, and other renewable energy systems to ensure backup power and operational resilience.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Education & Incentives **Climate and Equity Intersection:** Resilience	Grant process to get rooftop solar and battery storage was very difficult – encourage state and/or FEMA to make this process easier and provide more grant opportunities. Rather than "bolstering climate preparedness," maybe "engaging in long-term climate planning?"
Assess the impacts of climate migration in Clallam County during Comprehensive Plan update periods. Integrate these findings into Comprehensive Plan updates, infrastructure plans, revenue and expense forecasting, and housing assessments.	**Source:** Port Angeles **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	Jamestown S'Klallam Tribe had people specifically move there to get away from climate impacts – likely

		to grow in the future.

EMERGENCY MANAGEMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.720 (4) The County should support expansion of the telecommunication network. Fiber optic cables and cellular service should be enhanced to serve the economic development goals of the County. Cellular sites should be placed in locations which provide required service without significantly impacting scenic qualities of the area. The County should factor climate impacts into the planning of emergency communications and coordination of preparedness, response, and recovery activities among first responders and partners.	
31.02.420 (10) Road safety should continually increase as population growth occurs. (x) Map road and other transportation infrastructure such as marinas and port facilities that are vulnerable to repeated floods, landslides, and other natural hazards exacerbated by climate change, and designate alternative travel routes for critical transportation corridors when roads must be closed. (i) Prioritize safety deficiencies using both statistical measures (e.g., accidents and road geometrics) and public input. Periodically, review the process for effectiveness of prioritizing road segment and intersection deficiencies.	
31.02.320 (26) The public should be protected from personal injury, loss of life, or property damage from environmental hazards and climate change impacts. Land use practices in hazard areas should not cause or exacerbate natural processes which endanger the lives, property and resources of citizens. Undevelopable hazardous areas should be utilized as open space whenever possible. The County should support enhanced data collection for hazard events of all magnitudes to provide a fuller understanding of the community's hazard characteristics — including those affected by climate change.	

NEW POLICIES

Goal	Promote and implement preparedness, response, and recovery efforts to ensure that all members of the Clallam County community are ready for climate emergencies. Anticipate and be ready to accommodate the rise in

demand for emergency services due to climate change impacts and understand community needs when preparing for emergency situations.

Policy	Policy Context	Notes
Enhance local government staff's expertise in climate change and environmental justice to improve policy implementation, equity, and resilience. Staff should seek State Department of Health funding and other grant opportunities to create comprehensive wildfire and flood resilience strategies to boost emergency response, promote fire and flood-resilient landscapes, and support fire and flood-adapted communities. Encourage participation in incentive-based emergency preparedness programs such as the Community Rating System (FEMA's National Flood Insurance Program), Firewise (National Fire Protection Association), and StormReady (National Weather Service).	**Source:** NODC Adaptation Strategies, Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	
Conduct a sea level rise evaluation and resilience plan to assess the vulnerability of County assets, including motorized and non-motorized roads, sewage treatment and water infrastructure, buildings, and marine access. This includes: • Aligning with the Multi-jurisdictional Hazard Mitigation Plan to identify vulnerable infrastructure. • Analyzing sewer system capacity and vulnerability to sea level rise and proposing actions to enhance resilience. • Evaluating roads and structures along bluff crests for erosion threats due to sea level rise, considering planned retreat and ecosystem restoration, while minimizing realignment and protection efforts.	**Source:** Port Angeles Resilience Plan **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Develop a comprehensive strategy to map vulnerable transportation infrastructure, designate alternative routes for critical corridors during closures, and incorporate sea-level rise and tsunami hazard data into critical area delineation for infrastructure siting and land-use planning. Enhance data collection to better understand community	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience	

hazard characteristics, including those influenced by climate change, and support informed decision-making in emergency management.		
Develop resilience hubs as community-serving facilities to support residents, coordinate communication, distribute resources, and enhance quality of life while reducing carbon emissions. Identify community resilience hubs for each of the County's twenty micro-islands, seek funding to make these sites resilient, communicate the locations of these sites for public use during an emergency, and coordinate all plans to serve these hubs effectively in an emergency.	**Source:** Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	
Integrate climate impacts into the planning and coordination of operations for preparedness, response, and recovery activities among first responders and partners, including public health, law enforcement, fire, school, and emergency medical services (EMS) personnel. This may include updating emergency services communications equipment; enhancing training of emergency personnel and other responders; taking regular inventory of emergency facility needs (e.g., home emergency kits, cooling centers and temporary shelters); and assessing and improving the adaptive capacity of people who are most vulnerable to climate change-exacerbated hazards, such as Elders or people living in high-risk areas.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	
Develop and improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Operations Plan, and other plans to mitigate the impact of emergencies and hazards affected by climate change. Expand disaster training programs like CERT to equip Tribal members and the local community with emergency response skills, and partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions. Additionally, continue to align climate impacts risk	**Source:** Clallam MJHMP, Makah HMP **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience	

assessment and policies with the Multi-jurisdictional Hazard Mitigation Plan (MJHMP) update efforts.		
Establish a County-led climate resilience committee and identify grant opportunities and partners to jointly apply for grants that benefit the community, especially the most at-risk populations. Seek funding and technical assistance from the Department of Ecology to plan and prepare for climate hazards.	**Source:** Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	

Hazard Mitigation and Climate Resilience (HMCR) Steering Committee

| **Oct 10th, 2024** | 11:30 AM-1:30 PM |
Zoom link

Meeting purpose

Review and discuss draft Climate Element goals and policies and provide updates on MJHMP and Climate Element work to date

Type in the chat: Name, organization

Icebreaker (in chat): What is one climate-related project or policy that you think helps to build resilience to climate impacts?

Please rename yourself with your first name, organization, and pronouns.

Meeting Agenda

- Introduction and Update
- HMP Draft Update
- Climate Element Development Update
- Climate Element Policy Discussion
- Questions and Next Steps

Update on Work to Date

Progress to Date

- Climate Element
  - ✓Draft CE goals and policies
  - ✓Draft Climate Vulnerability Assessment
  - ✓Energy Future Conference (Oct 30th)
- MJHMP
  - ✓Draft MJHMP sections
- Both
  - ✓Climate survey analysis
  - ✓Planning fall engagement

Recap of HMCR Meeting #4

MJHMP & Climate Element	• Presented and discussed MJHMP hazard profiles • Update on Climate Vulnerability Assessment
Engagement Update	• Presented draft Climate Survey
Hazard Mitigation and Climate Resilience Steering Committee	• Overview of next steps for Steering Committee

PROJECT ACTIVITY

Q1 2024

- Project kicks off
- Climate and hazard data gathering

Q2 2024

- HAZUS-MH Vulnerability and Risk Analysis
- Identify and Update Community Assets
- Climate impacts and policy audit
- Begin drafting Climate Element policies

Q3 2024

- Identify hazard mitigation projects
- Climate Vulnerability Assessment
- Continue refining and prioritizing Climate Element policies

Q4 2024

- Submit Hazard Mitigation Plan to FEMA for approval
- Draft Climate Element

Q1 2025

- Climate Element review & revisions
- Finalize Climate Element & integrate into Comprehensive Plan
- **Hazard Mitigation Plan Adoption**
- Planning Commission / BOCC Hearings and work sessions

Q2 2025

- Planning Commission / BOCC Hearings and work sessions

Q3 2025

- Board of County Commissioners Comprehensive Plan Adoption

COMMUNITY ENGAGEMENT

Q1 2024

Develop Engagement Plan

Q2 2024

PHASE 1
Spread the Word

- Community Hazard Survey
- Website launch
- Establish Hazard Mitigation Climate Resilience Steering Committee

- 3/8 – 3/9 *KONP Home Show*
- 4/15 *KONP Radio Show*

Q3 2024

PHASE 2
Identify Priorities

- Community Hazard Survey results & analysis
- BOCC session
- Launch Climate Survey
- Community events
- Planning Commission

- 8/3 *Joyce Festival*
- 8/7 *Jamestown S'Klallam Workshop*
- 8/15 – 8/17 *Clallam County Fair*

Q4 2024

PHASE 3
Refine Based on Feedback

- Climate Element Survey results & analysis
- BOCC session
- MJHMP Public Comment November & December 2024

- 10/1 *Public Release of MJHMP*
- 10/5 *City of Sequim Public Safety Fair*
- 10/29 – 10/30 *NODC Futures Meeting*

Q1 2025

PHASE 3 (Cont'd)
Refine Based on Feedback

- Comprehensive Plan Survey

Engagement Summary Report

Q2 2025

Comprehensive Plan

- Release of Draft Comprehensive Plan
- Comprehensive Plan Open House and Public Comment Period

Q3 2025

Comprehensive Plan

- Finalize Climate Element as a part of Comprehensive Plan

HMCR Looking Ahead...

- Draft Climate Element Worksheet
  - Additional comments to Cascadia by October 18, 2024
- NODC Energy Futures Meeting
  - Clallam Climate Element workshop on Oct 30
- MJHMP
  - Public Comment: Nov/Dec
- Climate Vulnerability Assessment & Climate Survey Report
  - HMCR Review: Nov/Dec
- Comprehensive Plan
  - Q1, Q2, Q3 2025
  - Survey Q1 & Open-house Q2

NODC
NORTH OLYMPIC DEVELOPMENT COUNCIL

NORTH OLYMPIC PENINSULA SUMMIT ON
Energy and Climate Resilience
October 29-30, 2024
at 7 Cedars Hotel & Conference Center · Blyn, Washington

Co-hosted by the North Olympic Development Council and Clallam County*

Please save the date for the 2024 North Olympic Peninsula Energy and Climate Resilience Summit on October 29-30 at 7 Cedars Hotel in Blyn, Washington. This event will build on the progress made toward goals of energy resilience and reliability at the North Olympic Peninsula Energy Futures convenings in 2022 and 2023 and will add the critical component of climate resiliency. Come learn about exciting energy resilience and reliability projects that have been completed or begun as well as the work being done to mitigate and adapt to the impacts of climate change on our region. Help shape the climate component of area comprehensive and Hazard Mitigation Plans. Collaborate on development of additional projects and solutions and learn about funding opportunities that could support these solutions.

Who should attend? Local, state and federal elected officials and/or their staff members; Tribal representatives; subject matter experts and technical assistance providers; public utilities; economic development agencies; project developers; non-profit organizations; and state and federal funders.

Due to budget and space constraints, this event is not open to the general public.
Official invitation and registration details coming soon.

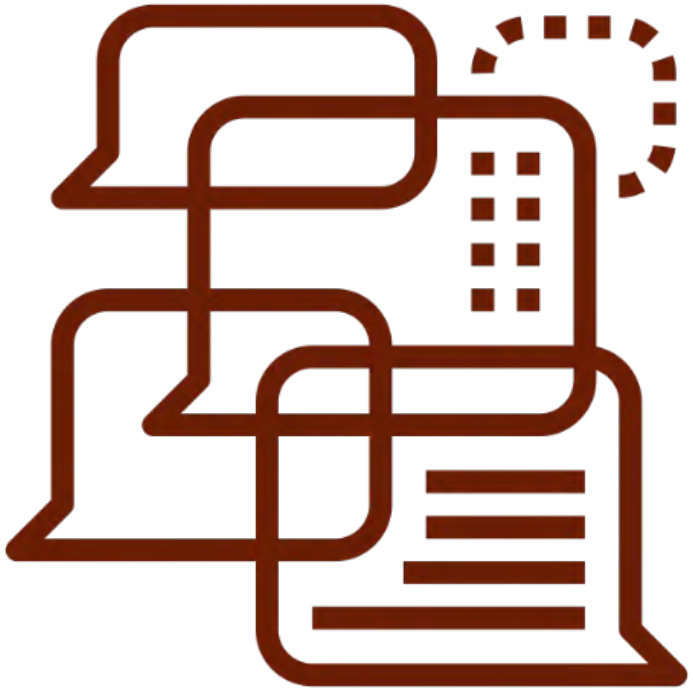
The event is free, with costs covered by sponsorships. If your organization would like to be a sponsor, please contact Karen Affeld (karen@noprcd.org). We hope to see you there!

Special Thanks to Our Sponsors:

Pacific Northwest National Laboratory · Jamestown S'Klallam Tribe · Clallam County PUD · Department of Ecology State of Washington · Strait Ecosystem · Ameresco · Jefferson County PUD · Cascadia · Puget Sound Partnership · Sazan Group · Port Townsend · Climate Commitment Act

*The North Olympic Peninsula Summit on Energy and Climate Resilience is supported with funding from Washington's Climate Commitment Act. The CCA supports Washington's climate action efforts by putting cap-and-invest dollars to work reducing climate pollution, creating jobs, and improving public health. Information about the CCA is available at www.climate.wa.gov.

Questions?



Type your comment or question into the Zoom chat

OR

Raise your virtual hand to comment or ask verbally

MJHMP Update

MJHMP Update – Mitigation Actions

- Mitigation actions – reduce or eliminate long-term risk
  - **Different from actions to prepare or respond to an event**
- Mitigation activities lessen or eliminate the need for preparedness or response resources
- Emphasis on the impact or vulnerabilities – not on the hazard itself

STAPLE/E Review and Selection Criteria

Social

- Is the proposed action socially acceptable to the jurisdiction and surrounding community?
- Are there equity issues involved that would mean that one segment of the jurisdiction and/or community is treated unfairly?
- Will the action cause social disruption?

Technical

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other jurisdiction goals?

Administrative

- Can the jurisdiction implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

Political

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

Legal

- Is the jurisdiction authorized to implement the proposed action?
- Are there legal side effects? Could the activity be construed as a taking?
- Will the jurisdiction be liable for action or lack of action?
- Will the activity be challenged?

Economic

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, nonprofit, and private)?
- How will this action affect the fiscal capability of the jurisdiction?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?
- Does the action contribute to other jurisdiction goals?
- What benefits will the action provide?

Environmental

- How will the action affect the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

Mitigation Prioritization & Timeframe

Category	Comments
High	Top organizational priority and is generally a well-detailed project idea. Protects population, resource or property at high risk, Uses feasible methods, techniques or technology.
Medium	A good idea that needs more information or is an action that addresses a moderate hazard.
Low	An idea that needs a lot more information or will take a lot of preliminary action to build support.

Category	Timeframe
Short-term	1-2 years
Mid-term	3-4 years
Long-term	5+ years
Ongoing	1-2 years and ongoing thereafter

MJHMP Maintenance and Update Process

- Clallam County Operational Area reviews the MJHMP once annually
  - Document any necessary changes to hazard mitigation projects, priorities, and strategy through 1 – hour meeting.
- MJHMPs active for five year period
  - Initiate update in 2029 for the 2030 MJHMP update.

Climate Element Policy Update

Climate Element Progress Update

- ✓ **May-August 2024:** Drafted Climate Element Goals and Policies using policy audit results, Steering Committee input, MJHMP alignment, and resources such as Commerce's Menu of Measures and Washington's draft Climate Resilience Strategy.
- ✓ **August 2024:** Held Hazard Mitigation & Climate Resilience Planning Workshop.
- ✓ **August-September 2024:** Conducted one-on-one policy meetings to solicit input on draft Climate Element and better understand partners' needs, concerns, and considerations for policy development.
- ✓ **September-October 2024:** Climate Survey, Climate Vulnerability Assessment analysis, and Hazard Mitigation Plan inform updates and prioritization of policies.
- ✓ **October 2024:** Review and discuss draft CE policies with HMCR Steering Committee.

Resilience Sub-element Requirements

- **Summary:**
  - Include at least one goal and supportive policy for each hazard (e.g., extreme heat) relevant to the jurisdiction.
  - Prioritize actions that benefit overburdened communities most impacted by climate change.
- **Minimum Requirements:**
  - Address climate-exacerbated natural hazards;
  - Identify, protect, and enhance natural areas;
  - Identify, protect, and enhance community resilience, including social, economic, and built-environment factors that support climate adaptation consistent with environmental justice.

Next Steps for Climate Element Policy Drafting

Refine and prioritize draft Climate Element policies using:

- Feedback from today's breakout sessions
- Feedback from NODC Energy and Climate meeting
- Climate Vulnerability Assessment results
- Climate Survey results
- Additional partner engagement and meetings
- Alignment with MJHMP and Comprehensive Plan update process

Policy Worksheet

Cultural Resources & Practices

Commerce-identified priority sector

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.330 (1) All jurisdictions should work individually and cooperatively to identify, record, study and encourage the preservation, maintenance and use of lands, sites, and structures that have historical and archaeological significance. The early identification and resolution of conflicts between preservation of historical or archaeological resources and competing land uses should be promoted and facilitated. Ensure that lands, sites, and structures that have cultural and archaeological significance are prioritized for protection from and resilient to the effects of extreme weather and natural disasters exacerbated by climate change.	

Existing Comprehensive Plan goals/policies (changes in red)

NEW POLICIES

Goal	Ensure that cultural resources and practices, such as historic, archaeological, and sacred sites, traditional foods, and natural resources, are resilient to the effects of extreme weather and other natural disasters exacerbated by climate change.

New Climate Element goal

Policy	Policy Context	Notes
Restore and protect ecosystems to uphold Tribal Treaty Rights and preserve culturally significant resources including but not limited to historic, archaeological, and scared sites, traditional foods, plants, and resources at risk from climate change impacts. Re-evaluate collaboration with appropriate partners (Tribes, local communities) to integrate Traditional Ecological Knowledge and Western science to identify significant resources and places, assess vulnerability to climate impacts, and co-develop plans to increase resilience.	**Source:** HMP, Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	
Reassess and mend government-to-government relations with local Tribes to protect archaeological and sacred sites and cultural properties from climate-related threats, and work to safeguard these sites from floods and other natural hazards.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	
Evaluate current practices around the protection of salmonid habitats by incorporating riparian and stream habitat conservation measures into land use and infrastructure plans (transportation, water,	**Source:** Jamestown S'Klallam Adaptation Plan, Commerce Menu of	

New Climate Element policies

Policy context (Source, lever, climate and equity intersection)

Policy Discussion and Breakout Sessions

- 3 rounds - 25 minutes each.
- Participants randomly assigned to rooms each round.

Round 1 Sectors	Round 2 Sectors	Round 3 Sectors
• Agriculture & Food Systems • Ecosystems • Water Resources • Waste Management	• Buildings & Energy • Transportation • Zoning & Development	• Cultural Resources & Practices • Economic Development • Health & Well-being

*Note: Emergency Management (EM) sector not included in policy discussion because this was central focus of MJHMP discussions. However, EM policies **will** be in the Climate Element.

Discussion Questions

- Are there any goals or policies that you would consider a **must-have**?
- Are there **crucial policies missing** and/or do you have new ideas not currently reflected in this list?
- Do you have any **concerns** about these policies or feel that **edits** need to be made to them?
- Are there considerations we need to make for goals/policies for **those who may be especially impacted** (Elders, youth, low-income residents, people with existing health conditions, etc.)?

Next Steps

Project Next Steps

- Climate Element
  - ✓County will continue to workshop Climate Element policies with key partners/jurisdictions
  - ✓Consolidate and prioritize Climate Element policies
  - ✓Draft Climate Vulnerability Assessment
  - ✓Climate Survey analysis
  - ✓Climate and Energy Conference

- MJHMP
  - ✓ Draft final plan
  - ✓Pubic Comment (Nov/December)
  - ✓Finalize plan (January 2025)

Next Steps: Committee Timeline

Phase 1: Discovery & Visioning

March 2024

Meeting 1

Objective: Establish operating procedures, gain important background context, build a collective vision and goals for the Climate Element and MJHMP.

Phase 2: Risk Identification & Prioritization

April/May 2024

Meetings 2 & 3

Objective: Identify key climate risks, relevant agencies and partners that these changes will affect, and prioritize these risks to inform climate policies and hazard mitigation options.

Phase 3: Measures & Strategies

June/October 2024

Meeting 4 & 5; Energy & Climate Resilience Summit

Objective: Identify, vet, and prioritize measures and strategies to include in the MJHMP and the Climate Element.

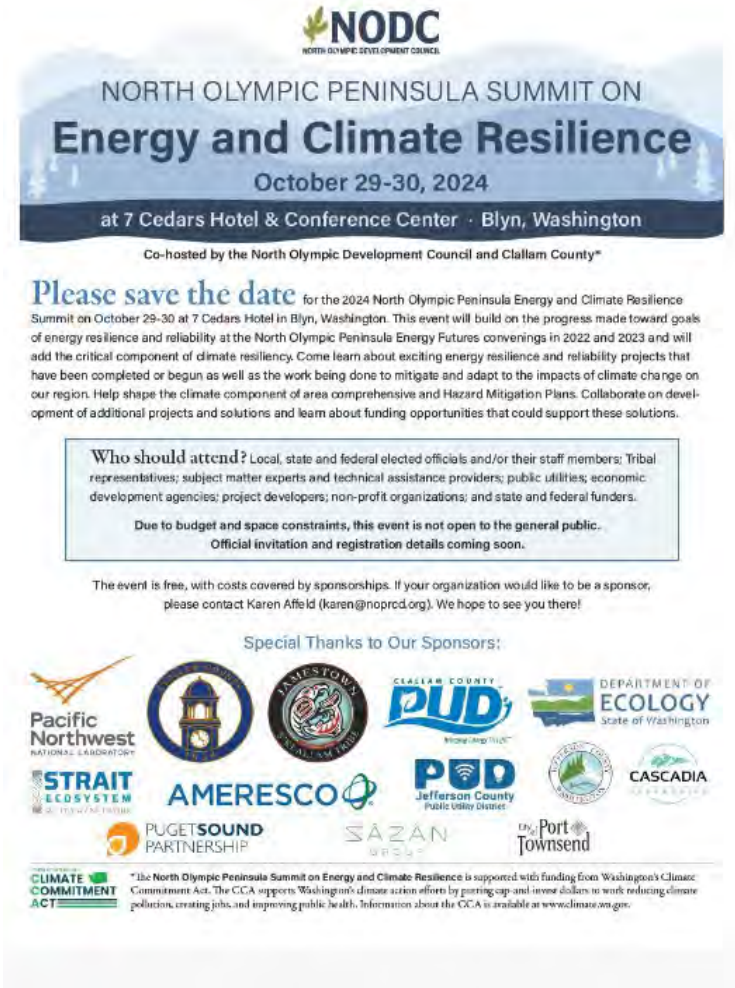
Phase 4: Final Review & Implementation

Draft review, as needed meetings to discuss

Objective: Support the integration of the MJHMP and the Climate Element for seamless implementation following the adoption of these plans.

HMCR Looking Ahead...

- Draft Climate Element Worksheet
  - Additional comments to Cascadia by October 18, 2024
- NODC Energy Futures Meeting
  - Clallam Climate Element workshop on Oct 30
- MJHMP
  - Public Comment: Nov/Dec
- Climate Vulnerability Assessment & Climate Survey Report
  - HMCR Review: Nov/Dec
- Comprehensive Plan
  - Q1, Q2, Q3 2025
  - Survey Q1 & Open-house Q2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Clallam County PUD
Department of Ecology State of Washington
Strait Ecosystem
AMERESCO
PUD Jefferson County Public Utility District
CASCADIA
Puget Sound Partnership
SAZAN group
Port Townsend
Climate Commitment Act
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Thank you!

Hazard Mitigation and Climate Resilience Steering Committee

Steering Committee Meeting #5 | **Oct 10th, 2024** | 11:30 AM-1:30 PM | Zoom

Agenda

Time	Agenda Item
11:30-11:40 AM	Introduction and Updates
11:40-11:55 AM	HMP Update
11:55-12:05 PM	Climate Element Policy Introduction
12:05-1:20 PM	Climate Element Policy Breakout Rooms
1:20-1:30 PM	Questions and Next Steps

Meeting #5 Objectives

- Provide update on work to date
- Hazard Mitigation Plan Draft update
- Review and Discuss draft Climate Element goals and policies
- Summarize next steps

Project Team

Clallam County	Role on Project
Diane Harvey, Sheriff's Office	Project Lead
Tim Havel, Planner, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Director, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
Mary Ann Rozance, Cascadia Consulting Group	Project Manager and Climate Resilience Lead
Alyssa Rodriguez, Cascadia Consulting Group	Engagement Lead
Mike Chang, Cascadia Consulting Group	Principal in Charge
Meg Horst, Cascadia Consulting Group	Climate Vulnerability Assessment Lead
Abigail Lambert, Cascadia Consulting Group	Climate Resilience Policy Lead

Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead
Casey Marchese, Michael Baker International	Hazard Mitigation Analyst and Notetaker
Jim Buck	Strategic Advisor

Detailed Agenda

Time	Topic	Lead	Notes
11:30-11:40 AM	Introduction and Updates 10 mins	Cascadia / Mary Ann	**Introduction** ✓ Ice breaker and introductions ✓ Share meeting objectives ✓ Work-to-date Name, organization, Icebreaker in chat: What is one climate-related project or policy that you think helps to build resilience to climate impacts? **Project Updates** ✓ Provide brief project updates and work to date.
11:40-11:55 AM	Multi-jurisdiction Hazard Mitigation Plan Updates 15 mins	MB	**MJHMP Updates** ✓ Plan Maintenance ✓ Q&A
11:55-12:05 PM	Climate Element Development Update 10 mins	Cascadia/ Abigail	**Climate Element Policy Development Introduction** ✓ Provide update on Climate Element development process and engagement to date ✓ Re-share Commerce requirements and goals of the Element ✓ Introduce breakout activity and discussion questions

Time	Topic	Lead	Notes
12:05-12:30 PM	Climate Element Breakout #1 25 mins	Cascadia/ MB	**Climate Element Breakout Session #1** ✓ *Agriculture & Food Systems* ✓ *Ecosystems* ✓ *Water Resources* ✓ *Waste Management* *Breakout Group Discussion Questions:* • Are there any goals or policies that you would consider a must-have? • Are there crucial policies missing and/or do you have new ideas not currently reflected in this list? • Do you have any concerns about these policies or feel that edits need to be made to them? • Are there considerations we need to make for goals/policies for those who may be especially impacted (Elders, youth, low-income residents, people with existing health conditions, etc.)? See below for detailed breakout room facilitation instructions.
12:30-12:55 PM	Climate Element Breakout #2 25 mins	Cascadia/ MB	**Climate Element Breakout Session #2** ✓ *Buildings & Energy* ✓ *Transportation* ✓ *Zoning & Development* *Breakout Group Discussion Questions:* • Are there any goals or policies that you would consider a must-have? • Are there crucial policies missing and/or do you have new ideas not currently reflected in this list? • Do you have any concerns about these policies or feel that edits need to be made to them? • Are there considerations we need to make for goals/policies for those who may be especially impacted (Elders, youth, low-income residents, people with existing health conditions, etc.)?

Time	Topic	Lead	Notes
12:55-1:20 PM	Climate Element Breakout #3 25 mins	Cascadia/ MB	**Climate Element Breakout Session #3** ✓ *Cultural Resources & Practices* ✓ *Economic Development* ✓ *Health & Well-being* *Breakout Group Discussion Questions:* • Are there any goals or policies that you would consider a must-have? • Are there crucial policies missing and/or do you have new ideas not currently reflected in this list? • Do you have any concerns about these policies or feel that edits need to be made to them? • Are there considerations we need to make for goals/policies for those who may be especially impacted (Elders, youth, low-income residents, people with existing health conditions, etc.)?
1:20-1:30 PM	Questions and Next Steps 10 mins	Cascadia / Mary Ann	**Summarize next steps** ✓ Climate Element ○ Consolidate and prioritize Climate Element Policies ○ Draft Vulnerability Assessment ○ Climate Resilience Survey ○ Climate and Energy Conference ✓ Hazard Mitigation Plan ✓ Review timeline and workplan **Questions and Discussion** ✓ Answer any final questions

Meeting Discussion Summary

The meeting included a recap and update on the progress to date for both the Climate Element (CE) and the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). It also provided an overview of the final phases of the planning process for the MJHMP and CE policies. The focus was on gathering feedback on the CE policies with three breakout discussions during the meeting. Each breakout session was designed to collect input on policies and goals from specific sectors. Additional feedback will be collected at the North Olympic Peninsula Summit on Energy & Climate Resilience.

Participants

- Bowen Kendrick, Clallam County PUD
- Bruce Emery, Clallam County DCD
- Blaine and Keith, CCFD3
- Chip Keen, CCFPD6
- Crystie Kisler, Chimacum Valley Grainery
- Culley Lehman, Cascadia Water
- Dennis Burnett, City of Sequim
- Diane Harvey, Clallam County
- Doug Adams, Clallam PUD
- Ellen Chappelka, Clallam Emergency Management
- George Drake, Clallam PUD
- Ian Miller, Washington Sea Grant
- James Roubal
- Jen Garcelon, Clallam County Health
- Jesse Waknitz, Port of Port Angeles
- Justine Chorley
- Lexi Wagor, North Olympic Land Trust
- Luke Strong-Cvetich
- Meggan Uecker, City of Sequim
- Rhiana Barkie, Clallam Co Project Coordinator
- Robert Knapp, Jamestown S'Klallam Tribe
- Shannen Cartmel
- Tim Havel, Clallam County

Detailed Meeting Notes

Multi-jurisdiction Hazard Mitigation Plan Updates

- The HMP draft should be completed in November 2024 and ready for public comment
    - **HMP Prioritization and Timeline**: Actions will be prioritized from **Low to High impact** and categorized by timelines spanning **Short-term to Ongoing efforts**. HMP, once approved by FEMA, will be active for a five-year period.
- The Climate Element is slowing down to be in more alignment with the overall Comprehensive Planning Process

- Draft VA and Climate Survey Report: Targeting delivery in November/December 2024.
- Comprehensive Plan Engagement: Survey launch set for Q1 2025, followed by an open house in Q2 2025 to gather community feedback and insights.

Climate Element Policy Development Introduction

- The consulting team will lead a workshop at the North Olympic Peninsula Summit on Energy & Climate Resilience on October 30th to gather additional feedback.
- The workshop will include three breakout sessions, each focused on different sectors. Participants will rotate through all three rooms in 25-minute intervals.
- Feedback from the NODC Energy and Climate meeting will be refined and aligned with ongoing engagement efforts, supporting the completion of the VA and HMP.
- After the meeting, participants will have until October 18th to provide comments and feedback on the Draft Climate Element worksheet.

Climate Element Policy Breakout Rooms

Room 1: Mary Ann

GENERAL COMMENTS

- Comment form Luke: First time we are taking over a CE and making more Clallam county goals to see benefit, and even if we get 15-20 % right
- Elaborate on the word Resilience throughout document in the goal or policy for each sector. Clarify what resilience means for each of the sectors.

AGRICULTURE & FOOD SYSTEMS

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.120 (6) Agricultural land users shall be encouraged to maintain water quality and sustainable water-storage practices, protect fish and wildlife consistent with commercial agriculture, prevent erosion of valuable agricultural soils, implement climate-smart agricultural practices, and prepare for a changing climate.	
31.02.120 (8) Clallam County shall enhance the food security of its citizens and develop the local farm economy by actively supporting producers of food and other agricultural products for local consumption and supporting policies that encourage local institutions to purchase local food. This includes exploring existing funding and tax incentives to support the local food economy and expanding partnerships to mitigate climate impacts and improve access to healthy, affordable, and climate-friendly foods.	

31.02.120 (10) Clallam County should actively pursue the preservation of farmland and promote carbon sequestration—capturing, securing and storing carbon dioxide from the atmosphere—through a purchase or transfer of development rights program, Conservation Futures, and Open Space Program strategies with the Climate Commitment Act. Promote voluntary carbon credit programs, incentives, or financial assistance programs to support the long-term sustainability and economic vitality of the agricultural industry in the County.	

NEW POLICIES

Goal Support a sustainable local and regional agriculture sector in Clallam County that sequesters carbon, provides local jobs and food supply, and is resilient to the impacts of climate change.

Policy	Policy Context	Notes
Transition away from use of industrial fertilizer on agriculture and forestry lands, which can exacerbate ocean acidification. Educate agricultural and forestry managers on alternatives to industrial fertilizer and provide technical assistance as feasible.	**Source:** NODC Climate Adaptation Strategies (E-21) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction	
Preserve land for long-term agricultural use and restore ecosystems such as wetlands and ponds on agriculturally zoned properties in order to preserve carbon sinks, promote water storage, and provide additional ecosystem services.	**Source:** Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Align with the County's Climate Action Plan to invest in the local agricultural sector of Clallam County, including food and materials producers, distributors, and sellers. Protect productive agricultural lands and expand sustainable food production in Clallam County by: • Seeking Washington State Department of Agriculture (WSDA) funding to support private landowners to implement practices that increase climate resilience through livestock	**Source:** Clallam Climate Action Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	

infrastructure improvements, soil health, equipment and technology upgrades, and habitat enhancement projects. • Modifying regulatory codes to preserve agricultural lands and prevent their conversion into residential, commercial, or industrial areas. • Facilitating increased land access for local farmers, protecting farmland, and maintaining open spaces.		
Ensure that the local agriculture sector is resilient to extreme weather and other current and future climate impacts by: • Supporting sustainable business opportunities that educate farmers on water storage and regenerative farming practices that enable agricultural producers to adapt to changing climate conditions, minimize production losses, and maintain ecosystem balance. • Providing education and technical assistance on meeting increasing challenges and demands around climate adaptation, especially for agricultural products most vulnerable to climate impacts. • Promoting financial assistance, carbon crediting, and incentive programs to support the economic vitality of this sector.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction, equity	Probably biased because I'm working on an off-channel reservoir, but yes I agree that sustainable water storage is pretty important.
Enhance local food security and the food economy to mitigate climate impacts and improve access to healthy, affordable, and climate-friendly foods by: • Encouraging and supporting farmers markets, community gardens, and urban agriculture activities in the county. • Developing education and outreach programs supporting food access and security, including a distributed model of local food sales and distribution. • Seeking state grants to boost local food supply and ensure rapid emergency food distribution to communities impacted by fire, flood, extreme heat, drought, and	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	

other climate and public health emergencies.		

ECOSYSTEMS

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
27.12.020 (9) Protect water quality by controlling erosion, by providing guidance in the siting of land uses and activities to prevent or reduce the of release chemical or bacterial pollutants into waters of the State, and by maintaining stream flows and habitat quality for fish and marine shellfish. Integrate climate change projections into shellfish hatchery planning and manage or enhance upstream watersheds to improve water quality and minimize pollution from new and existing sources, including climate change impacts.	
27.12.020 (16) Provide the regulatory framework to supplement adopted policies in the Clallam County Comprehensive Plan, CCC Title 31, and the Zoning Code, CCC Title 33, which set forth land use designations, open space preservation, natural resource protection, wildlife migration corridor preservation, fish and wildlife habitat protection, wetland protection and, overall, protects the natural features in Clallam County by promoting wise use of lands within Clallam County. Strive for no net loss of ecosystem composition, structure, and functions and net ecological gain to enhance ecosystem resiliency to climate impacts in Clallam County.	
31.02.320 [Policy No. 5] Clallam County shall work with other agencies, tribes and individuals to prevent additional listing of fish, wildlife and plants under the Endangered Species Act through pro-active (rather than reactive) planning and implementation of proper land use practices. The County should identify potential future climate impacts on habitats and protect species using or reliant on vulnerable habitats, including identifying the most drought tolerant, resilient plant species for the region.	
31.02.320 (3) Wetlands. [Policy No. 9] Clallam County shall work to achieve no net loss of regulated wetlands while allowing a	

reasonable use of property, with regard to their functions and values, in the short-term and should work to achieve a long-term net gain in these attributes through restoration and enhancement. The public acquisition of important wetland areas should be pursued, and the County should identify and quantify the ecosystem services benefits of wetlands and include these natural capital assets in cost-benefit assessments for community and development planning. Wetlands provide biological and hydrological connectivity that fosters resilience to climate impacts, and the natural abilities of wetlands to provide recreational, educational, historical and cultural values should also be protected.	
31.02.320 (4c) [Policy No. 12] To protect quality and quantity of essential aquifers for current and future needs, Clallam County should encourage water conservation measures for all land uses; support water conservation measures and educate residents on methods to conserve water; and promote the application and implementation of water-conserving landscaping plans. This may include boosting regional water storage to improve water system climate resilience by promoting rainwater harvesting, encouraging water-efficient appliances, improving stormwater retention in suitable areas, establishing reclaimed water systems, and collaborating with Clallam Public Utilities Department for widespread water conservation education. Clallam County should undertake further studies of the groundwater regime of the County so that the factors influencing the quantity, quality and flow patterns of groundwater are more precisely known.	
31.02.320 (7c) [Policy No. 20] Clallam County shall recognize the large number of salmon and steelhead stocks that have been classified as critical or depressed. The County shall work toward prevention of these stocks from being listed as threatened and endangered through habitat restoration and land use practices which cause no further degradation to habitat needs. The County should implement actions identified in restoration and salmon recovery plans to improve the climate resilience of streams and watersheds.	
31.02.320 (9a) [Policy No. 22] Flood control should be undertaken in the context of varied uses including agricultural and residential, fish and wildlife habitat, water supply, open space, and recreation. Land use and related regulations and zoning should reflect the natural constraints of floodplains, meander zones, riparian habitat zones, and projected impacts of climate change on flood-prone areas.	

NEW POLICIES

Goal	Ensure that forests, wetlands, shorelines, and other ecosystems are resilient to the impacts of extreme weather, invasive species, pests, diseases, and other impacts worsened by climate change.

Policy	Policy Context	Notes
Prepare ecosystems for climate impacts by implementing restoration and recovery actions for streams, wetlands, and watersheds, focusing on biological and hydrological connectivity, reducing aquatic invasive species, and improving watershed-scale processes. This includes: • Bolstering the resilience of aquatic ecosystems by restoring riparian vegetation, floodplains, and stream structures, conserving water, and maintaining habitats to protect native fish and other aquatic life. • Exploring innovative adaptation strategies to manage water quality and streamflow and reduce sedimentation in streams resulting from wildfire damage and the associated impacts of landslides and flooding.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Strengthen habitat and ecosystem resilience by inventorying and protecting climate refugia and critical habitats to strive for no net loss of ecosystem attributes, with a focus on achieving net ecological gains. Expand habitat protection, quality, and connectivity through designations such as conservation areas, buffers, and open space corridors. Incorporate climate considerations in determining permissible activities within wetlands and wildlife habitats.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	Better definition of "protection" land acquisition is the best way to protect something. (here and other places that "protection" is used. Link the word "protection" to the policy lever we are meaning)
Adopt integrated natural resource management practices and optimize management activities that enhance habitat integrity and function in the face of climate impacts. Proactively manage invasive species	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation, Planning & Partnerships	

and promote native, drought- and pest-resistant plants for restoration projects to boost ecosystem resilience to climate-related stressors. Quantify the benefits of ecosystem services to include these natural capital assets in community planning, climate action plans, and development of cost-benefit analyses.	**Climate and Equity Intersection:** Resilience, emissions reduction	
Protect and enhance urban forests by implementing climate-smart forest management, prioritizing efforts in more vulnerable areas of the community. This may include: • Implementing open space requirements for new developments, establishing green belts to connect communities, and enhancing urban forest management to optimize carbon storage and increase resilience. • Developing and implementing educational, incentive-based, and regulatory strategies to preserve and enhance private and urban forest lands for increased climate resilience, carbon sequestration, and ecosystem health. • Reducing financial impacts on landowners by advertising and encouraging participation in technical and financial assistance programs, such as Washington's cost-share program. • Focusing on proactive urban forestry management, emphasizing risk mitigation from pests, disease, and wildfires, while ensuring that tree planting and species selection are adaptive to future climate conditions and prioritize vulnerable communities. • Seeking state-funded grants to reduce wildfire risk for areas identified as the wildland-urban interface through improvements such as structural hardening, improved water storage capacity, and wildfire risk assessments for communities and critical infrastructure.	**Source:** Commerce Menu of Measures; Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation, Education & Incentives **Climate and Equity Intersection:** Resilience	
Promote forest stewardship education, tax incentive programs, carbon crediting, payment for ecosystems services programs, and other approaches to support landowners in	**Source:** Commerce Menu of Measures; NODC	

managing their lands for climate resilience and preventing conversion. Collaborate with State agencies, conservation districts, and the Washington State University Extension Forestry Program to make resources and information available to landowners and support sustainable working forests. Explore other jurisdictions' strategies to recognize the economic benefits of and monetize environmental services maintained on landowners' properties.	**Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	
Enhance the resilience of habitats and communities to climate change by protecting and restoring coastal ecosystems, taking into account sea-level rise in coastal and nearshore restoration projects. Focus on identifying, protecting, and restoring submerged aquatic vegetation that offer critical habitat, "blue" carbon storage, and other ecosystem services. In addition, evaluate and address sea level rise in local clean-up sites, address concerns related to Tribal cultural resources and sites on the shoreline, and conduct long-term cost-benefit analysis of shoreline armor repairs along key shoreline sites.	**Source:** Commerce Menu of Measures, Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	

WATER RESOURCES

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (6) Marine Resources.. (a) [Policy No. 16] Clallam County should work to achieve alternatives for sewage treatment plant discharges to marine waters. (b) [Policy No. 17] Clallam County shall preserve the scenic, aesthetic and ecological qualities of the marine shorelines of Clallam County, in harmony with those uses which are deemed essential to the life of its citizens. Clallam County shall implement marine resource goals through the Clallam County Shoreline Master Program and/or critical areas ordinance, as now or hereafter amended. • Reduce local land-based pollutants that enhance acidification in marine waters. • Protect and restore natural systems along the shoreline to enhance buffers between coastal storms and development, and prioritize shoreline and watershed areas appropriate	

for defense and retreat as sea-level rise and coastal storms worsen in the region. • Encourage soft armoring of shorelines to protect infrastructure and habitat, and implement native vegetation and other natural resource management practices to reduce landslides and coastal erosion	
31.02.320 (9) Floodplains. (a) [Policy No. 22] Flood control should be undertaken in the context of varied uses including agricultural and residential, fish and wildlife habitat, water supply, open space, and recreation. Land use and related regulations and zoning should reflect the natural constraints of floodplains, meander zones, and riparian habitat zones. Flood control measures should reserve to the fullest extent possible opportunities for other uses, including public access. • Increase resiliency to flooding events by protecting, and where possible, enhancing and restoring existing flood storage, conveyance, and ecological functions and values of floodplains, wetlands, and riparian corridors. • Use regulations, zoning, and incentives to maintain open space and limit development in floodplains, riparian corridors, high value wetlands, and unstable slopes vulnerable to degradation due to climate change impacts. • Work with the Department of Ecology on a Floodplains by Design program to seek technical assistance, grants, and coordination support to reduce flood risks, protect lives and property, and enhance and restore habitat and ecosystem services provided by floodplains.	

NEW POLICIES

Goal	Protect, conserve, and enhance water resources in Clallam County and create more climate resilient water systems.

Policy	Policy Context	Notes
Require the integration of water conservation methods and technologies in the development of irrigation infrastructure within parks and recreation areas to prepare for drought. Promote the adoption of advanced irrigation technologies and practices that minimize water use and mitigate environmental impacts.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Promote the creation of mechanisms for trading water rights to effectively allocate	**Source:** Commerce Menu of Measures,	

water resources and promote sustainable management practices.	NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	
Seek funding from the Department of Ecology to develop and implement a comprehensive drought resilience strategy that considers projected climate impacts and sets action levels for different drought stages. Incorporate climate projections into drought planning to enhance preparedness and mitigate the impacts of drought on water resources.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies, Ecology Climate Resilience Strategy (County recommendation) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Identify and implement strategies to prepare for and mitigate the effects of saltwater intrusion into aquifers and drainage systems. Explore existing grant opportunities to fund initiatives aimed at monitoring and preventing saltwater intrusion to ensure the reliability and sustainability of water supplies.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Evaluate the long-term adequacy of water delivery infrastructure to anticipate and effectively manage changes in hydrological patterns linked to climate change. Construct and maintain new water-storage systems, such as large cisterns, water towers, and reservoirs, to provide backup water supplies during droughts and enhance climate resilience. Promote bringing additional rural areas and failed wells into centralized and existing public water systems. Raise awareness about the DOH Office of Drinking Water's (ODW) guidance on integrating climate constraints, contingency planning, and sustainability in water treatment. Highlight their management of the Drinking Water State Revolving Fund (DWSRF), which funds infrastructure improvements and resilience, especially for smaller public water systems in underserved communities.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies, Ecology Climate Resilience Strategy (County recommendation) **Policy Lever:** Incentives & Education, Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	Update the Watershed Management Plan

Require the use of green infrastructure and low-impact development to manage increased storm intensities and reduce stormwater runoff.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Encourage residents to reduce water consumption by implementing smart grid water use and water reclamation systems, promoting smart irrigation technologies, updating water rates to discourage lawn watering, and promoting existing incentives for sustainable food cultivation.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	

WASTE MANAGEMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (b) [Policy No. 32] Treatment and disposal of biosolids should be undertaken locally to minimize transportation costs for waste disposal and to encourage the safe operation and timely maintenance of sewage disposal systems. Incorporate future climate change related hazards such as flooding and sea-level rise on the treatment and disposal of biosolids and affected sites.	
31.02.320 (c) [Policy No. 33] Education and incentive programs on solid and hazardous waste reduction, recycling, and disposal, including those for households and small businesses, should be made available. Opportunities for the collection and disposal of household, agricultural, and commercial hazardous waste should be provided. In addition, provide support to communities to manage debris cleanup and removal resulting from natural hazards exacerbated by climate change.	Debris addressed below.

NEW POLICIES:

Goal	Ensure that the County reduces, reuses, and recycles waste materials sustainably and prepares for climate change impacts to waste systems.

Policy	Policy Context	Notes

Develop and implement a strategy to quickly manage the collection, transport, sorting, and disposal of debris, such as downed tree limbs and buildings blocking roads and streams, after a disaster to reduce the risks of fire, flood, injury, and disease vectors.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	Update and approve Clallam County Debris Management Plan, integrating existing City Debris Management Plans.
Evaluate wastewater facilities to reduce greenhouse emissions and build resilience to climate impacts such as landslides and sea-level rise, including: • Maximizing on-site natural gas co-generation from anaerobic digesters to reduce emissions and vulnerability to power outages and fuel shortages. • Reducing vulnerability of access routes to treatment plants and identifying alternative routes if primary ones are compromised. • Enhancing management of septic water quality issues and evaluating alternative wastewater treatment solutions in vulnerable areas.	**Source:** Port Angeles Climate Resilience Plan **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience, emission reduction	Wastewater facilities are not regulated as waste management at the state level- this policy does not make sense here.
Pursue investment and partnerships on recovering local waste materials.		Local waste streams provide opportunities for innovative climate resiliency strategies such as food rescue for local consumption, energy production, production of soil amendments or biochar production, stormwater LID,

BUILDINGS & ENERGY

General Notes:

- Design and implement pilot projects, and encourage local governments, utilities, and public facilities to apply for solar and energy storage grants through the State Department of Commerce. " This should include smart grid grants.
- PUD is actively applying for solar plus storage grants.

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.510 (3) Measuring Housing Need: A Data Toolkit for Clallam County includes the following strategies for providing affordable housing and meeting the demand for diversity of housing choices: Encourage the development of infill development and "missing middle" housing by developing policies and codes to balance available funding to include a wider range of housing types in designated single-family zones that also experience fewer climate risks (e.g., flooding, wildfire, etc.), reduce displacement due to climate impacts, and improve equitable access to existing city transit systems and community services inside UGAs. Identify and expand climate-resilient anti-displacement strategies and infrastructure to mitigate housing insecurities exacerbated by climate-driven gentrification.	
31.02.285 (Goal 7, Policy 17) Essential Public Facilities. Essential public facilities are public capital facilities of a County-wide or State-wide nature which are typically difficult to site. Essential public facilities may be located in designated commercial forest or rural lands provided the County finds that such facilities cannot otherwise be located in urban areas, are largely self-contained or served by urban governmental services in a manner that adjacent rural or urban development is not promoted, and the facility does not cause nuisances (noise, dust, light, etc.) on adjacent properties that cannot be adequately mitigated. The siting of essential public facilities in resource lands should not interfere with resource management on adjacent resource lands. Additionally, the County should collaborate with energy utilities and seek available grants to enhance the resilience and reliability of infrastructure susceptible to climate change impacts, including planning and building facilities and utilities to avoid or withstand flooding from rising sea levels and associated climate impacts.	
31.02.720 (3) Utility lines shall be underground for new land divisions to reduce damage from storms and wildfire ignition risks. The County, cities, and service providers should work to place existing above-ground utility lines underground along major highway corridors inside urban growth areas.	

NEW POLICIES

Goal Increase the resilience of public utilities, facilities, and services by preparing for climate change impacts.

Policy	Policy Context	Notes
Ensure that energy infrastructure, including generation and transmission systems, can withstand and recover from the effects of extreme weather and other natural disasters intensified by climate change. Work with utilities to ensure infrastructure safety and reliability such as through undergrounding lines, establishing redundancies, and promoting small-scale energy generation systems.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	Clallam PUD is also doing this- looking for grants to implement (YES, would like to see this)
Encourage the deployment of emerging technologies to promote distributed energy generation, demand response, energy storage, energy efficiency, and smart grid technologies to increase grid reliability, flexibility, and capacity. Design and implement pilot projects, and encourage local governments, utilities, and public facilities to apply for solar and energy storage grants through the State Department of Commerce.	**Source:** Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	Clallam PUD is doing this- looking for these grant opportunities (YES, would like to see this)

Goal Promote building retrofits and new construction that is sustainably built to minimize environmental impacts and enhance resilience against extreme weather and other risks exacerbated by climate change.

Policy	Policy Context	Notes
Develop or modify building standards to reduce the impacts of climate change on indoor and outdoor buildings features. This may include requiring low-impact development and stormwater runoff mitigation systems, designing buildings for passive survivability in case of extended power loss, adopting fire resilience standards such as venting and features designed to prevent ember ignition, and promoting "green" or "cool" roofs. Prioritize the preservation and weatherization of housing in overburdened communities and	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Incentives & Education, Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction, equity	Blanket promoting of green roofs might not work for the area with larger rainfall

provide assistance for existing tenants at risk of displacement or additional cost burden from green gentrification.		
Align with the County's Climate Action Plan to collaborate with partners to incentivize building improvements and retrofits for residential and commercial buildings in the County to improve energy efficiency and resilience. Specific activities may include expanding low-income Energy Assistance programs, promoting existing weatherization incentives and assistance, upgrading cooling infrastructure in facilities serving vulnerable populations, and implementing alternatives like increasing tree cover and adding shade structures. Prioritize incentives and assistance programs for cost burdened communities and ensure outreach is targeted towards and benefits overburdened populations, such as those who live in multifamily and affordable housing units.	**Source:** Clallam Climate Action Plan, Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	

TRANSPORTATION

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.420 (k, iii, v) Bridges and other transportation facilities should not constrict the natural meander of river channels, should have the least possible adverse effects on the shoreline, should account for sea-level rise projections, should minimize loss of shoreline ecological functions, and should not adversely impact habitat restoration and enhancement projects.	
31.02.420 (k, 11,i) New transportation corridors shall minimize to the reasonable extent possible the disruption to wildlife and stream corridors and shall provide for maintaining connectivity between habitat areas with the application of buffers and other means. The County should incorporate hydrologic climate impacts into the design of water-crossing structures (i.e., climate-smart culverts and bridges) for fish passage and habitat quality.	
31.02.420 (29) The safety and quality of the travel experience for the non-motorized traveler shall be improved with a greater role in the transportation system.	

(a) Widely and prominently sign for the public the location of safe alternate bicycle routes and trails to separate motorized and non-motorized traffic when possible. (b) The Olympic Discovery Trail shall be developed as a priority transportation facility to bring non-motorized travelers from Jefferson County to the Port Angeles corridor and to the major towns and communities west to the Pacific Coast. (Cont…) Reduce pedestrian or bicycle and car collisions, beginning with communities with the highest rate of injury or death, by establishing a safe and welcoming environment that includes green corridors, lighting, shade, visibility, sustainable landscaping, and active uses.	

NEW POLICIES:

Goal	Ensure the local transportation system, including infrastructure, routes, and travel modes, can withstand and recover from extreme weather events and other climate change-related hazards.

Policy	Policy Context	Notes
Design and site new and expanded roads to minimize adverse effects on the shoreline, accommodate sea-level rise projections, preserve shoreline ecological functions, and avoid negative impacts on water-oriented uses, public access, and habitat restoration projects. Incorporate hydrologic climate impacts into the design of water-crossing structures, such as climate-smart culverts and bridges, to support fish passage and habitat quality. The County should identify existing roads and bridges susceptible to flooding and work with the Washington Department of Transportation to improve resilience of vulnerable assets in conjunction with repairs.	**Source:** Jamestown S'Klallam Adaptation Plan, Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Improve street connectivity and walkability to expand potential evacuation routes, and reduce stormwater impacts from transportation and development through watershed planning, redevelopment, retrofits, and low-impact development.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation	

	Climate and Equity Intersection: Resilience, emissions reduction	
Enhance the resilience of parks and recreational trails by assessing and addressing climate hazards and impacts, and advocate to expand the Washington State Department of Transportation (WSDOT) climate vulnerability assessment to include non-state roads and other transportation systems. Work with the Department of Natural Resource (DNR) to establish roadside vegetation management to reduce wildfire risk along Highway 101 and Highway 112.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	Include other transportation partners like cities and tribes Flagging redundant routing, for one road in one road out
Continue to partner and support Clallam Transit to identify barriers to using transit, understand climate vulnerability of transit systems, expand transit use and equity, and ensure routes are convenient, safe, and accessible for travelers/commuters. Develop strategies that promote transit equity and community safety by considering the needs of the most vulnerable populations, and design and implement transit to support pedestrians, bicycles, and public transit.	**Source:** Clallam Climate Action Plan, Port Angeles Resilience Plan **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	

ZONING & DEVELOPMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.410 (k, iv, vii) The amount of impervious surfaces should be minimized to allow for maximum infiltration, reduced quantity of runoff and potential reduction for flooding. Additionally, utilize the environmental services provided by trees to mini**mize** the negative effects of impervious surfaces and vehicular traffic such as increased temperatures, airborne particulates, carbon dioxide, noise, and stormwater runoff.	
27.12.020 (18) Promote harmonious co-existence between the ongoing use of pre-existing development sites in critical areas, and the functional protection of those critical areas. Preserve unique or major physical features such as marine shorelines, bluffs, ravines, streams, wetlands, wildlife habitat and other	

environmentally sensitive areas and those vulnerable to climate change impacts as designated open space. Maintain and update a critical areas ordinance that incorporates climate change considerations.	
31.02.420 (Policy No. 31) Clallam County should require new development to mitigate impacts on transportation facilities which are insufficient to safely handle transportation demands. The County should require new development to rectify and/or compensate for impacts to transportation facilities not meeting minimum safety standards, when reasonable and capable of being accomplished. Additionally, the County should consider future climate conditions during siting and design of transportation facilities, including changes to temperature, rainfall, and sea level, to help ensure they function as intended over their planned life cycle.	
31.02.263 Policy 4 (e). In order to maintain rural character, infill development and redevelopment within LAMIRDs should minimize impervious surfaces in order to maintain a more "open" or "rural" atmosphere; should have increased setbacks, buffers, and screening to separate land uses from adjacent rural residential zones; should incorporate measures to reduce the impacts of noise, odor, and traffic; and should require high-quality landscaping designed to protect rural character. The County should also develop regulations for elevating or setting back new and substantially improved structures to reduce the risk of damage caused by sea level rise, and establish new minimums, if necessary, so that improvements are not required to protect structures during their expected life.	

NEW POLICIES

Goal	Establish development patterns that increase the resilience of Clallam County's built environment, natural areas, and communities to climate impacts.

Policy	Policy Context	Notes
Utilize best available science and updates codes as necessary to establish overlays, special zoning districts, and design standards to increase resilience to climate hazards and direct new development away from high-risk areas. Continue to update vulnerability assessment of climate impacts and use this information to determine if and where zoning	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	

changes are needed. Additionally, conduct an environmental justice audit prior to creating new zoning designations or rezoning to ensure that decisions center environmental justice and do not further harm overburdened communities.		
Restore, maintain, and protect natural resources and open space areas, shorelines, agricultural lands, and forested lands to maximize climate resilience benefits and prevent their conversion to developed land. Protect undeveloped areas from conversion and encourage development within UGAs and already developed areas to improve resilience. Consider adopting concepts including conservation design and a land-first approach to development to prioritize healthy ecological functions, while still permitting development in appropriate locations. Center external partnerships with Tribes, nonprofits, and others to help implement this policy.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Implement development regulations and best practices to reduce risks from wildfires, extreme heat, flooding, and climate-related hazards. Include documentation of potential climate-related risks in property records to enhance transparency regarding on-site development vulnerabilities and retrofit infrastructure for hazards such as coastal flooding and sea level rise. Consider financial safeguards for any development that proceeds in these high-risk zones and explore the feasibility of requiring long-term financial bonds for projects in vulnerable locations.	**Source:** Commerce Menu of Measures, Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	
Integrate future climate conditions into the siting and design of capital facilities, parks, and community assets. Support long-term visioning for vulnerable areas through equitable community engagement, including managed retreat and relocation of hazardous industries and essential services.	Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	
Relocate hazardous industries and essential public services away from the 500-year floodplain and develop regulations to elevate or set back new structures to mitigate sea level rise damage. Require shoreline	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies	Educate potential buyers and load entities on climate hazards

stabilization to use soft methods, assess vulnerability of natural assets like wetlands and beaches, and ensure new developments are sited outside of sea-level rise hazard areas.	**Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Acquire properties or easements vulnerable to climate hazards and work with local communities to establish a development rights program to transfer rights from these areas to promote conservation and climate resilience while encouraging denser development in suitable locations.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	

CULTURAL RESOURCES & PRACTICES

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.330 (1) All jurisdictions should work individually and cooperatively to identify, record, study and encourage the preservation, maintenance and use of lands, sites, and structures that have historical and archaeological significance. The early identification and resolution of conflicts between preservation of historical or archaeological resources and competing land uses should be promoted and facilitated. Ensure that lands, sites, and structures that have cultural and archaeological significance are prioritized for protection from and resilient to the effects of extreme weather and natural disasters exacerbated by climate change.	

NEW POLICIES

Goal	Ensure that cultural resources and practices, such as historic, archaeological, and sacred sites, traditional foods, and natural resources, are resilient to the effects of extreme weather and other natural disasters exacerbated by climate change.

Policy	Policy Context	Notes
Restore and protect ecosystems to uphold Tribal Treaty Rights and preserve culturally significant resources including but not limited to historic, archaeological, and scared sites, traditional foods, plants, and resources at risk from climate change impacts. Re-evaluate	**Source:** HMP, Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience,	Committed to Gov Order 2105 for cultural resources for capital projects – Question: is this covered for capital projects? Or do we

collaboration with appropriate partners (Tribes, local communities) to integrate Traditional Ecological Knowledge and Western science to identify significant resources and places, assess vulnerability to climate impacts, and co-develop plans to increase resilience.	emissions reduction, equity	expand beyond capital projects? More examples/description of what "projects mean" or types of initiatives that would have gov-gov conversations beyond capital projects
Reassess and mend government-to-government relations with local Tribes to protect archaeological and sacred sites and cultural properties from climate-related threats, and work to safeguard these sites from floods and other natural hazards.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	This goes beyond state/federal laws- try to understand what partners need
Evaluate current practices around the protection of salmonid habitats by incorporating riparian and stream habitat conservation measures into land use and infrastructure plans (transportation, water, sewer, electricity) developed by the County in partnership with cities, Tribes, service providers, and state agencies.	**Source:** Jamestown S'Klallam Adaptation Plan, Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	

Goal	Provide all community members an equitable opportunity to learn about climate impacts, influence policy decisions, and take actions to enhance community well-being and resilience.

Policy	Policy Context	Notes
Develop and implement culturally relevant educational programs to communicate and provide targeted engagement around immediate and future climate change threats and methods for enhancing resilience. This may include building and strengthening partnerships with local organizations and entities (such as non-profits, Tribes, and schools) to educate, engage, and empower diverse groups in implementing resilience strategies, linking local issues to broader regional issues. Equitably distribute funds for climate resilience engagement	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:**	

Policy	Policy Context	Notes
opportunities in overburdened communities, with a focus on equity and underrepresented groups.	Resilience, equity	

ECONOMIC DEVELOPMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.620 (3) Environmental Stewardship. Encourage economic development that fosters protection of the natural environment and water resources that are vital to sustaining the County's tourism, natural resource-based industries, and quality of life. Recognize the environment as a key economic value in the community that must be protected in the face of current and future climate impacts. (b) Policy 2. Protect the natural environment and utilize renewable resources for long-term sustainable economic development and ecosystem resilience, including protection of existing farmland. (c) Policy 3. Implement cooperative and coordinated surface and groundwater management policies to ensure the future availability and quality of water throughout the County. Protect and preserve water quality and quantity from drought, extreme heat, and other hazards exacerbated by climate change.	
31.02.620 (4) (a) Policy 1. Participate with local business leaders and organizations like the Economic Development Council, chambers of commerce, real estate professionals, permit advisory boards, downtown associations, industry cluster teams, and other groups to address current and changing business and job requirements and bolster the County's local green economy, focusing efforts on the County's more vulnerable communities.	

NEW POLICIES

Goal	Ensure Clallam County's local economy is resilient to climate-related disruptions and encourage a green local economy and business opportunities.

Policy	Policy Context	Notes

Identify and monetize environmental services that promote climate resilience by creating a mechanism for compensating landowners for the environmental services maintained on their property. Utilize best available science to better understand the economic context of project planning and decision-making particular to shoreline and forest ecosystems affected by climate change throughout the county, such as No Net Loss policy and buffer setbacks. Specific mechanisms to compensate landowners for promoting eco-resiliency may include available tax incentives, carbon crediting, and financial assistance programs.	**Source:** NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction, equity	What commitment are we obligating ourselves with identify and monetize environmental services? What services: Wetland buffers? Streamside buffers? Compensating may not work here- we have this system in place? Carbon credits? Can't monetize critical areas We have a Public Benefit Rating System in place, is this something that could be reviewed/updated re: climate conditions that may expand that system? (e.g., carbon crediting as a tax-break for open-space?) Deprioritize generally b/c county wouldn't start a new market for funding this- but could potentially build from PBRS
Develop a green jobs strategy in Clallam County through collaboration with community groups and businesses that:	**Source:** Commerce Menu of Measures	

• Facilitates the transition of impacted industries to low-carbon operations; • Creates opportunities for youth and affected workers to move into green jobs; • Offers training and continuing education in green jobs for economically vulnerable individuals or those with limited skills and experience in this sector; • Ensures opportunities for local employment in these jobs.	**Policy Lever:** Incentives & Education, Partnerships & Planning **Climate and Equity Intersection:** Resilience, emissions reduction, equity	
Support the efforts of local businesses in bolstering climate preparedness and continuity of operations before, during, and after extreme weather events. This may include collaborating with community partners to create emergency plans that maintain business continuity during extreme weather events and promoting existing incentives and grants for businesses to install rooftop solar panels, batteries, and other renewable energy systems to ensure backup power and operational resilience.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Education & Incentives **Climate and Equity Intersection:** Resilience	
Assess the impacts of climate migration in Clallam County during Comprehensive Plan update periods. Integrate these findings into Comprehensive Plan updates, infrastructure plans, revenue and expense forecasting, and housing assessments.	**Source:** Port Angeles **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	

HEALTH & WELL-BEING

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (27) Clallam County should promote a high level of air quality for maximum visibility for scenic views, elimination of pollutant transport, reduction in adverse health impacts, resilience to wildfire smoke events, and minimization of noxious effects of airborne particulates.	

NEW POLICIES

Goal	Protect community health and well-being from the impacts of climate change and focus on overburdened communities in the County to ensure that the most vulnerable people do not experience disproportionate health impacts.

Policy	Policy Context	Notes
Promote health impact assessments and other tools to address health, equity, and climate change impacts on vulnerable communities in the County. Review land use maps to identify opportunities and barriers for responding to rapid population changes and rebuilding after disasters and other extreme climate impacts, and prioritize anti-displacement programs in overburdened communities when increasing densities and making zoning changes.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	
Identify communities disproportionately impacted by extreme heat events or low air quality and prioritize equitable access to emergency preparedness resources for overburdened and unsheltered communities. Develop an urban heat resilience strategy and wildfire smoke resilience strategy in partnership with local residents, Tribes, emergency management officials, regional clean air agency officials, and other partners that includes land use, urban design, waste heat reduction, and urban greening actions. This may include providing tools and resources for the community to stay safe during extreme heat events such as a community notification alert to reduce exposure to wildfire smoke and particulate matter. Prioritize at-risk community members by providing personal protective equipment and support for infrastructure updates (e.g., HVAC upgrades with MERV 13 filters) for facilities serving vulnerable populations.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	Currently underway, received grant funding. So decision re: having this policy since it's happening, include or exclude? "Re-word: As part of an awarded grant..." or something like that.
Develop messaging on climate change's impacts on health and safety with guidance for residents to plan and protect themselves and involve overburdened communities using multiple formats and languages for outreach. Co-create climate communications with Clallam County communities, especially Tribes, to ensure	**Source:** Commerce Menu of Measures, **Source:** Clallam Climate Action Plan **Policy Lever:** Incentives & Education	

their input on climate impacts, health impacts, and emergency resources during extreme events, focusing on culturally relevant transcreation to reach specific communities.	**Climate and Equity Intersection:** Resilience, equity	

EMERGENCY MANAGEMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.720 (4) The County should support expansion of the telecommunication network. Fiber optic cables and cellular service should be enhanced to serve the economic development goals of the County. Cellular sites should be placed in locations which provide required service without significantly impacting scenic qualities of the area. The County should factor climate impacts into the planning of emergency communications and coordination of preparedness, response, and recovery activities among first responders and partners.	
31.02.420 (10) Road safety should continually increase as population growth occurs. (x) Map road and other transportation infrastructure such as marinas and port facilities that are vulnerable to repeated floods, landslides, and other natural hazards exacerbated by climate change, and designate alternative travel routes for critical transportation corridors when roads must be closed. (i) Prioritize safety deficiencies using both statistical measures (e.g., accidents and road geometrics) and public input. Periodically, review the process for effectiveness of prioritizing road segment and intersection deficiencies.	
31.02.320 (26) The public should be protected from personal injury, loss of life, or property damage from environmental hazards and climate change impacts. Land use practices in hazard areas should not cause or exacerbate natural processes which endanger the lives, property and resources of citizens. Undevelopable hazardous areas should be utilized as open space whenever possible. The County should support enhanced data collection for hazard events of all magnitudes to provide a fuller understanding of the community's hazard characteristics — including those affected by climate change.	

NEW POLICIES

Goal	Promote and implement preparedness, response, and recovery efforts to ensure that all members of the Clallam County community are ready for climate emergencies. Anticipate and be ready to accommodate the rise in demand for emergency services due to climate change impacts and understand community needs when preparing for emergency situations.

Policy	Policy Context	Notes
Enhance local government staff's expertise in climate change and environmental justice to improve policy implementation, equity, and resilience. Staff should seek State Department of Health funding and other grant opportunities to create comprehensive wildfire and flood resilience strategies to boost emergency response, promote fire and flood-resilient landscapes, and support fire and flood-adapted communities. Encourage participation in incentive-based emergency preparedness programs such as the Community Rating System (FEMA's National Flood Insurance Program), Firewise (National Fire Protection Association), and StormReady (National Weather Service).	**Source:** NODC Adaptation Strategies, Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	
Conduct a sea level rise evaluation and resilience plan to assess the vulnerability of County assets, including motorized and non-motorized roads, sewage treatment and water infrastructure, buildings, and marine access. This includes: • Aligning with the Multi-jurisdictional Hazard Mitigation Plan to identify vulnerable infrastructure. • Analyzing sewer system capacity and vulnerability to sea level rise and proposing actions to enhance resilience. • Evaluating roads and structures along bluff crests for erosion threats due to sea level rise, considering planned retreat and ecosystem restoration, while minimizing realignment and protection efforts.	**Source:** Port Angeles Resilience Plan **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Develop a comprehensive strategy to map vulnerable transportation infrastructure,	**Source:** Commerce Menu of Measures	

designate alternative routes for critical corridors during closures, and incorporate sea-level rise and tsunami hazard data into critical area delineation for infrastructure siting and land-use planning. Enhance data collection to better understand community hazard characteristics, including those influenced by climate change, and support informed decision-making in emergency management.	**Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Develop resilience hubs as community-serving facilities to support residents, coordinate communication, distribute resources, and enhance quality of life while reducing carbon emissions. Identify community resilience hubs for each of the County's twenty micro-islands, seek funding to make these sites resilient, communicate the locations of these sites for public use during an emergency, and coordinate all plans to serve these hubs effectively in an emergency.	**Source:** Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	
Integrate climate impacts into the planning and coordination of operations for preparedness, response, and recovery activities among first responders and partners, including public health, law enforcement, fire, school, and emergency medical services (EMS) personnel. This may include updating emergency services communications equipment; enhancing training of emergency personnel and other responders; taking regular inventory of emergency facility needs (e.g., home emergency kits, cooling centers and temporary shelters); and assessing and improving the adaptive capacity of people who are most vulnerable to climate change-exacerbated hazards, such as Elders or people living in high-risk areas.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	
Develop and improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Operations Plan, and other plans to mitigate the impact of emergencies and hazards affected by climate change. Expand disaster training programs like CERT to equip Tribal members and the local	**Source:** Clallam MJHMP, Makah HMP **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience	

community with emergency response skills, and partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions. Additionally, continue to align climate impacts risk assessment and policies with the Multi-jurisdictional Hazard Mitigation Plan (MJHMP) update efforts.		
Establish a County-led climate resilience committee and identify grant opportunities and partners to jointly apply for grants that benefit the community, especially the most at-risk populations. Seek funding and technical assistance from the Department of Ecology to plan and prepare for climate hazards.	**Source:** Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	Question: Which DOE funding and tech assistance-add commerce, etc. We can expand to other State & Federal resources

Room 2: Aylssa

ECOSYSTEMS

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
27.12.020 (9) Protect water quality by controlling erosion, by providing guidance in the siting of land uses and activities to prevent or reduce the of release chemical or bacterial pollutants into waters of the State, and by maintaining stream flows and habitat quality for fish and marine shellfish. Integrate climate change projections into shellfish hatchery planning and manage or enhance upstream watersheds to improve water quality and minimize pollution from new and existing sources, including climate change impacts.	
27.12.020 (16) Provide the regulatory framework to supplement adopted policies in the Clallam County Comprehensive Plan, CCC Title 31, and the Zoning Code, CCC Title 33, which set forth land use designations, open space preservation, natural resource protection, wildlife migration corridor preservation, fish and wildlife habitat protection, wetland protection and, overall, protects the natural features in Clallam County by promoting wise use of lands within Clallam County. Strive for no net loss of ecosystem composition, structure, and functions and net ecological gain to enhance ecosystem resiliency to climate impacts in Clallam County.	

31.02.320 [Policy No. 5] Clallam County shall work with other agencies, tribes and individuals to prevent additional listing of fish, wildlife and plants under the Endangered Species Act through pro-active (rather than reactive) planning and implementation of proper land use practices. The County should identify potential future climate impacts on habitats and protect species using or reliant on vulnerable habitats, including identifying the most drought tolerant, resilient plant species for the region.	
31.02.320 (3) Wetlands. [Policy No. 9] Clallam County shall work to achieve no net loss of regulated wetlands while allowing a reasonable use of property, with regard to their functions and values, in the short-term and should work to achieve a long-term net gain in these attributes through restoration and enhancement. The public acquisition of important wetland areas should be pursued, and the County should identify and quantify the ecosystem services benefits of wetlands and include these natural capital assets in cost-benefit assessments for community and development planning. Wetlands provide biological and hydrological connectivity that fosters resilience to climate impacts, and the natural abilities of wetlands to provide recreational, educational, historical and cultural values should also be protected.	
31.02.320 (4c) [Policy No. 12] To protect quality and quantity of essential aquifers for current and future needs, Clallam County should encourage water conservation measures for all land uses; support water conservation measures and educate residents on methods to conserve water; and promote the application and implementation of water-conserving landscaping plans. This may include boosting regional water storage to improve water system climate resilience by promoting rainwater harvesting, encouraging water-efficient appliances, improving stormwater retention in suitable areas, establishing reclaimed water systems, and collaborating with Clallam Public Utilities Department for widespread water conservation education. Clallam County should undertake further studies of the groundwater regime of the County so that the factors influencing the quantity, quality and flow patterns of groundwater are more precisely known.	
31.02.320 (7c) [Policy No. 20] Clallam County shall recognize the large number of salmon and steelhead stocks that have been classified as critical or depressed. The County shall work toward prevention of these stocks from being listed as threatened and endangered through habitat restoration and land use practices which cause no further degradation to habitat needs. The County should implement actions identified in restoration and salmon recovery plans to improve the climate resilience of streams and watersheds.	

31.02.320 (9a) [Policy No. 22] Flood control should be undertaken in the context of varied uses including agricultural and residential, fish and wildlife habitat, water supply, open space, and recreation. Land use and related regulations and zoning should reflect the natural constraints of floodplains, meander zones, riparian habitat zones, and projected impacts of climate change on flood-prone areas.	

NEW POLICIES

Goal	Ensure that forests, wetlands, shorelines, and other ecosystems are resilient to the impacts of extreme weather, invasive species, pests, diseases, and other impacts worsened by climate change.

Policy	Policy Context	Notes
Prepare ecosystems for climate impacts by implementing restoration and recovery actions for streams, wetlands, and watersheds, focusing on biological and hydrological connectivity, reducing aquatic invasive species, and improving watershed-scale processes. This includes: • Bolstering the resilience of aquatic ecosystems by restoring riparian vegetation, floodplains, and stream structures, conserving water, and maintaining habitats to protect native fish and other aquatic life. • Exploring innovative adaptation strategies to manage water quality and streamflow and reduce sedimentation in streams resulting from wildfire damage and the associated impacts of landslides and flooding.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Strengthen habitat and ecosystem resilience by inventorying and protecting climate refugia and critical habitats to strive for no net loss of ecosystem attributes, with a focus on achieving net ecological gains. Expand habitat protection, quality, and connectivity through designations	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	

Policy	Policy Context	Notes
such as conservation areas, buffers, and open space corridors. Incorporate climate considerations in determining permissible activities within wetlands and wildlife habitats.		
Adopt integrated natural resource management practices and optimize management activities that enhance habitat integrity and function in the face of climate impacts. Proactively manage invasive species and promote native, drought- and pest-resistant plants for restoration projects to boost ecosystem resilience to climate-related stressors. Quantify the benefits of ecosystem services to include these natural capital assets in community planning, climate action plans, and development of cost-benefit analyses.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	- Wildlife corridors and establishing green belts - Definition of invasive species, maybe not previously. Better to monitor as what species do well? Natural invasion - Shellfish: bringing in non-native species without knowing impact on ecosystem
Protect and enhance urban forests by implementing climate-smart forest management, prioritizing efforts in more vulnerable areas of the community. This may include: • Implementing open space requirements for new developments, establishing green belts to connect communities, and enhancing urban forest management to optimize carbon storage and increase resilience. • Developing and implementing educational, incentive-based, and regulatory strategies to preserve and enhance private and urban forest lands for increased climate resilience, carbon sequestration, and ecosystem health. • Reducing financial impacts on landowners by advertising and encouraging participation in technical and financial assistance	**Source:** Commerce Menu of Measures; Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation, Education & Incentives **Climate and Equity Intersection:** Resilience	-Why is there a need to differentiate urban and rural lands? -Private and public lands? -seeking federal and state funded grants

Policy	Policy Context	Notes
programs, such as Washington's cost-share program. • Focusing on proactive urban forestry management, emphasizing risk mitigation from pests, disease, and wildfires, while ensuring that tree planting and species selection are adaptive to future climate conditions and prioritize vulnerable communities. • Seeking state-funded grants to reduce wildfire risk for areas identified as the wildland-urban interface through improvements such as structural hardening, improved water storage capacity, and wildfire risk assessments for communities and critical infrastructure.		
Promote forest stewardship education, tax incentive programs, carbon crediting, payment for ecosystems services programs, and other approaches to support landowners in managing their lands for climate resilience and preventing conversion. Collaborate with State agencies, conservation districts, and the Washington State University Extension Forestry Program to make resources and information available to landowners and support sustainable working forests. Explore other jurisdictions' strategies to recognize the economic benefits of and monetize environmental services maintained on landowners' properties.	**Source:** Commerce Menu of Measures; NODC **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	- County, city or state basis? Carbon crediting could be difficult/authority
Enhance the resilience of habitats and communities to climate change by protecting and restoring coastal ecosystems, taking into account sea-level rise in coastal and nearshore restoration projects. Focus on identifying, protecting, and restoring submerged aquatic vegetation that offer critical habitat, "blue" carbon	**Source:** Commerce Menu of Measures, Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	

Policy	Policy Context	Notes
storage, and other ecosystem services. In addition, evaluate and address sea level rise in local clean-up sites, address concerns related to Tribal cultural resources and sites on the shoreline, and conduct long-term cost-benefit analysis of shoreline armor repairs along key shoreline sites.		

WATER RESOURCES

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (6) Marine Resources.. (a) [Policy No. 16] Clallam County should work to achieve alternatives for sewage treatment plant discharges to marine waters. (b) [Policy No. 17] Clallam County shall preserve the scenic, aesthetic and ecological qualities of the marine shorelines of Clallam County, in harmony with those uses which are deemed essential to the life of its citizens. Clallam County shall implement marine resource goals through the Clallam County Shoreline Master Program and/or critical areas ordinance, as now or hereafter amended. • Reduce local land-based pollutants that enhance acidification in marine waters. • Protect and restore natural systems along the shoreline to enhance buffers between coastal storms and development, and prioritize shoreline and watershed areas appropriate for defense and retreat as sea-level rise and coastal storms worsen in the region. • Encourage soft armoring of shorelines to protect infrastructure and habitat, and implement native vegetation and other natural resource management practices to reduce landslides and coastal erosion	
31.02.320 (9) Floodplains. (a) [Policy No. 22] Flood control should be undertaken in the context of varied uses including agricultural and residential, fish and wildlife habitat, water supply, open space, and recreation. Land use and related regulations and zoning should reflect the natural constraints of floodplains, meander zones, and riparian habitat zones. Flood control measures should reserve to the fullest extent possible opportunities for other uses, including public access. • Increase resiliency to flooding events by protecting, and where possible, enhancing and restoring existing flood storage, conveyance, and ecological functions and values of floodplains, wetlands, and riparian corridors.	

• Use regulations, zoning, and incentives to maintain open space and limit development in floodplains, riparian corridors, high value wetlands, and unstable slopes vulnerable to degradation due to climate change impacts. • Work with the Department of Ecology on a Floodplains by Design program to seek technical assistance, grants, and coordination support to reduce flood risks, protect lives and property, and enhance and restore habitat and ecosystem services provided by floodplains.	

NEW POLICIES

Goal	Protect, conserve, and enhance water resources in Clallam County and create more climate resilient water systems.

Policy	Policy Context	Notes
Require the integration of water conservation methods and technologies in the development of irrigation infrastructure within parks and recreation areas to prepare for drought. Promote the adoption of advanced irrigation technologies and practices that minimize water use and mitigate environmental impacts.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Promote the creation of mechanisms for trading water rights to effectively allocate water resources and promote sustainable management practices.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	- Political worries, who decides what is a fair trade? Tribes would have a lot - Clarification on who and what, bulk of water starts in park and forest federal lands - Do the benefits out weigh the costs?
Seek funding from the Department of Ecology to develop and implement a comprehensive drought resilience strategy that considers projected	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies, Ecology	

Policy	Policy Context	Notes
climate impacts and sets action levels for different drought stages. Incorporate climate projections into drought planning to enhance preparedness and mitigate the impacts of drought on water resources.	Climate Resilience Strategy (County recommendation) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Identify and implement strategies to prepare for and mitigate the effects of saltwater intrusion into aquifers and drainage systems. Explore existing grant opportunities to fund initiatives aimed at monitoring and preventing saltwater intrusion to ensure the reliability and sustainability of water supplies.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Evaluate the long-term adequacy of water delivery infrastructure to anticipate and effectively manage changes in hydrological patterns linked to climate change. Construct and maintain new water-storage systems, such as large cisterns, water towers, and reservoirs, to provide backup water supplies during droughts and enhance climate resilience. Promote bringing additional rural areas and failed wells into centralized and existing public water systems. Raise awareness about the DOH Office of Drinking Water's (ODW) guidance on integrating climate constraints, contingency planning, and sustainability in water treatment. Highlight their management of the Drinking Water State Revolving Fund (DWSRF), which funds infrastructure improvements and resilience, especially for smaller public water systems in underserved communities.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies, Ecology Climate Resilience Strategy (County recommendation) **Policy Lever:** Incentives & Education, Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	Water storage would also benefit Em and resilience A must do
Require the use of green infrastructure and low-impact development to manage increased storm intensities and reduce stormwater runoff.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation	Consider long term planning for water availability for both people & ecosystems. Other policies for buildings/development

Policy	Policy Context	Notes
	Climate and Equity Intersection: Resilience, emissions reduction	should consider water resources. Need more visibility from water purveyors on sourcing DOH would have that info Climate change not accounted for in planning projections
Encourage residents to reduce water consumption by implementing smart grid water use and water reclamation systems, promoting smart irrigation technologies, updating water rates to discourage lawn watering, and promoting existing incentives for sustainable food cultivation.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	Add Non-traditional septic systems

WASTE MANAGEMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (b) [Policy No. 32] Treatment and disposal of biosolids should be undertaken locally to minimize transportation costs for waste disposal and to encourage the safe operation and timely maintenance of sewage disposal systems. Incorporate future climate change related hazards such as flooding and sea-level rise on the treatment and disposal of biosolids and affected sites.	
31.02.320 (c) [Policy No. 33] Education and incentive programs on solid and hazardous waste reduction, recycling, and disposal, including those for households and small businesses, should be made available. Opportunities for the collection and disposal of household, agricultural, and commercial hazardous waste should be provided. In addition, provide support to communities to manage debris cleanup and removal resulting from natural hazards exacerbated by climate change.	

NEW POLICIES:

Goal	Ensure that the County reduces, reuses, and recycles waste materials sustainably and prepares for climate change impacts to waste systems.

Policy	Policy Context	Notes
Develop and implement a strategy to quickly manage the collection, transport, sorting, and disposal of debris, such as downed tree limbs and buildings blocking roads and streams, after a disaster to reduce the risks of fire, flood, injury, and disease vectors.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	Moved to DCD, debris removal plan. Was HHS, moved to public works (roads/facilities)
Evaluate wastewater facilities to reduce greenhouse emissions and build resilience to climate impacts such as landslides and sea-level rise, including: • Maximizing on-site natural gas co-generation from anaerobic digesters to reduce emissions and vulnerability to power outages and fuel shortages. • Reducing vulnerability of access routes to treatment plants and identifying alternative routes if primary ones are compromised. • Enhancing management of septic water quality issues and evaluating alternative wastewater treatment solutions in vulnerable areas.	**Source:** Port Angeles Climate Resilience Plan **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience, emission reduction	

AGRICULTURE & FOOD SYSTEMS

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.120 (6) Agricultural land users shall be encouraged to maintain water quality and sustainable water-storage practices, protect fish and wildlife consistent with commercial agriculture, prevent erosion of valuable agricultural soils, implement climate-smart agricultural practices, and prepare for a changing climate.	
31.02.120 (8) Clallam County shall enhance the food security of its citizens and develop the local farm economy by actively supporting producers of food and other agricultural products for local consumption and supporting policies that encourage local institutions to purchase local food. This includes exploring existing funding and tax incentives to support the local food economy and expanding partnerships to mitigate climate impacts and improve access to healthy, affordable, and climate-friendly foods.	

31.02.120 (10) Clallam County should actively pursue the preservation of farmland and promote carbon sequestration—capturing, securing and storing carbon dioxide from the atmosphere—through a purchase or transfer of development rights program, Conservation Futures, and Open Space Program strategies with the Climate Commitment Act. Promote voluntary carbon credit programs, incentives, or financial assistance programs to support the long-term sustainability and economic vitality of the agricultural industry in the County.	

NEW POLICIES

Goal Support a sustainable local and regional agriculture sector in Clallam County that sequesters carbon, provides local jobs and food supply, and is resilient to the impacts of climate change.

Policy	Policy Context	Notes
Transition away from use of industrial fertilizer on agriculture and forestry lands, which can exacerbate ocean acidification. Educate agricultural and forestry managers on alternatives to industrial fertilizer and provide technical assistance as feasible.	**Source:** NODC Climate Adaptation Strategies (E-21) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction	
Preserve land for long-term agricultural use and restore ecosystems such as wetlands and ponds on agriculturally zoned properties in order to preserve carbon sinks, promote water storage, and provide additional ecosystem services.	**Source:** Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Align with the County's Climate Action Plan to invest in the local agricultural sector of Clallam County, including food and materials producers, distributors, and sellers. Protect productive agricultural lands and expand sustainable food production in Clallam County by: • Seeking Washington State Department of Agriculture (WSDA) funding to support private landowners to implement practices that increase climate resilience through livestock	**Source:** Clallam Climate Action Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	

Policy	Policy Context	Notes
infrastructure improvements, soil health, equipment and technology upgrades, and habitat enhancement projects. • Modifying regulatory codes to preserve agricultural lands and prevent their conversion into residential, commercial, or industrial areas. • Facilitating increased land access for local farmers, protecting farmland, and maintaining open spaces.		
Ensure that the local agriculture sector is resilient to extreme weather and other current and future climate impacts by: • Supporting sustainable business opportunities that educate farmers on water storage and regenerative farming practices that enable agricultural producers to adapt to changing climate conditions, minimize production losses, and maintain ecosystem balance. • Providing education and technical assistance on meeting increasing challenges and demands around climate adaptation, especially for agricultural products most vulnerable to climate impacts. • Promoting financial assistance, carbon crediting, and incentive programs to support the economic vitality of this sector.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction, equity	
Enhance local food security and the food economy to mitigate climate impacts and improve access to healthy, affordable, and climate-friendly foods by: • Encouraging and supporting farmers markets, community gardens, and urban agriculture activities in the county. • Developing education and outreach programs supporting food access and security, including a distributed model of local food sales and distribution. • Seeking state grants to boost local food supply and ensure rapid emergency food	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	

Policy	Policy Context	Notes
distribution to communities impacted by fire, flood, extreme heat, drought, and other climate and public health emergencies.		

TRANSPORTATION

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.420 (k, iii, v) Bridges and other transportation facilities should not constrict the natural meander of river channels, should have the least possible adverse effects on the shoreline, should account for sea-level rise projections, should minimize loss of shoreline ecological functions, and should not adversely impact habitat restoration and enhancement projects.	
31.02.420 (k, 11,i) New transportation corridors shall minimize to the reasonable extent possible the disruption to wildlife and stream corridors and shall provide for maintaining connectivity between habitat areas with the application of buffers and other means. The County should incorporate hydrologic climate impacts into the design of water-crossing structures (i.e., climate-smart culverts and bridges) for fish passage and habitat quality.	
31.02.420 (29) The safety and quality of the travel experience for the non-motorized traveler shall be improved with a greater role in the transportation system. (a) Widely and prominently sign for the public the location of safe alternate bicycle routes and trails to separate motorized and non-motorized traffic when possible. (b) The Olympic Discovery Trail shall be developed as a priority transportation facility to bring non-motorized travelers from Jefferson County to the Port Angeles corridor and to the major towns and communities west to the Pacific Coast. (Cont…) Reduce pedestrian or bicycle and car collisions, beginning with communities with the highest rate of injury or death, by	

establishing a safe and welcoming environment that includes green corridors, lighting, shade, visibility, sustainable landscaping, and active uses.	

NEW POLICIES:

Goal	Ensure the local transportation system, including infrastructure, routes, and travel modes, can withstand and recover from extreme weather events and other climate change-related hazards.

Policy	Policy Context	Notes
Design and site new and expanded roads to minimize adverse effects on the shoreline, accommodate sea-level rise projections, preserve shoreline ecological functions, and avoid negative impacts on water-oriented uses, public access, and habitat restoration projects. Incorporate hydrologic climate impacts into the design of water-crossing structures, such as climate-smart culverts and bridges, to support fish passage and habitat quality. The County should identify existing roads and bridges susceptible to flooding and work with the Washington Department of Transportation to improve resilience of vulnerable assets in conjunction with repairs.	**Source:** Jamestown S'Klallam Adaptation Plan, Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	Make sure we state that County does not have control over state routes in Clallam County (SR 110 and 112)
Improve street connectivity and walkability to expand potential evacuation routes, and reduce stormwater impacts from transportation and development through watershed planning, redevelopment, retrofits, and low-impact development.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	Good idea to use PA as an example of too much encroachment on ROW. Opportunity to explore allow people to pass on foot to evacuate Building trails to support weighted vehicles to support alternative evacuation routes
Enhance the resilience of parks and recreational trails by assessing and addressing climate hazards and impacts, and advocate to expand the Washington	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan, Ecology Climate	Clallam transit does a good job some sort of survey to see why people

Policy	Policy Context	Notes
State Department of Transportation (WSDOT) climate vulnerability assessment to include non-state roads and other transportation systems. Work with the Department of Natural Resource (DNR) to establish roadside vegetation management to reduce wildfire risk along Highway 101 and Highway 112.	Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	are driving rundown cars versus taking public transit?
Continue to partner and support Clallam Transit to identify barriers to using transit, understand climate vulnerability of transit systems, expand transit use and equity, and ensure routes are convenient, safe, and accessible for travelers/commuters. Develop strategies that promote transit equity and community safety by considering the needs of the most vulnerable populations, and design and implement transit to support pedestrians, bicycles, and public transit.	**Source:** Clallam Climate Action Plan, Port Angeles Resilience Plan **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	

ZONING & DEVELOPMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.410 (k, iv, vii) The amount of impervious surfaces should be minimized to allow for maximum infiltration, reduced quantity of runoff and potential reduction for flooding. Additionally, utilize the environmental services provided by trees to mini**mize** the negative effects of impervious surfaces and vehicular traffic such as increased temperatures, airborne particulates, carbon dioxide, noise, and stormwater runoff.	
27.12.020 (18) Promote harmonious co-existence between the ongoing use of pre-existing development sites in critical areas, and the functional protection of those critical areas. Preserve unique or major physical features such as marine shorelines, bluffs, ravines, streams, wetlands, wildlife habitat and other environmentally sensitive areas and those vulnerable to climate change impacts as designated open space. Maintain and update a critical areas ordinance that incorporates climate change considerations.	
31.02.420 (Policy No. 31) Clallam County should require new development to mitigate impacts on transportation facilities which	

are insufficient to safely handle transportation demands. The County should require new development to rectify and/or compensate for impacts to transportation facilities not meeting minimum safety standards, when reasonable and capable of being accomplished. Additionally, the County should consider future climate conditions during siting and design of transportation facilities, including changes to temperature, rainfall, and sea level, to help ensure they function as intended over their planned life cycle.	
31.02.263 Policy 4 (e). In order to maintain rural character, infill development and redevelopment within LAMIRDs should minimize impervious surfaces in order to maintain a more "open" or "rural" atmosphere; should have increased setbacks, buffers, and screening to separate land uses from adjacent rural residential zones; should incorporate measures to reduce the impacts of noise, odor, and traffic; and should require high-quality landscaping designed to protect rural character. The County should also develop regulations for elevating or setting back new and substantially improved structures to reduce the risk of damage caused by sea level rise, and establish new minimums, if necessary, so that improvements are not required to protect structures during their expected life.	

NEW POLICIES

Goal	Establish development patterns that increase the resilience of Clallam County's built environment, natural areas, and communities to climate impacts.

Policy	Policy Context	Notes
Utilize best available science and updates codes as necessary to establish overlays, special zoning districts, and design standards to increase resilience to climate hazards and direct new development away from high-risk areas. Continue to update vulnerability assessment of climate impacts and use this information to determine if and where zoning changes are needed. Additionally, conduct an environmental justice audit prior to creating new zoning	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	**1. EJ assessment** a. Is the EJ assessment separate? What does that mean for every zoning update? b. If the City was adopting this policy, this would

Policy	Policy Context	Notes
designations or rezoning to ensure that decisions center environmental justice and do not further harm overburdened communities.		require county to do more than CEPA for even a 1 acre parcel c. A lot of burdens as local govt, trying to make sure not adding more d. Framing as associated with comp plan revision to do an EJ assessment, versus every time a rezone
Restore, maintain, and protect natural resources and open space areas, shorelines, agricultural lands, and forested lands to maximize climate resilience benefits and prevent their conversion to developed land. Protect undeveloped areas from conversion and encourage development within UGAs and already developed areas to improve resilience. Consider adopting concepts including conservation design and a land-first approach to development to prioritize healthy ecological functions, while still permitting development in appropriate locations. Center external partnerships with Tribes, nonprofits, and others to help implement this policy.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	1. **Concerned about preventing conversation to developed land** **a.** Prevent is an absolute, sometimes there is a time when un developed **b.** Add "Designated" forest lands or commercial **c.** Doesn't like prevent, but maybe change to discourage

Policy	Policy Context	Notes
		d. Nervous about the absolute e. Read them as someone will use against in litigation f. Incentivize preventing or continuation of
Implement development regulations and best practices to reduce risks from wildfires, extreme heat, flooding, and climate-related hazards. Include documentation of potential climate-related risks in property records to enhance transparency regarding on-site development vulnerabilities and retrofit infrastructure for hazards such as coastal flooding and sea level rise. Consider financial safeguards for any development that proceeds in these high-risk zones and explore the feasibility of requiring long-term financial bonds for projects in vulnerable locations.	**Source:** Commerce Menu of Measures, Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	Financial bonds - for repairs/recovery if the event occurred? Or for what?
Integrate future climate conditions into the siting and design of capital facilities, parks, and community assets. Support long-term visioning for vulnerable areas through equitable community engagement, including managed retreat and relocation of hazardous industries and essential services.	Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	
Relocate hazardous industries and essential public services away from the 500-year floodplain and develop regulations to elevate or set back new structures to mitigate sea level rise damage. Require shoreline	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation	1. Relocate hazardous change to "Assess and encourage relocation" a. Opportunity to review

Policy	Policy Context	Notes
stabilization to use soft methods, assess vulnerability of natural assets like wetlands and beaches, and ensure new developments are sited outside of sea-level rise hazard areas.	**Climate and Equity Intersection:** Resilience	b. 500 year flood plain hardly used rn c. Should it be required in all cases? Does it create another obligation d. Don't regulate to that e. Do more assessment work around streams f. Implies that the primary hazard is flooding, but could apply to other hazards like wildfire. Might want to support movement away for any hazard
Acquire properties or easements vulnerable to climate hazards and work with local communities to establish a development rights program to transfer rights from these areas to promote conservation and climate resilience while encouraging denser development in suitable locations.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	1. Acquire a. Haven't been sued before b. Looking at this one, can't possibly do this one. c. Untenable obligation d. Soften to "work towards or

Policy	Policy Context	Notes
		collaborate to obtain properties" e. Overall soften language f. Visions goals and policies, which or all subject to lawsuit ? If language too strong?

BUILDINGS & ENERGY

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.510 (3) Measuring Housing Need: A Data Toolkit for Clallam County includes the following strategies for providing affordable housing and meeting the demand for diversity of housing choices: Encourage the development of infill development and "missing middle" housing by developing policies and codes to balance available funding to include a wider range of housing types in designated single-family zones that also experience fewer climate risks (e.g., flooding, wildfire, etc.), reduce displacement due to climate impacts, and improve equitable access to existing city transit systems and community services inside UGAs. Identify and expand climate-resilient anti-displacement strategies and infrastructure to mitigate housing insecurities exacerbated by climate-driven gentrification.	
31.02.285 (Goal 7, Policy 17) Essential Public Facilities. Essential public facilities are public capital facilities of a County-wide or State-wide nature which are typically difficult to site. Essential public facilities may be located in designated commercial forest or rural lands provided the County finds that such facilities cannot otherwise be located in urban areas, are largely self-contained or served by urban governmental services in a manner that adjacent rural or urban development is not promoted, and the facility does not cause nuisances (noise, dust, light, etc.) on adjacent properties that cannot be adequately mitigated. The siting of essential public facilities in resource lands should not interfere with resource management on adjacent resource lands. Additionally, the County	

should collaborate with energy utilities and seek available grants to enhance the resilience and reliability of infrastructure susceptible to climate change impacts, including planning and building facilities and utilities to avoid or withstand flooding from rising sea levels and associated climate impacts.	
31.02.720 (3) Utility lines shall be underground for new land divisions to reduce damage from storms and wildfire ignition risks. The County, cities, and service providers should work to place existing above-ground utility lines underground along major highway corridors inside urban growth areas.	

NEW POLICIES

Goal	Increase the resilience of public utilities, facilities, and services by preparing for climate change impacts.

Policy	Policy Context	Notes
Ensure that energy infrastructure, including generation and transmission systems, can withstand and recover from the effects of extreme weather and other natural disasters intensified by climate change. Work with utilities to ensure infrastructure safety and reliability such as through undergrounding lines, establishing redundancies, and promoting small-scale energy generation systems.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Encourage the deployment of emerging technologies to promote distributed energy generation, demand response, energy storage, energy efficiency, and smart grid technologies to increase grid reliability, flexibility, and capacity. Design and implement pilot projects, and encourage local governments, utilities, and public facilities to apply for solar and energy storage grants through the State Department of Commerce.	**Source:** Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	

Goal	Promote building retrofits and new construction that is sustainably built to minimize environmental impacts and enhance resilience against extreme weather and other risks exacerbated by climate change.

Policy	Policy Context	Notes

Develop or modify building standards to reduce the impacts of climate change on indoor and outdoor buildings features. This may include requiring low-impact development and stormwater runoff mitigation systems, designing buildings for passive survivability in case of extended power loss, adopting fire resilience standards such as venting and features designed to prevent ember ignition, and promoting "green" or "cool" roofs. Prioritize the preservation and weatherization of housing in overburdened communities and provide assistance for existing tenants at risk of displacement or additional cost burden from green gentrification.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Incentives & Education, Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction, equity	
Align with the County's Climate Action Plan to collaborate with partners to incentivize building improvements and retrofits for residential and commercial buildings in the County to improve energy efficiency and resilience. Specific activities may include expanding low-income Energy Assistance programs, promoting existing weatherization incentives and assistance, upgrading cooling infrastructure in facilities serving vulnerable populations, and implementing alternatives like increasing tree cover and adding shade structures. Prioritize incentives and assistance programs for cost burdened communities and ensure outreach is targeted towards and benefits overburdened populations, such as those who live in multifamily and affordable housing units.	**Source:** Clallam Climate Action Plan, Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	

ECONOMIC DEVELOPMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.620 (3) Environmental Stewardship. Encourage economic development that fosters protection of the natural environment and water resources that are vital to sustaining the County's tourism, natural resource-based industries, and quality of life. Recognize the environment as a key economic value in the	

community that must be protected in the face of current and future climate impacts. (b) Policy 2. Protect the natural environment and utilize renewable resources for long-term sustainable economic development and ecosystem resilience, including protection of existing farmland. (c) Policy 3. Implement cooperative and coordinated surface and groundwater management policies to ensure the future availability and quality of water throughout the County. Protect and preserve water quality and quantity from drought, extreme heat, and other hazards exacerbated by climate change.	
31.02.620 (4) (a) Policy 1. Participate with local business leaders and organizations like the Economic Development Council, chambers of commerce, real estate professionals, permit advisory boards, downtown associations, industry cluster teams, and other groups to address current and changing business and job requirements and bolster the County's local green economy, focusing efforts on the County's more vulnerable communities.	

NEW POLICIES

Goal	Ensure Clallam County's local economy is resilient to climate-related disruptions and encourage a green local economy and business opportunities.

Policy	Policy Context	Notes
Identify and monetize environmental services that promote climate resilience by creating a mechanism for compensating landowners for the environmental services maintained on their property. Utilize best available science to better understand the economic context of project planning and decision-making particular to shoreline and forest ecosystems affected by climate change throughout the county, such as No Net Loss policy and buffer setbacks. Specific mechanisms to compensate landowners for	**Source:** NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction, equity	1. Clarification of compensation of preserving ecosystems? For what? a. Do other areas of the country have protecting ecosystems as a part of tourism and economic development? b. One looking at environment stops doing something,

Policy	Policy Context	Notes
promoting eco-resiliency may include available tax incentives, carbon crediting, and financial assistance programs.		versus having to pay for advanced stormwater treatment c. Communities who have invested in preserving scenic corridors, also should be compensated d. Connection between the two, healthy ecosystems would contribute
Develop a green jobs strategy in Clallam County through collaboration with community groups and businesses that: • Facilitates the transition of impacted industries to low-carbon operations; • Creates opportunities for youth and affected workers to move into green jobs; • Offers training and continuing education in green jobs for economically vulnerable individuals or those with limited skills and experience in this sector; • Ensures opportunities for local employment in these jobs.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Partnerships & Planning **Climate and Equity Intersection:** Resilience, emissions reduction, equity	1. Green jobs a. Could remove green b. Just says job c. Goal is to encourage a green local economy, what is the definition of green i. Could look very different ii. What is a green job? Would that slow it down or make it difficult. Make it broader and

Policy	Policy Context	Notes
		more flexible d. Refine definitions wherever possible. Defining resilience as it applies in that policy
Support the efforts of local businesses in bolstering climate preparedness and continuity of operations before, during, and after extreme weather events. This may include collaborating with community partners to create emergency plans that maintain business continuity during extreme weather events and promoting existing incentives and grants for businesses to install rooftop solar panels, batteries, and other renewable energy systems to ensure backup power and operational resilience.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Education & Incentives **Climate and Equity Intersection:** Resilience	1. Not just limit to extreme weather events a. Any climate hazard. Any type of disaster
Assess the impacts of climate migration in Clallam County during Comprehensive Plan update periods. Integrate these findings into Comprehensive Plan updates, infrastructure plans, revenue and expense forecasting, and housing assessments.	**Source:** Port Angeles **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	

HEALTH & WELL-BEING

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes

31.02.320 (27) Clallam County should promote a high level of air quality for maximum visibility for scenic views, elimination of pollutant transport, reduction in adverse health impacts, resilience to wildfire smoke events, and minimization of noxious effects of airborne particulates.	

NEW POLICIES

Goal	Protect community health and well-being from the impacts of climate change and focus on overburdened communities in the County to ensure that the most vulnerable people do not experience disproportionate health impacts.

Policy	Policy Context	Notes
Promote health impact assessments and other tools to address health, equity, and climate change impacts on vulnerable communities in the County. Review land use maps to identify opportunities and barriers for responding to rapid population changes and rebuilding after disasters and other extreme climate impacts, and prioritize anti-displacement programs in overburdened communities when increasing densities and making zoning changes.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	1. Valuable to be able to use those tools to progress the health of everyone, particularly vulnerable communities. a. Definition that would apply to agencies that don't apply to others b. By definition would be overall Clallam county disadvantaged technically. In a comp plan want a clear concise language for funding, care for the housing in secure elderly etc c. Who do we mean by overburdened and where

Policy	Policy Context	Notes
		d. All of clallam technically is EPA overburdened e. Common english and definitions all at once
Identify communities disproportionately impacted by extreme heat events or low air quality and prioritize equitable access to emergency preparedness resources for overburdened and unsheltered communities. Develop an urban heat resilience strategy and wildfire smoke resilience strategy in partnership with local residents, Tribes, emergency management officials, regional clean air agency officials, and other partners that includes land use, urban design, waste heat reduction, and urban greening actions. This may include providing tools and resources for the community to stay safe during extreme heat events such as a community notification alert to reduce exposure to wildfire smoke and particulate matter. Prioritize at-risk community members by providing personal protective equipment and support for infrastructure updates (e.g., HVAC upgrades with MERV 13 filters) for facilities serving vulnerable populations.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	1. Prioritize at - risk members? a. At risk due to proximity to a hazard or financial b. Or due to health ? c. Make more clallam county centric d. Could apply at the national level e. Across the board, the poor aren't pushed towards f. Infrastructure upgrades and at-risk suggest a nursing home, resilience center that makes sure they have HVAC
Develop messaging on climate change's impacts on health and safety with guidance for residents to plan and protect themselves and involve overburdened communities using multiple	**Source:** Commerce Menu of Measures, **Source:** Clallam Climate Action Plan **Policy Lever:** Incentives & Education	

Policy	Policy Context	Notes
formats and languages for outreach. Co-create climate communications with Clallam County communities, especially Tribes, to ensure their input on climate impacts, health impacts, and emergency resources during extreme events, focusing on culturally relevant transcreation to reach specific communities.	**Climate and Equity Intersection:** Resilience, equity	

CULTURAL RESOURCES & PRACTICES

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.330 (1) All jurisdictions should work individually and cooperatively to identify, record, study and encourage the preservation, maintenance and use of lands, sites, and structures that have historical and archaeological significance. The early identification and resolution of conflicts between preservation of historical or archaeological resources and competing land uses should be promoted and facilitated. Ensure that lands, sites, and structures that have cultural and archaeological significance are prioritized for protection from and resilient to the effects of extreme weather and natural disasters exacerbated by climate change.	

NEW POLICIES

Goal	Ensure that cultural resources and practices, such as historic, archaeological, and sacred sites, traditional foods, and natural resources, are resilient to the effects of extreme weather and other natural disasters exacerbated by climate change.

Policy	Policy Context	Notes
Restore and protect ecosystems to uphold Tribal Treaty Rights and preserve culturally significant resources including but not limited to historic, archaeological, and sacred sites, traditional foods,	**Source:** HMP, Commerce Menu of Measures **Policy Lever:** Planning & Partnerships	1. Important that the language is there, to fine tune a bit. Uphold treaty rights for the **whole** ecosystem,

Policy	Policy Context	Notes
plants, and resources at risk from climate change impacts. Re-evaluate collaboration with appropriate partners (Tribes, local communities) to integrate Traditional Ecological Knowledge and Western science to identify significant resources and places, assess vulnerability to climate impacts, and co-develop plans to increase resilience.	**Climate and Equity Intersection:** Resilience, emissions reduction, equity	important to have the whole ecosystem in tact 2. Luke provided feedback already 3. Historic sites, and not "key" "including but not limited to" and a. national historic preservation act b. Would do us a disserve to equate historic to sacred tribal site c. Luke had sent more detailed feedback for this section Spelling sacred and not scared
Reassess and mend government-to-government relations with local Tribes to protect archaeological and sacred sites and cultural properties from climate-related threats, and work to safeguard these sites from floods and other natural hazards.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	1. There are sites around the world that are being lost to SLR (inundation and erosion) language is oriented to safe guard a. Preserve b. In concept makes sense, in the context of climate change. What that means for

Policy	Policy Context	Notes
		culturally significant
Evaluate current practices around the protection of salmonid habitats by incorporating riparian and stream habitat conservation measures into land use and infrastructure plans (transportation, water, sewer, electricity) developed by the County in partnership with cities, Tribes, service providers, and state agencies.	**Source:** Jamestown S'Klallam Adaptation Plan, Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	

Goal	Provide all community members an equitable opportunity to learn about climate impacts, influence policy decisions, and take actions to enhance community well-being and resilience.

Policy	Policy Context	Notes
Develop and implement culturally relevant educational programs to communicate and provide targeted engagement around immediate and future climate change threats and methods for enhancing resilience. This may include building and strengthening partnerships with local organizations and entities (such as non-profits, Tribes, and schools) to educate, engage, and empower diverse groups in implementing resilience strategies, linking local issues to broader regional issues. Equitably distribute funds for climate resilience engagement opportunities in overburdened communities, with a focus on equity and underrepresented groups.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	

EMERGENCY MANAGEMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.720 (4) The County should support expansion of the telecommunication network. Fiber optic cables and cellular service should be enhanced to serve the economic development goals of the County. Cellular sites should be placed in locations which	

provide required service without significantly impacting scenic qualities of the area. The County should factor climate impacts into the planning of emergency communications and coordination of preparedness, response, and recovery activities among first responders and partners.	
31.02.420 (10) Road safety should continually increase as population growth occurs. (x) Map road and other transportation infrastructure such as marinas and port facilities that are vulnerable to repeated floods, landslides, and other natural hazards exacerbated by climate change, and designate alternative travel routes for critical transportation corridors when roads must be closed. (i) Prioritize safety deficiencies using both statistical measures (e.g., accidents and road geometrics) and public input. Periodically, review the process for effectiveness of prioritizing road segment and intersection deficiencies.	
31.02.320 (26) The public should be protected from personal injury, loss of life, or property damage from environmental hazards and climate change impacts. Land use practices in hazard areas should not cause or exacerbate natural processes which endanger the lives, property and resources of citizens. Undevelopable hazardous areas should be utilized as open space whenever possible. The County should support enhanced data collection for hazard events of all magnitudes to provide a fuller understanding of the community's hazard characteristics — including those affected by climate change.	

NEW POLICIES

Goal	Promote and implement preparedness, response, and recovery efforts to ensure that all members of the Clallam County community are ready for climate emergencies. Anticipate and be ready to accommodate the rise in demand for emergency services due to climate change impacts and understand community needs when preparing for emergency situations.

Policy	Policy Context	Notes
Enhance local government staff's expertise in climate change and environmental justice to improve policy implementation, equity, and resilience. Staff should seek State Department of Health funding and other grant opportunities to create comprehensive wildfire and flood resilience strategies to boost emergency response, promote fire	**Source:** NODC Adaptation Strategies, Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion)	

Policy	Policy Context	Notes
and flood-resilient landscapes, and support fire and flood-adapted communities. Encourage participation in incentive-based emergency preparedness programs such as the Community Rating System (FEMA's National Flood Insurance Program), Firewise (National Fire Protection Association), and StormReady (National Weather Service).	**Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	
Conduct a sea level rise evaluation and resilience plan to assess the vulnerability of County assets, including motorized and non-motorized roads, sewage treatment and water infrastructure, buildings, and marine access. This includes: • Aligning with the Multi-jurisdictional Hazard Mitigation Plan to identify vulnerable infrastructure. • Analyzing sewer system capacity and vulnerability to sea level rise and proposing actions to enhance resilience. • Evaluating roads and structures along bluff crests for erosion threats due to sea level rise, considering planned retreat and ecosystem restoration, while minimizing realignment and protection efforts.	**Source:** Port Angeles Resilience Plan **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Develop a comprehensive strategy to map vulnerable transportation infrastructure, designate alternative routes for critical corridors during closures, and incorporate sea-level rise and tsunami hazard data into critical area delineation for infrastructure siting and land-use planning. Enhance data collection to better understand community hazard characteristics, including those influenced by climate change, and support informed decision-making in emergency management.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience	
Develop resilience hubs as community-serving facilities to support residents, coordinate communication, distribute resources, and enhance quality of life while reducing carbon emissions. Identify community resilience hubs for each of the County's twenty micro-islands, seek funding to make these sites resilient, communicate	**Source:** Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education	

Policy	Policy Context	Notes
the locations of these sites for public use during an emergency, and coordinate all plans to serve these hubs effectively in an emergency.	**Climate and Equity Intersection:** Resilience, equity	
Integrate climate impacts into the planning and coordination of operations for preparedness, response, and recovery activities among first responders and partners, including public health, law enforcement, fire, school, and emergency medical services (EMS) personnel. This may include updating emergency services communications equipment; enhancing training of emergency personnel and other responders; taking regular inventory of emergency facility needs (e.g., home emergency kits, cooling centers and temporary shelters); and assessing and improving the adaptive capacity of people who are most vulnerable to climate change-exacerbated hazards, such as Elders or people living in high-risk areas.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	
Develop and improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Operations Plan, and other plans to mitigate the impact of emergencies and hazards affected by climate change. Expand disaster training programs like CERT to equip Tribal members and the local community with emergency response skills, and partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions. Additionally, continue to align climate impacts risk assessment and policies with the Multi-jurisdictional Hazard Mitigation Plan (MJHMP) update efforts.	**Source:** Clallam MJHMP, Makah HMP **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Establish a County-led climate resilience committee and identify grant opportunities and partners to jointly apply for grants that benefit the community, especially the most at-risk populations. Seek funding and technical assistance from the Department of Ecology to plan and prepare for climate hazards.	**Source:** Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Planning & Partnerships	

Policy	Policy Context	Notes
	Climate and Equity Intersection: Resilience, equity	

Room 3: Abigail

WATER RESOURCES

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (6) Marine Resources.. (a) [Policy No. 16] Clallam County should work to achieve alternatives for sewage treatment plant discharges to marine waters. (b) [Policy No. 17] Clallam County shall preserve the scenic, aesthetic and ecological qualities of the marine shorelines of Clallam County, in harmony with those uses which are deemed essential to the life of its citizens. Clallam County shall implement marine resource goals through the Clallam County Shoreline Master Program and/or critical areas ordinance, as now or hereafter amended. • Reduce local land-based pollutants that enhance acidification in marine waters. • Protect and restore natural systems along the shoreline to enhance buffers between coastal storms and development, and prioritize shoreline and watershed areas appropriate for defense and retreat as sea-level rise and coastal storms worsen in the region. • Encourage soft armoring of shorelines to protect infrastructure and habitat, and implement native vegetation and other natural resource management practices to reduce landslides and coastal erosion	Have the impacts of SLR on septic systems been considered?
31.02.320 (9) Floodplains. (a) [Policy No. 22] Flood control should be undertaken in the context of varied uses including agricultural and residential, fish and wildlife habitat, water supply, open space, and recreation. Land use and related regulations and zoning should reflect the natural constraints of floodplains, meander zones, and riparian habitat zones. Flood control measures should reserve to the fullest extent possible opportunities for other uses, including public access. • Increase resiliency to flooding events by protecting, and where possible, enhancing and restoring existing flood storage, conveyance, and ecological functions and values of floodplains, wetlands, and riparian corridors. • Use regulations, zoning, and incentives to maintain open space and limit development in floodplains, riparian corridors, high	For "…the context of varied uses" Can this be more clear? I'm assuming that this is trying to say that flood control should minimize impacts to these uses? Consider enhancing the amount of required freeboard and

value wetlands, and unstable slopes vulnerable to degradation due to climate change impacts. • Work with the Department of Ecology on a Floodplains by Design program to seek technical assistance, grants, and coordination support to reduce flood risks, protect lives and property, and enhance and restore habitat and ecosystem services provided by floodplains.	shoreline setbacks for construction. Should be expanded to address erosion control as well? On shorelines, and maybe on rivers, flood control structures are more difficult to permit as compared to erosion control structures, so a statement about how the use of those structures can impact other uses would be valuable Erosion control also influences water resources, but is not covered in this policy. Should it be?

NEW POLICIES

Goal	Protect, conserve, and enhance water resources in Clallam County and create more climate resilient water systems.

Policy	Policy Context	Notes
Require the integration of water conservation methods and technologies in the development of irrigation infrastructure within parks and recreation areas to prepare for drought. Promote the adoption of advanced irrigation technologies and	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	• Watershed management plans – Dungeness and Elwha • Covers irrigation

practices that minimize water use and mitigate environmental impacts.		
Promote the creation of mechanisms for trading water rights to effectively allocate water resources and promote sustainable management practices.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	
Seek funding from the Department of Ecology to develop and implement a comprehensive drought resilience strategy that considers projected climate impacts and sets action levels for different drought stages. Incorporate climate projections into drought planning to enhance preparedness and mitigate the impacts of drought on water resources.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies, Ecology Climate Resilience Strategy (County recommendation) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Identify and implement strategies to prepare for and mitigate the effects of saltwater intrusion into aquifers and drainage systems. Explore existing grant opportunities to fund initiatives aimed at monitoring and preventing saltwater intrusion to ensure the reliability and sustainability of water supplies.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience	Flood plain development requirements – Add coastal setback requirements and elevating free board requirements. FEMA base flood projections may be inadequate.
Evaluate the long-term adequacy of water delivery infrastructure to anticipate and effectively manage changes in hydrological patterns linked to climate change. Construct and maintain new water-storage systems, such as large cisterns, water towers, and reservoirs, to provide backup water supplies during droughts and enhance climate resilience. Promote bringing additional rural areas and failed wells into centralized and existing public water systems. Raise awareness about the DOH Office of Drinking Water's (ODW) guidance on integrating climate constraints, contingency planning, and	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies, Ecology Climate Resilience Strategy (County recommendation) **Policy Lever:** Incentives & Education, Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	• Need a callout of septic systems – flooding and waste. • "Coordinate with water purveyors to..." to note that there's a policy share here between organizations.

sustainability in water treatment. Highlight their management of the Drinking Water State Revolving Fund (DWSRF), which funds infrastructure improvements and resilience, especially for smaller public water systems in underserved communities.		
Require the use of green infrastructure and low-impact development to manage increased storm intensities and reduce stormwater runoff.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	Reluctance that mandates this without further evaluation – need more practical guidance. Consider changing to "where it's been evaluated/explore and where appropriate…"
Encourage residents to reduce water consumption by implementing smart grid water use and water reclamation systems, promoting smart irrigation technologies, updating water rates to discourage lawn watering, and promoting existing incentives for sustainable food cultivation.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	

WASTE MANAGEMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (b) [Policy No. 32] Treatment and disposal of biosolids should be undertaken locally to minimize transportation costs for waste disposal and to encourage the safe operation and timely maintenance of sewage disposal systems. Incorporate future climate change related hazards such as flooding and sea-level rise on the treatment and disposal of biosolids and affected sites.	"as flooding" could be more specific, maybe specify "surface and groundwater"
31.02.320 (c) [Policy No. 33] Education and incentive programs on solid and hazardous waste reduction, recycling, and disposal, including those for households and small businesses, should be made available. Opportunities for the collection and disposal of household, agricultural, and commercial hazardous waste should be provided. In addition, provide support to communities to manage debris cleanup and removal resulting from natural hazards exacerbated by climate change.	In addition, explore mechanisms to provide support...

NEW POLICIES:

Goal	Ensure that the County reduces, reuses, and recycles waste materials sustainably and prepares for climate change impacts to waste systems.

COMMENT: Worthwhile to develop a goal focused on encouraging development of local recycling capacity and contributing to market development?

Policy	Policy Context	Notes
Develop and implement a strategy to quickly manage the collection, transport, sorting, and disposal of debris, such as downed tree limbs and buildings blocking roads and streams, after a disaster to reduce the risks of fire, flood, injury, and disease vectors.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	• County has a draft debris management plan and noting alignment with hazardous waste plan. • Education element (for jurisdictions and for the community – what to do in this scenario) about windstorms and debris cleanup from compounding/successive events.
Evaluate wastewater facilities to reduce greenhouse emissions and build resilience to climate impacts such as landslides and sea-level rise, including: • Maximizing on-site natural gas co-generation from anaerobic digesters to reduce emissions and vulnerability to power outages and fuel shortages. • Reducing vulnerability of access routes to treatment plants and identifying alternative routes if primary ones are compromised. • Enhancing management of septic water quality issues and evaluating alternative wastewater treatment	**Source:** Port Angeles Climate Resilience Plan **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience, emission reduction	Where wastewater treatment plants are located in terms of climate impacts. It might also be worth adding language in here clarifying how these facilities can/should be protected in light of hazards like flooding.

solutions in vulnerable areas.		

AGRICULTURE & FOOD SYSTEMS

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.120 (6) Agricultural land users shall be encouraged to maintain water quality and sustainable water-storage practices, protect fish and wildlife consistent with commercial agriculture, prevent erosion of valuable agricultural soils, implement climate-smart agricultural practices, and prepare for a changing climate.	Is there a guidance for climate-smart agriculture practices?
31.02.120 (8) Clallam County shall enhance the food security of its citizens and develop the local farm economy by actively supporting producers of food and other agricultural products for local consumption and supporting policies that encourage local institutions to purchase local food. This includes exploring existing funding and tax incentives to support the local food economy and expanding partnerships to mitigate climate impacts and improve access to healthy, affordable, and climate-friendly foods.	
31.02.120 (10) Clallam County should actively pursue the preservation of farmland and promote carbon sequestration—capturing, securing and storing carbon dioxide from the atmosphere—through a purchase or transfer of development rights program, Conservation Futures, and Open Space Program strategies with the Climate Commitment Act. Promote voluntary carbon credit programs, incentives, or financial assistance programs to support the long-term sustainability and economic vitality of the agricultural industry in the County.	

NEW POLICIES

Goal	Support a sustainable local and regional agriculture sector in Clallam County that sequesters carbon, provides local jobs and food supply, and is resilient to the impacts of climate change.

Policy	Policy Context	Notes
Transition away from use of industrial fertilizer on agriculture and forestry lands, which can exacerbate ocean acidification. Educate agricultural and forestry managers on alternatives to industrial fertilizer and provide technical assistance as feasible.	**Source:** NODC Climate Adaptation Strategies (E-21) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction	Encourage and incentivize to aid in the transition way from...
Preserve land for long-term agricultural use and restore ecosystems such as wetlands and ponds on agriculturally zoned properties in order to preserve carbon sinks, promote water storage, and provide additional ecosystem services.	**Source:** Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Align with the County's Climate Action Plan to invest in the local agricultural sector of Clallam County, including food and materials producers, distributors, and sellers. Protect productive agricultural lands and expand sustainable food production in Clallam County by: • Seeking Washington State Department of Agriculture (WSDA) funding to support private landowners to implement practices that increase climate resilience through livestock infrastructure improvements, soil health, equipment and technology upgrades, and habitat enhancement projects. • Modifying regulatory codes to preserve agricultural lands and prevent their conversion into residential, commercial, or industrial areas. • Facilitating increased land access for local farmers, protecting farmland, and maintaining open spaces.	**Source:** Clallam Climate Action Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	

Ensure that the local agriculture sector is resilient to extreme weather and other current and future climate impacts by: • Supporting sustainable business opportunities that educate farmers on water storage and regenerative farming practices that enable agricultural producers to adapt to changing climate conditions, minimize production losses, and maintain ecosystem balance. • Providing education and technical assistance on meeting increasing challenges and demands around climate adaptation, especially for agricultural products most vulnerable to climate impacts. • Promoting financial assistance, carbon crediting, and incentive programs to support the economic vitality of this sector.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction, equity	Ushering in succession to new farmers – in addition to protecting existing farmers. Supporting climate resilient crops.
Enhance local food security and the food economy to mitigate climate impacts and improve access to healthy, affordable, and climate-friendly foods by: • Encouraging and supporting farmers markets, community gardens, and urban agriculture activities in the county. • Developing education and outreach programs supporting food access and security, including a distributed model of local food sales and distribution. • Seeking state grants to boost local food supply and ensure rapid emergency food distribution to communities impacted by fire, flood, extreme heat, drought, and other climate and public health emergencies.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	

ECOSYSTEMS

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes

27.12.020 (9) Protect water quality by controlling erosion, by providing guidance in the siting of land uses and activities to prevent or reduce the of release chemical or bacterial pollutants into waters of the State, and by maintaining stream flows and habitat quality for fish and marine shellfish. Integrate climate change projections into shellfish hatchery planning and manage or enhance upstream watersheds to improve water quality and minimize pollution from new and existing sources, including climate change impacts.	
27.12.020 (16) Provide the regulatory framework to supplement adopted policies in the Clallam County Comprehensive Plan, CCC Title 31, and the Zoning Code, CCC Title 33, which set forth land use designations, open space preservation, natural resource protection, wildlife migration corridor preservation, fish and wildlife habitat protection, wetland protection and, overall, protects the natural features in Clallam County by promoting wise use of lands within Clallam County. Strive for no net loss of ecosystem composition, structure, and functions and net ecological gain to enhance ecosystem resiliency to climate impacts in Clallam County.	
31.02.320 [Policy No. 5] Clallam County shall work with other agencies, tribes and individuals to prevent additional listing of fish, wildlife and plants under the Endangered Species Act through pro-active (rather than reactive) planning and implementation of proper land use practices. The County should identify potential future climate impacts on habitats and protect species using or reliant on vulnerable habitats, including identifying the most drought tolerant, resilient plant species for the region.	
31.02.320 (3) Wetlands. [Policy No. 9] Clallam County shall work to achieve no net loss of regulated wetlands while allowing a reasonable use of property, with regard to their functions and values, in the short-term and should work to achieve a long-term net gain in these attributes through restoration and enhancement. The public acquisition of important wetland areas should be pursued, and the County should identify and quantify the ecosystem services benefits of wetlands and include these natural capital assets in cost-benefit assessments for community and development planning. Wetlands provide biological and hydrological connectivity that fosters resilience to climate impacts, and the natural abilities of wetlands to provide recreational, educational, historical and cultural values should also be protected.	
31.02.320 (4c) [Policy No. 12] To protect quality and quantity of essential aquifers for current and future needs, Clallam County should encourage water conservation measures for all land uses; support water conservation measures and educate residents on methods to conserve water; and promote the application and	

implementation of water-conserving landscaping plans. This may include boosting regional water storage to improve water system climate resilience by promoting rainwater harvesting, encouraging water-efficient appliances, improving stormwater retention in suitable areas, establishing reclaimed water systems, and collaborating with Clallam Public Utilities Department for widespread water conservation education. Clallam County should undertake further studies of the groundwater regime of the County so that the factors influencing the quantity, quality and flow patterns of groundwater are more precisely known.	
31.02.320 (7c) [Policy No. 20] Clallam County shall recognize the large number of salmon and steelhead stocks that have been classified as critical or depressed. The County shall work toward prevention of these stocks from being listed as threatened and endangered through habitat restoration and land use practices which cause no further degradation to habitat needs. The County should implement actions identified in restoration and salmon recovery plans to improve the climate resilience of streams and watersheds.	
31.02.320 (9a) [Policy No. 22] Flood control should be undertaken in the context of varied uses including agricultural and residential, fish and wildlife habitat, water supply, open space, and recreation. Land use and related regulations and zoning should reflect the natural constraints of floodplains, meander zones, riparian habitat zones, and projected impacts of climate change on flood-prone areas.	

NEW POLICIES

Goal	Ensure that forests, wetlands, shorelines, and other ecosystems are resilient to the impacts of extreme weather, invasive species, pests, diseases, and other impacts worsened by climate change.

Policy	Policy Context	Notes
Prepare ecosystems for climate impacts by implementing restoration and recovery actions for streams, wetlands, and watersheds, focusing on biological and hydrological connectivity, reducing aquatic invasive species, and improving watershed-scale processes. This includes: • Bolstering the resilience of aquatic ecosystems by restoring riparian vegetation, floodplains, and stream	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	Interest in wildlife bridges and wildlife corridors? This is a gap. Bridges instead of culverts on 101 – continuing to do this.

structures, conserving water, and maintaining habitats to protect native fish and other aquatic life. • Exploring innovative adaptation strategies to manage water quality and streamflow and reduce sedimentation in streams resulting from wildfire damage and the associated impacts of landslides and flooding.		
Strengthen habitat and ecosystem resilience by inventorying and protecting climate refugia and critical habitats to strive for no net loss of ecosystem attributes, with a focus on achieving net ecological gains. Expand habitat protection, quality, and connectivity through designations such as conservation areas, buffers, and open space corridors. Incorporate climate considerations in determining permissible activities within wetlands and wildlife habitats.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Adopt integrated natural resource management practices and optimize management activities that enhance habitat integrity and function in the face of climate impacts. Proactively manage invasive species and promote native, drought- and pest-resistant plants for restoration projects to boost ecosystem resilience to climate-related stressors. Quantify the benefits of ecosystem services to include these natural capital assets in community planning, climate action plans, and development of cost-benefit analyses.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	
Protect and enhance urban forests by implementing climate-smart forest management, prioritizing efforts in more vulnerable areas of the community. This may include: • Implementing open space requirements for new developments, establishing green belts to connect communities, and enhancing urban forest management to optimize carbon storage and increase resilience. • Developing and implementing educational, incentive-based, and regulatory strategies to preserve and enhance private and urban forest lands for increased climate	**Source:** Commerce Menu of Measures; Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation, Education & Incentives **Climate and Equity Intersection:** Resilience	

resilience, carbon sequestration, and ecosystem health. • Reducing financial impacts on landowners by advertising and encouraging participation in technical and financial assistance programs, such as Washington's cost-share program. • Focusing on proactive urban forestry management, emphasizing risk mitigation from pests, disease, and wildfires, while ensuring that tree planting and species selection are adaptive to future climate conditions and prioritize vulnerable communities. • Seeking state-funded grants to reduce wildfire risk for areas identified as the wildland-urban interface through improvements such as structural hardening, improved water storage capacity, and wildfire risk assessments for communities and critical infrastructure.		
Promote forest stewardship education, tax incentive programs, carbon crediting, payment for ecosystems services programs, and other approaches to support landowners in managing their lands for climate resilience and preventing conversion. Collaborate with State agencies, conservation districts, and the Washington State University Extension Forestry Program to make resources and information available to landowners and support sustainable working forests. Explore other jurisdictions' strategies to recognize the economic benefits of and monetize environmental services maintained on landowners' properties.	**Source:** Commerce Menu of Measures; NODC **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience	
Enhance the resilience of habitats and communities to climate change by protecting and restoring coastal ecosystems, taking into account sea-level rise in coastal and nearshore restoration projects. Focus on identifying, protecting, and restoring submerged aquatic vegetation that offer critical habitat, "blue" carbon storage, and other ecosystem services. In addition, evaluate and address sea level rise in local clean-up sites, address concerns related to Tribal cultural resources and sites	**Source:** Commerce Menu of Measures, Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	

on the shoreline, and conduct long-term cost-benefit analysis of shoreline armor repairs along key shoreline sites.		

ZONING & DEVELOPMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.410 (k, iv, vii) The amount of impervious surfaces should be minimized to allow for maximum infiltration, reduced quantity of runoff and potential reduction for flooding. Additionally, utilize the environmental services provided by trees to mini**mize** the negative effects of impervious surfaces and vehicular traffic such as increased temperatures, airborne particulates, carbon dioxide, noise, and stormwater runoff.	
27.12.020 (18) Promote harmonious co-existence between the ongoing use of pre-existing development sites in critical areas, and the functional protection of those critical areas. Preserve unique or major physical features such as marine shorelines, bluffs, ravines, streams, wetlands, wildlife habitat and other environmentally sensitive areas and those vulnerable to climate change impacts as designated open space. Maintain and update a critical areas ordinance that incorporates climate change considerations.	
31.02.420 (Policy No. 31) Clallam County should require new development to mitigate impacts on transportation facilities which are insufficient to safely handle transportation demands. The County should require new development to rectify and/or compensate for impacts to transportation facilities not meeting minimum safety standards, when reasonable and capable of being accomplished. Additionally, the County should consider future climate conditions during siting and design of transportation facilities, including changes to temperature, rainfall, and sea level, to help ensure they function as intended over their planned life cycle.	
31.02.263 Policy 4 (e). In order to maintain rural character, infill development and redevelopment within LAMIRDs should minimize impervious surfaces in order to maintain a more “open” or “rural” atmosphere; should have increased setbacks, buffers, and screening to separate land uses from adjacent rural residential zones; should incorporate measures to reduce the impacts of noise, odor, and traffic; and should require high-quality landscaping designed to protect rural character. The County should also develop regulations for elevating or setting back new and substantially improved structures to reduce the risk of	

damage caused by sea level rise, and establish new minimums, if necessary, so that improvements are not required to protect structures during their expected life.	

NEW POLICIES

Goal	Establish development patterns that increase the resilience of Clallam County's built environment, natural areas, and communities to climate impacts.

Policy	Policy Context	Notes
Utilize best available science and updates codes as necessary to establish overlays, special zoning districts, and design standards to increase resilience to climate hazards and direct new development away from high-risk areas. Continue to update vulnerability assessment of climate impacts and use this information to determine if and where zoning changes are needed. Additionally, conduct an environmental justice audit prior to creating new zoning designations or rezoning to ensure that decisions center environmental justice and do not further harm overburdened communities.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	Some developments are County owned and some will not be – making sure the County has jurisdiction or think about ways to support/encourage other entities that manage/own this infrastructure. Re: Environmental justice audit. Could this could be framed as establishing environmental justice standards that should be applied to re-zoning
Restore, maintain, and protect natural resources and open space areas, shorelines, agricultural lands, and forested lands to maximize climate resilience benefits and prevent their conversion to developed land. Protect undeveloped areas from conversion and encourage development within UGAs and already developed areas to improve resilience. Consider adopting concepts including conservation design and a land-first approach to development to prioritize healthy ecological functions, while still permitting development in appropriate	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	Thinking about data beyond the 500-year floodplain – using alternative data sources/supplementing.

locations. Center external partnerships with Tribes, nonprofits, and others to help implement this policy.		
Implement development regulations and best practices to reduce risks from wildfires, extreme heat, flooding, and climate-related hazards. Include documentation of potential climate-related risks in property records to enhance transparency regarding on-site development vulnerabilities and retrofit infrastructure for hazards such as coastal flooding and sea level rise. Consider financial safeguards for any development that proceeds in these high-risk zones and explore the feasibility of requiring long-term financial bonds for projects in vulnerable locations.	**Source:** Commerce Menu of Measures, Clallam Climate Action Plan **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	
Integrate future climate conditions into the siting and design of capital facilities, parks, and community assets. Support long-term visioning for vulnerable areas through equitable community engagement, including managed retreat and relocation of hazardous industries and essential services.	Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	First line “integrate "risks associated with" future climate conditions”
Relocate hazardous industries and essential public services away from the 500-year floodplain and develop regulations to elevate or set back new structures to mitigate sea level rise damage. Require shoreline stabilization to use soft methods, assess vulnerability of natural assets like wetlands and beaches, and ensure new developments are sited outside of sea-level rise hazard areas.	**Source:** Commerce Menu of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	Subject to obtaining grant funding – needs a qualification that ensures funding. For relocation, need substantial funding from state or federal government. Think about this for real infrastructure changes. The use of a 500-year floodplain as a standard here should be carefully assessed. The delineation of that floodplain is notoriously problematic, and doesn’t integrate

		projected climate changes This implies that flooding is the primary hazard of concern that might drive relocation, whereas something like fire risk might also motivate it. It might be about encouraging or supporting the relocation of the most vulnerable infrastructure?
Acquire properties or easements vulnerable to climate hazards and work with local communities to establish a development rights program to transfer rights from these areas to promote conservation and climate resilience while encouraging denser development in suitable locations.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, equity	Subject to obtaining grant funding – needs a qualification that ensures funding.

BUILDINGS & ENERGY

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.510 (3) Measuring Housing Need: A Data Toolkit for Clallam County includes the following strategies for providing affordable housing and meeting the demand for diversity of housing choices: Encourage the development of infill development and "missing middle" housing by developing policies and codes to balance available funding to include a wider range of housing types in designated single-family zones that also experience fewer climate risks (e.g., flooding, wildfire, etc.), reduce displacement due to climate impacts, and improve equitable access to existing city transit systems and community services inside UGAs. Identify and expand climate-resilient anti-displacement strategies and infrastructure to mitigate housing insecurities exacerbated by climate-driven gentrification.	
31.02.285 (Goal 7, Policy 17) Essential Public Facilities. Essential public facilities are public capital facilities of a County-wide or State-wide nature which are typically difficult to site. Essential public facilities may be located in designated commercial forest or rural lands provided the County finds that such facilities cannot	

otherwise be located in urban areas, are largely self-contained or served by urban governmental services in a manner that adjacent rural or urban development is not promoted, and the facility does not cause nuisances (noise, dust, light, etc.) on adjacent properties that cannot be adequately mitigated. The siting of essential public facilities in resource lands should not interfere with resource management on adjacent resource lands. Additionally, the County should collaborate with energy utilities and seek available grants to enhance the resilience and reliability of infrastructure susceptible to climate change impacts, including planning and building facilities and utilities to avoid or withstand flooding from rising sea levels and associated climate impacts.	
31.02.720 (3) Utility lines shall be underground for new land divisions to reduce damage from storms and wildfire ignition risks. The County, cities, and service providers should work to place existing above-ground utility lines underground along major highway corridors inside urban growth areas.	

NEW POLICIES

Goal Increase the resilience of public utilities, facilities, and services by preparing for climate change impacts.

Policy	Policy Context	Notes
Ensure that energy infrastructure, including generation and transmission systems, can withstand and recover from the effects of extreme weather and other natural disasters intensified by climate change. Work with utilities to ensure infrastructure safety and reliability such as through undergrounding lines, establishing redundancies, and promoting small-scale energy generation systems.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	
Encourage the deployment of emerging technologies to promote distributed energy generation, demand response, energy storage, energy efficiency, and smart grid technologies to increase grid reliability, flexibility, and capacity. Design and implement pilot projects, and encourage local governments, utilities, and public facilities to apply for	**Source:** Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction	Expand to include other funding sources beyond Dept of Commerce – FEMA, Dept of Energy, Public Works. Make energy storage grants more broad – to include other strategies listed here (energy efficiency

solar and energy storage grants through the State Department of Commerce.		and resiliency projects/infrastructure, DEG, etc.)

Goal	Promote building retrofits and new construction that is sustainably built to minimize environmental impacts and enhance resilience against extreme weather and other risks exacerbated by climate change.

Policy	Policy Context	Notes
Develop or modify building standards to reduce the impacts of climate change on indoor and outdoor buildings features. This may include requiring low-impact development and stormwater runoff mitigation systems, designing buildings for passive survivability in case of extended power loss, adopting fire resilience standards such as venting and features designed to prevent ember ignition, and promoting "green" or "cool" roofs. Prioritize the preservation and weatherization of housing in overburdened communities and provide assistance for existing tenants at risk of displacement or additional cost burden from green gentrification.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Incentives & Education, Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction, equity	Definition of a resilience center – what are requirements to be one – how to make this actionable.
Align with the County's Climate Action Plan to collaborate with partners to incentivize building improvements and retrofits for residential and commercial buildings in the County to improve energy efficiency and resilience. Specific activities may include expanding low-income Energy Assistance programs, promoting existing weatherization incentives and assistance, upgrading cooling infrastructure in facilities serving vulnerable populations, and implementing alternatives like increasing tree cover and adding shade structures. Prioritize incentives and assistance programs for cost burdened communities and ensure outreach is targeted towards and benefits overburdened populations,	**Source:** Clallam Climate Action Plan, Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	

such as those who live in multifamily and affordable housing units.		

TRANSPORTATION

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.420 (k, iii, v) Bridges and other transportation facilities should not constrict the natural meander of river channels, should have the least possible adverse effects on the shoreline, should account for sea-level rise projections, should minimize loss of shoreline ecological functions, and should not adversely impact habitat restoration and enhancement projects.	Is "other transportation facilities" intended to include ports and marinas given that the proposed language is very shoreline focused? It may be worth considering a separate marine transportation goal. Maybe just "establish overlays, special zoning districts, and land-owner outreach zones to direct new development away from current and future high-risk areas AND reduce risk in those areas"
31.02.420 (k, 11,i) New transportation corridors shall minimize to the reasonable extent possible the disruption to wildlife and stream corridors and shall provide for maintaining connectivity between habitat areas with the application of buffers and other means. The County should incorporate hydrologic climate impacts into the design of water-crossing structures (i.e., climate-smart culverts and bridges) for fish passage and habitat quality.	
31.02.420 (29) The safety and quality of the travel experience for the non-motorized traveler shall be improved with a greater role in the transportation system. (a) Widely and prominently sign for the public the location of safe alternate bicycle routes and trails to separate motorized and non-motorized traffic when possible. (b) The Olympic Discovery Trail shall be developed as a priority transportation facility to bring non-motorized travelers from Jefferson County to the Port Angeles corridor and to the major towns and communities west to the Pacific Coast. (Cont…)	

Reduce pedestrian or bicycle and car collisions, beginning with communities with the highest rate of injury or death, by establishing a safe and welcoming environment that includes green corridors, lighting, shade, visibility, sustainable landscaping, and active uses.	

NEW POLICIES

Goal	Ensure the local transportation system, including infrastructure, routes, and travel modes, can withstand and recover from extreme weather events and other climate change-related hazards.

Policy	Policy Context	Notes
Design and site new and expanded roads to minimize adverse effects on the shoreline, accommodate sea-level rise projections, preserve shoreline ecological functions, and avoid negative impacts on water-oriented uses, public access, and habitat restoration projects. Incorporate hydrologic climate impacts into the design of water-crossing structures, such as climate-smart culverts and bridges, to support fish passage and habitat quality. The County should identify existing roads and bridges susceptible to flooding and work with the Washington Department of Transportation to improve resilience of vulnerable assets in conjunction with repairs.	**Source:** Jamestown S'Klallam Adaptation Plan, Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	One of the biggest impacts of flooding of roads during disasters is associated with access by first responders and/or individuals driving into hazardous areas...I feel like neither of these is really called out specifically in the language, though I'm wondering if it should be? Add landslides. Mapping and having agreements in place with alternate transportation routes in parks, private land, forest roads, etc. to ensure public safety and use in emergencies.

		Does the county have sufficient data to issue warnings? If not, do warning systems need to be considered (e.g. what data is missing)
Improve street connectivity and walkability to expand potential evacuation routes, and reduce stormwater impacts from transportation and development through watershed planning, redevelopment, retrofits, and low-impact development.	**Source:** Commerce Menu of Measures **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience, emissions reduction	Add something in here about encouraging evacuation route marking and awareness? Language about multimodal transportation – and improving resilience for people without cars/vehicles – and how storms can exacerbate this. Existing airports capable of serving more customers – and people from outside of the area. This would support local transportation and Clallam transit – and reduce cars/congestion on 101.
Enhance the resilience of parks and recreational trails by assessing and addressing climate hazards and impacts, and advocate to expand the Washington State Department of Transportation (WSDOT) climate vulnerability assessment to include non-state roads and other transportation systems. Work with the Department of Natural Resource (DNR) to establish roadside vegetation management	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	Intersections on evacuation routes with other jurisdictions – working with other entities besides WSDOT.

to reduce wildfire risk along Highway 101 and Highway 112.		
Continue to partner and support Clallam Transit to identify barriers to using transit, understand climate vulnerability of transit systems, expand transit use and equity, and ensure routes are convenient, safe, and accessible for travelers/commuters. Develop strategies that promote transit equity and community safety by considering the needs of the most vulnerable populations, and design and implement transit to support pedestrians, bicycles, and public transit.	**Source:** Clallam Climate Action Plan, Port Angeles Resilience Plan **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	

HEALTH & WELL-BEING

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.320 (27) Clallam County should promote a high level of air quality for maximum visibility for scenic views, elimination of pollutant transport, reduction in adverse health impacts, resilience to wildfire smoke events, and minimization of noxious effects of airborne particulates.	

NEW POLICIES

Goal	Protect community health and well-being from the impacts of climate change and focus on overburdened communities in the County to ensure that the most vulnerable people do not experience disproportionate health impacts.

Policy	Policy Context	Notes
Promote health impact assessments and other tools to address health, equity, and climate change impacts on vulnerable communities in the County. Review land use maps to identify opportunities and barriers for responding to rapid population changes and rebuilding after disasters and other extreme climate impacts, and prioritize anti-displacement programs in overburdened	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	

communities when increasing densities and making zoning changes.		
Identify communities disproportionately impacted by extreme heat events or low air quality and prioritize equitable access to emergency preparedness resources for overburdened and unsheltered communities. Develop an urban heat resilience strategy and wildfire smoke resilience strategy in partnership with local residents, Tribes, emergency management officials, regional clean air agency officials, and other partners that includes land use, urban design, waste heat reduction, and urban greening actions. This may include providing tools and resources for the community to stay safe during extreme heat events such as a community notification alert to reduce exposure to wildfire smoke and particulate matter. Prioritize at-risk community members by providing personal protective equipment and support for infrastructure updates (e.g., HVAC upgrades with MERV 13 filters) for facilities serving vulnerable populations.	**Source:** Commerce Menu of Measures, Port Angeles Resilience Plan **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	Health challenges – limited hospitals and access and capacity. One major event can overwhelm these systems. Funding issue. Worried about fundamental issues collapsing – need to deal with underlying issues. First responder infrastructure.
Develop messaging on climate change's impacts on health and safety with guidance for residents to plan and protect themselves and involve overburdened communities using multiple formats and languages for outreach. Co-create climate communications with Clallam County communities, especially Tribes, to ensure their input on climate impacts, health impacts, and emergency resources during extreme events, focusing on culturally relevant transcreation to reach specific communities.	**Source:** Commerce Menu of Measures, **Source:** Clallam Climate Action Plan **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	Should I know what "transcreation" means?

CULTURAL RESOURCES & PRACTICES

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes

31.02.330 (1) All jurisdictions should work individually and cooperatively to identify, record, study and encourage the preservation, maintenance and use of lands, sites, and structures that have historical and archaeological significance. The early identification and resolution of conflicts between preservation of historical or archaeological resources and competing land uses should be promoted and facilitated. Ensure that lands, sites, and structures that have cultural and archaeological significance are prioritized for protection from and resilient to the effects of extreme weather and natural disasters exacerbated by climate change.	

NEW POLICIES

Goal	Ensure that cultural resources and practices, such as historic, archaeological, and sacred sites, traditional foods, and natural resources, are resilient to the effects of extreme weather and other natural disasters exacerbated by climate change.

Policy	Policy Context	Notes
Restore and protect ecosystems to uphold Tribal Treaty Rights and preserve culturally significant resources including but not limited to historic, archaeological, and scared sites, traditional foods, plants, and resources at risk from climate change impacts. Re-evaluate collaboration with appropriate partners (Tribes, local communities) to integrate Traditional Ecological Knowledge and Western science to identify significant resources and places, assess vulnerability to climate impacts, and co-develop plans to increase resilience.	**Source:** HMP, Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, emissions reduction, equity	
Reassess and mend government-to-government relations with local Tribes to protect archaeological and sacred sites and cultural properties from climate-related threats, and work to safeguard these sites from floods and other natural hazards.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	Make more actionable.
Evaluate current practices around the protection of salmonid habitats by incorporating riparian and stream habitat conservation measures into land use and	**Source:** Jamestown S'Klallam Adaptation Plan, Commerce Menu	

infrastructure plans (transportation, water, sewer, electricity) developed by the County in partnership with cities, Tribes, service providers, and state agencies.	of Measures, NODC Adaptation Strategies **Policy Lever:** Zoning & Regulation **Climate and Equity Intersection:** Resilience	

Goal	Provide all community members an equitable opportunity to learn about climate impacts, influence policy decisions, and take actions to enhance community well-being and resilience.

Policy	Policy Context	Notes
Develop and implement culturally relevant educational programs to communicate and provide targeted engagement around immediate and future climate change threats and methods for enhancing resilience. This may include building and strengthening partnerships with local organizations and entities (such as non-profits, Tribes, and schools) to educate, engage, and empower diverse groups in implementing resilience strategies, linking local issues to broader regional issues. Equitably distribute funds for climate resilience engagement opportunities in overburdened communities, with a focus on equity and underrepresented groups.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	

ECONOMIC DEVELOPMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.620 (3) Environmental Stewardship. Encourage economic development that fosters protection of the natural environment and water resources that are vital to sustaining the County's tourism, natural resource-based industries, and quality of life. Recognize the environment as a key economic value in the community that must be protected in the face of current and future climate impacts. (b) Policy 2. Protect the natural environment and utilize renewable resources for long-term sustainable economic development and ecosystem resilience, including protection of existing farmland. (c) Policy 3. Implement cooperative and coordinated surface and	

groundwater management policies to ensure the future availability and quality of water throughout the County. Protect and preserve water quality and quantity from drought, extreme heat, and other hazards exacerbated by climate change.	
31.02.620 (4) (a) Policy 1. Participate with local business leaders and organizations like the Economic Development Council, chambers of commerce, real estate professionals, permit advisory boards, downtown associations, industry cluster teams, and other groups to address current and changing business and job requirements and bolster the County's local green economy, focusing efforts on the County's more vulnerable communities.	

NEW POLICIES

Goal	Ensure Clallam County's local economy is resilient to climate-related disruptions and encourage a green local economy and business opportunities.

Policy	Policy Context	Notes
Identify and monetize environmental services that promote climate resilience by creating a mechanism for compensating landowners for the environmental services maintained on their property. Utilize best available science to better understand the economic context of project planning and decision-making particular to shoreline and forest ecosystems affected by climate change throughout the county, such as No Net Loss policy and buffer setbacks. Specific mechanisms to compensate landowners for promoting eco-resiliency may include available tax incentives, carbon crediting, and financial assistance programs.	**Source:** NODC Adaptation Strategies **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, emissions reduction, equity	
Develop a green jobs strategy in Clallam County through collaboration with community groups and businesses that: • Facilitates the transition of impacted industries to low-carbon operations; • Creates opportunities for youth and affected workers to move into green jobs; • Offers training and continuing education in green jobs for economically vulnerable	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Partnerships & Planning **Climate and Equity Intersection:** Resilience, emissions reduction, equity	Green jobs needs more specificity. Also is it worth having this policy be broader than the individual jobs, to make a statement on the types of industries that

individuals or those with limited skills and experience in this sector; • Ensures opportunities for local employment in these jobs.		Clallam County would encourage support and even incentivize. Green jobs implies removing jobs (forestry) – jobs need to be available to folks who lose jobs and are qualified for, paid equitably, and interest. Strengthen policy to be more explicit around this.
Support the efforts of local businesses in bolstering climate preparedness and continuity of operations before, during, and after extreme weather events. This may include collaborating with community partners to create emergency plans that maintain business continuity during extreme weather events and promoting existing incentives and grants for businesses to install rooftop solar panels, batteries, and other renewable energy systems to ensure backup power and operational resilience.	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Education & Incentives **Climate and Equity Intersection:** Resilience	Grant process to get rooftop solar and battery storage was very difficult – encourage state and/or FEMA to make this process easier and provide more grant opportunities. Rather than "bolstering climate preparedness," maybe "engaging in long-term climate planning?"
Assess the impacts of climate migration in Clallam County during Comprehensive Plan update periods. Integrate these findings into Comprehensive Plan updates, infrastructure plans, revenue and expense forecasting, and housing assessments.	**Source:** Port Angeles **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	Jamestown S'Klallam Tribe had people specifically move there to get away from climate impacts – likely

		to grow in the future.

EMERGENCY MANAGEMENT

EXISTING GOALS & SUGGESTED EDITS

Existing goal with suggested edits in red	Notes
31.02.720 (4) The County should support expansion of the telecommunication network. Fiber optic cables and cellular service should be enhanced to serve the economic development goals of the County. Cellular sites should be placed in locations which provide required service without significantly impacting scenic qualities of the area. The County should factor climate impacts into the planning of emergency communications and coordination of preparedness, response, and recovery activities among first responders and partners.	
31.02.420 (10) Road safety should continually increase as population growth occurs. (x) Map road and other transportation infrastructure such as marinas and port facilities that are vulnerable to repeated floods, landslides, and other natural hazards exacerbated by climate change, and designate alternative travel routes for critical transportation corridors when roads must be closed. (i) Prioritize safety deficiencies using both statistical measures (e.g., accidents and road geometrics) and public input. Periodically, review the process for effectiveness of prioritizing road segment and intersection deficiencies.	
31.02.320 (26) The public should be protected from personal injury, loss of life, or property damage from environmental hazards and climate change impacts. Land use practices in hazard areas should not cause or exacerbate natural processes which endanger the lives, property and resources of citizens. Undevelopable hazardous areas should be utilized as open space whenever possible. The County should support enhanced data collection for hazard events of all magnitudes to provide a fuller understanding of the community's hazard characteristics — including those affected by climate change.	

NEW POLICIES

Goal	Promote and implement preparedness, response, and recovery efforts to ensure that all members of the Clallam County community are ready for climate emergencies. Anticipate and be ready to accommodate the rise in

demand for emergency services due to climate change impacts and understand community needs when preparing for emergency situations.

Policy	Policy Context	Notes
Enhance local government staff's expertise in climate change and environmental justice to improve policy implementation, equity, and resilience. Staff should seek State Department of Health funding and other grant opportunities to create comprehensive wildfire and flood resilience strategies to boost emergency response, promote fire and flood-resilient landscapes, and support fire and flood-adapted communities. Encourage participation in incentive-based emergency preparedness programs such as the Community Rating System (FEMA's National Flood Insurance Program), Firewise (National Fire Protection Association), and StormReady (National Weather Service).	**Source:** NODC Adaptation Strategies, Commerce Menu of Measures, Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	
Conduct a sea level rise evaluation and resilience plan to assess the vulnerability of County assets, including motorized and non-motorized roads, sewage treatment and water infrastructure, buildings, and marine access. This includes: • Aligning with the Multi-jurisdictional Hazard Mitigation Plan to identify vulnerable infrastructure. • Analyzing sewer system capacity and vulnerability to sea level rise and proposing actions to enhance resilience. • Evaluating roads and structures along bluff crests for erosion threats due to sea level rise, considering planned retreat and ecosystem restoration, while minimizing realignment and protection efforts.	**Source:** Port Angeles Resilience Plan **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience	
Develop a comprehensive strategy to map vulnerable transportation infrastructure, designate alternative routes for critical corridors during closures, and incorporate sea-level rise and tsunami hazard data into critical area delineation for infrastructure siting and land-use planning. Enhance data collection to better understand community	**Source:** Commerce Menu of Measures **Policy Lever:** Planning & Partnerships, Zoning & Regulation **Climate and Equity Intersection:** Resilience	

hazard characteristics, including those influenced by climate change, and support informed decision-making in emergency management.		
Develop resilience hubs as community-serving facilities to support residents, coordinate communication, distribute resources, and enhance quality of life while reducing carbon emissions. Identify community resilience hubs for each of the County's twenty micro-islands, seek funding to make these sites resilient, communicate the locations of these sites for public use during an emergency, and coordinate all plans to serve these hubs effectively in an emergency.	**Source:** Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Incentives & Education **Climate and Equity Intersection:** Resilience, equity	
Integrate climate impacts into the planning and coordination of operations for preparedness, response, and recovery activities among first responders and partners, including public health, law enforcement, fire, school, and emergency medical services (EMS) personnel. This may include updating emergency services communications equipment; enhancing training of emergency personnel and other responders; taking regular inventory of emergency facility needs (e.g., home emergency kits, cooling centers and temporary shelters); and assessing and improving the adaptive capacity of people who are most vulnerable to climate change-exacerbated hazards, such as Elders or people living in high-risk areas.	**Source:** Commerce Menu of Measures **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	
Develop and improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Operations Plan, and other plans to mitigate the impact of emergencies and hazards affected by climate change. Expand disaster training programs like CERT to equip Tribal members and the local community with emergency response skills, and partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions. Additionally, continue to align climate impacts risk	**Source:** Clallam MJHMP, Makah HMP **Policy Lever:** Incentives & Education, Planning & Partnerships **Climate and Equity Intersection:** Resilience	

assessment and policies with the Multi-jurisdictional Hazard Mitigation Plan (MJHMP) update efforts.		
Establish a County-led climate resilience committee and identify grant opportunities and partners to jointly apply for grants that benefit the community, especially the most at-risk populations. Seek funding and technical assistance from the Department of Ecology to plan and prepare for climate hazards.	**Source:** Ecology Climate Resilience Strategy (County suggestion) **Policy Lever:** Planning & Partnerships **Climate and Equity Intersection:** Resilience, equity	

Appendix C: Community Outreach Materials

APPENDIX C.1

Hazard Mitigation Plan Website

Online Maps & Services +
Bid Opportunities
Building Division +
Burning Restrictions +
Conservation Futures Program Advisory Board (CFPAB)
Hearing Examiner
Planning Commission (PC) +
Planning Division +
Natural Resources +
Code Enforcement
Public Records Request
Dungeness Water Rule
Agriculture Accessory Use Public Outreach
Dungeness/Towne Rd Levee Updates
Hazard Mitigation Plan Update
New Permitting Portal

Hazard Mitigation Plan Update

Overview

Clallam County (County) is updating its 2019 **Multi-Jurisdictional Hazard Mitigation Plan** and developing a **Climate Element** as a part of the 2025 Comprehensive Plan update. These documents will help the County prepare for environmental hazards and climate change. The County is interested in your feedback on the plans. Take the new Climate Risk & Resiliency Survey here!

We recently completed our first survey for the Multi-Jurisdictional Hazard Mitigation Plan, check out the results here!

We want to hear from you!

There are many opportunities to provide feedback on the new plan, and we will update this webpage regularly with those opportunities. The following timeline showcases the overall plan development timeline with engagement opportunities throughout 2024 and 2025.

Climate Risk & Resiliency Survey

Clallam County is conducting a Climate Vulnerability Assessment to better understand and address the specific threats that extreme weather and climate change pose to the community. To shape the assessment, we want to hear from people who live and work in Clallam County.

This survey will ask you about how extreme weather and climate change is affecting you and other communities in Clallam County, your priorities for the Climate Vulnerability Assessment, and your opinions on climate resiliency strategies. The survey responses will inform a new state-required Climate Element in Clallam County's forthcoming Comprehensive Plan Update.

You may have participated in a survey on Hazards during the Spring of 2024. This is a follow-up to that survey to focus more on climate resilience. The results of both surveys will be summarized and published on our project website, where you can also find out more about the Climate Element and other opportunities to participate.

Your participation in this effort is greatly appreciated. The survey should take approximately 15 minutes to complete. Your responses will be anonymous. This survey will be open from August 3 until October 4, 2024. Take the survey at this link.

Multi- Jurisdictional Hazard Mitigation Plan

The Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) provides a framework for Clallam County to reduce vulnerability to natural and human-caused hazard events such as earthquakes, drought, power outages, and wildfires and requires an update every 5 years.

Climate Element

The Climate Element (CE) meets new Washington House Bill 1181 requirements for cities and counties to integrate climate mitigation and/or resilience policies into their periodic comprehensive plan updates. Clallam County is required to satisfy a climate resilience sub-element for its 2025 Comprehensive Plan. Per WA State Department of Commerce guidance, one of the pathways to integrating climate resilience into a comprehensive plan is updating and adopting a hazard mitigation plan and then integrating climate resilience goals and policy into the comprehensive plan.

Hazard Mitigation and Climate Resilience (HMCR) Steering Committee

The HMCR Steering Committee is composed of 41 individuals from government entities including: Clallam County, City of Forks, City of Sequim, City of Port Angeles, the Jamestown S'Klallam Tribe, Lower Elwha Tribe, Makah Tribe, Quileute Tribe, Hoh Tribe, several fire districts, US Coast Guard, and other government entities. In addition, there are non-government entities represented from hospitals and social services organizations and local businesses.

Roadmap of Meetings

HMCR Steering Committee meetings will be organized into four phases. **Phase One** will include one meeting, **Phase Two** will include two meetings, **Phase Three** will include two meetings, and **Phase Four** will include one meeting. These phases are listed in Figure 1 below, along with a brief description of the timing and objectives for each.

Figure 1. Steering Committee Meeting Roadmap

For more information, please read the steering committee meeting notes and slides:

Meeting #1

- Steering Committee Notes
- Steering Committee Slides

Meeting #2

- Steering Committee Notes
- Steering Committee Slides

Meeting #3

- Steering Committee Notes
- Steering Committee Slides

MJHMP Survey 1 Summary

Clallam County & Consultant Project Team:

Clallam County	Role on Project
Diane Harvey, Sheriff's Office	Project Lead
Holden Fleming, Deputy Director, Department of Community Development	Comprehensive Planning Lead
Bruce Emery, Director, Department of Community Development	Comprehensive Planning
Consultant Team Members	**Role on Project**
Mary Ann Rozance, Cascadia Consulting Group	Project Manager
Alyssa Rodriguez, Cascadia Consulting Group	Engagement lead
Mike Chang, Cascadia Consulting Group	Principal in Charge
Noelle Anderson, Michael Baker International	Hazard Mitigation Plan Lead
Casey Marchese, Michael Baker International	Hazard Mitigation Analyst
Jim Buck	Strategic advisor

Community Development General Information Contact Form

First Name* Last Name* Phone*

Your Email* Subject*

Comments

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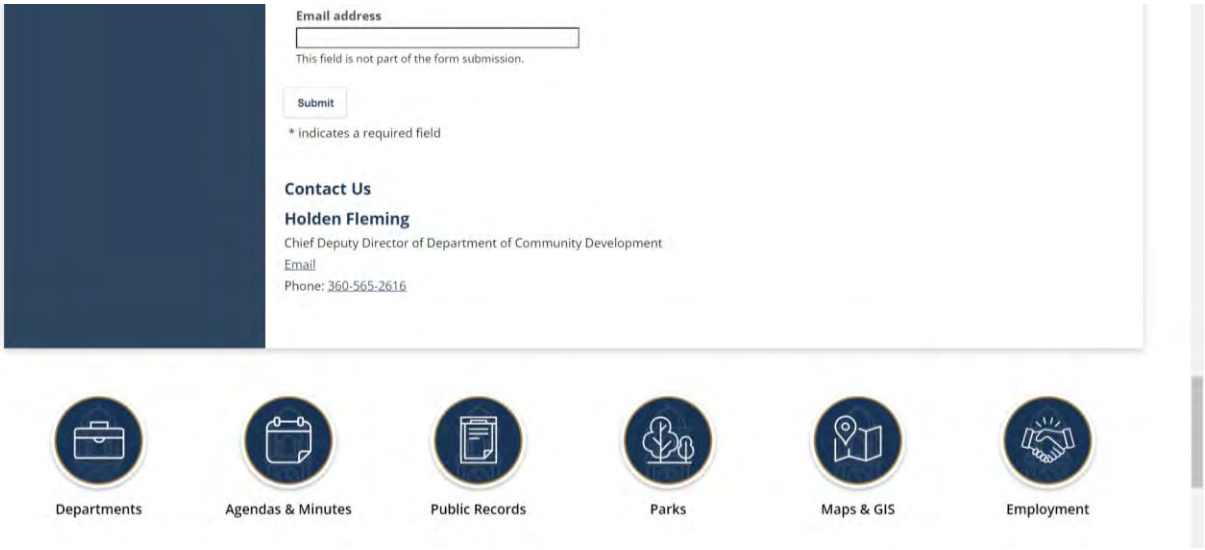
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* indicates a required field
Contact Us
Holden Fleming
Chief Deputy Director of Department of Community Development
Email
Phone: 360-565-2616

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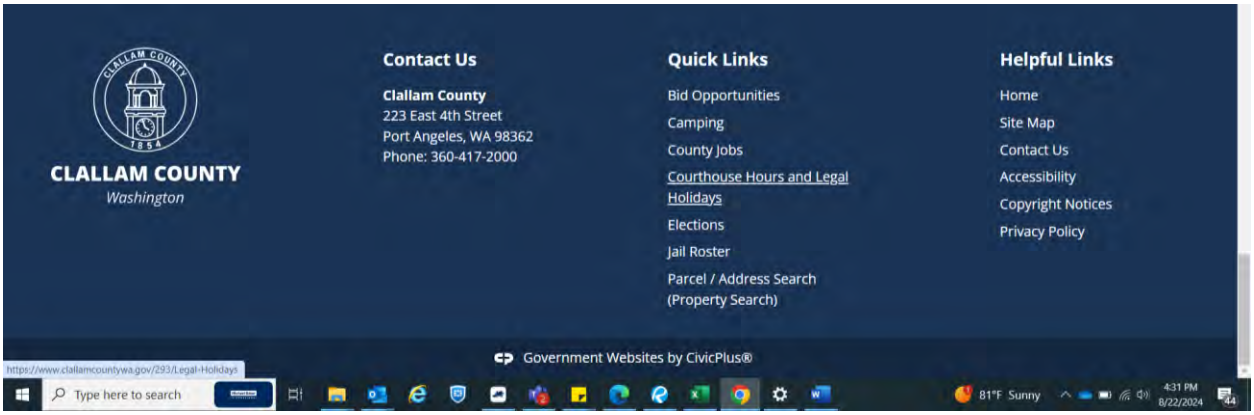
CLALLAM COUNTY
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Port Angeles, WA 98362
Phone: 360-417-2000
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Camping
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Government Websites by CivicPlus®
https://www.clallamcountywa.gov/293/Legal-Holidays
Type here to search
81°F Sunny
4:31 PM
8/22/2024

APPENDIX C.2

MJHMP Survey Notice, Summary and Results

Clallam County Sheriff's Office

WASPC Accredited Agency

223 East 4th Street, Suite 12
Port Angeles, WA 98362-3015

Administration: (360)417-2262
Fax: (360)417-2498

https://www.clallamcountywa.gov/497/Sheriff
sheriff@clallamcountywa.gov

Brian King
Sheriff

Lorraine Shore
Undersheriff

Amy Bundy
Chief Criminal Deputy

Elizabeth Waknitz
Chief Civil Deputy

Don Wenzl
Chief Corrections Deputy

FILE: K34.15

NEWS RELEASE

Day & Date: March 12, 2024
Release: Immediately

Contact: Lorraine Shore, Undersheriff
Lorraine.shore@clallamcountywa.gov

CLALLAM COUNTY HAZARD MITIGATION PLANNING COMMUNITY SURVEY

The Clallam County Sheriff's Office, Emergency Management Division, has many emergency planning and preparedness responsibilities. Among these tasks is keeping current the Clallam County Multi-Jurisdictional Hazard Mitigation Plan. This is a federally approved plan that examines the vulnerable hazards we face in our area and identifies ideas and thoughts on projects to prepare and mitigate the danger to our community and perhaps reduce damage to infrastructure. Having this approved plan in place enhances the ability for government entities and others to be eligible for grants to address these problems.

The Hazard Mitigation Plan is updated every five years. This year, we are pursuing an updated multi-jurisdictional plan that will include all our cities, the Lower Elwha Klallam Tribe, the Jamestown S'Klallam Tribe, Clallam PUD, Peninsula College, and the Port of Port Angeles. Numerous other stakeholders are also working with us as part of a Steering Committee that include fire districts, emergency management planners, hospitals, businesses, the Makah Tribe, the Quileute Tribe, the Hoh Tribe, stakeholders from our neighboring jurisdiction, Jefferson County and more. The Steering Committees' input is essential in preparing a robust and effective plan. The public's input in this process is equally vital.

We really want the citizens of Clallam County to be a part of this. So, Help Us, Help You by taking an online community survey. The community survey is available on the Clallam County website https://www.clallamcountywa.gov – just go to the front page under "LATEST COUNTY NEWS" and click on "Survey- Clallam County Multi-Jurisdiction Hazard Mitigation Plan Community Survey."
Or you can use the following direct link to the community survey:
https://clallamcountywa.gov/HazardSurvey2024
Your input is a vital part of the successful development and completion of this plan. The community survey will be available until May 10, 2024. But don't wait, we want to hear from you now!

Hazard mitigation planning is an important part of protecting our community. Not only does it allow the County to receive Federal Emergency Management Agency (FEMA) funding in the event of a disaster, but also lays a plan down on paper as to what should be done in the event of an emergency. As events across the globe have shown, having a plan in place in the event of a crisis can help save lives and money.
This community survey kicks off the planning process. There will be many opportunities for the public to participate, including open house meetings during the summer 2024.

Thank you for your participation in developing and creating this important plan.

Clallam County Multi-Jurisdictional Hazard Mitigation Plan Survey Summary

May 2024

Survey Overview

As part of the Multi-Jurisdictional Hazard Mitigation Plan (**MJHMP**) update development process and the development of the Climate Element for the Comprehensive Plan, Clallam County administered a public survey to gather the community's perspectives about climate risks and hazard planning. The survey was available online from March 6, 2024 to May 10, 2024 and received 619 responses. Survey respondents tended to be White or Caucasian, older, and have higher income compared to the general population of Clallam County. More than a third of respondents (31%) reported they reside in Sequim and 28% of respondents reported they live in Port Angeles. Most respondents identified as residents of Clallam County while 9% identified as business owners.

The results from this survey will help the County understand residents' priorities and inform the MJHMP. Results are summarized below by question. See *Appendix A. Open-Ended Responses* for verbatim responses to open-ended questions and *Appendix B. Detailed Figures* for responses to questions about experiences with each hazard.

Key Takeaways

- Clallam County residents are experiencing and are concerned about natural and human-caused hazards, many are taking action to prepare.
- Over ninety percent of respondents said that they are well-informed or familiar with natural and human-caused hazards.
- Most respondents were moderately or extremely concerned about natural and human-caused hazards.

- More than half of the respondents indicated that they experience power outage, windstorm, wildfire smoke, and winter storms at least once per year or multiple times per year.

- Natural and human-caused hazards are experienced differently, respondents indicated that some members of the community are more vulnerable to hazards and identified several considerations that increase vulnerability, for example age, disability status, and access to transportation.

- About half of respondents have taken steps to protect their home and business from natural and human-caused hazards, citing insurance, fortification, emergency supplies, landscaping, community preparedness, and self-sufficiency as common actions.

- Over half of the respondents have a 30-day supply of food and water at home. Those who do not have a 30-day supply of food indicated that they have not considered it, lack storage, and/or have limited funds to have a 30-day supply.

Survey Results

1. Please tell us what Clallam County jurisdiction you reside in or please provide your Tribal affiliation. (Please select one)

Nearly a third of respondents (31%) reported residing in Sequim, 28% of respondents reported living in Port Angeles, and a quarter of respondents (26%) reported living in Unincorporated Clallam County. See *Appendix A. Open-Ended Responses* for verbatim responses to open-ended response.

Jurisdiction	Responses	Percentage
Port Angeles	176	28.4%
Sequim	193	31.2%
Forks	29	4.7%
Jamestown S'Klallam Tribe	6	1.0%
Elwha Klallam Tribe	0	0.0%
Quileute Nation	1	0.2%
Makah Tribe	16	2.6%
Unincorporated Clallam County	160	25.9%
Other (please specify)	38	6.1%

2. Which of the following best defines your role in your community? *(Select all that apply)*

A majority of respondents identified as residents of Clallam County (84%). Another third of respondents (30.2%) reported they were landowners and a smaller grouping said they were business owners and government employees (9.5% and 10.5% respectively). See *Appendix A. Open-Ended Responses* for verbatim responses to open-ended response.

Role	Responses	Percentage
Resident	520	84.0%
Business Owner	59	9.5%
Landowner	187	30.2%
Government Employee	65	10.5%
Elected Official	13	2.1%
Tribal Member	27	4.4%
Student	32	5.2%
Other (please specify)	43	7.0%

3. How would you best describe your awareness and understanding of natural and human-caused hazards, such as earthquakes, tsunamis, power outages, etc. facing Clallam County? *(Please select one)*

The majority of respondents were well-informed or familiar with natural and human-caused hazards (90.7%).

Awareness	Responses	Percentage
I am well-informed about natural and human-caused hazards.	248	41.2%
I am familiar with some natural and human-caused hazards and try to stay informed.	298	49.5%
I have heard about these natural and human-caused hazards but don't know much about it.	50	8.3%
I am not informed about natural and human-caused hazards.	5	0.8%
I prefer not to say.	1	0.2%

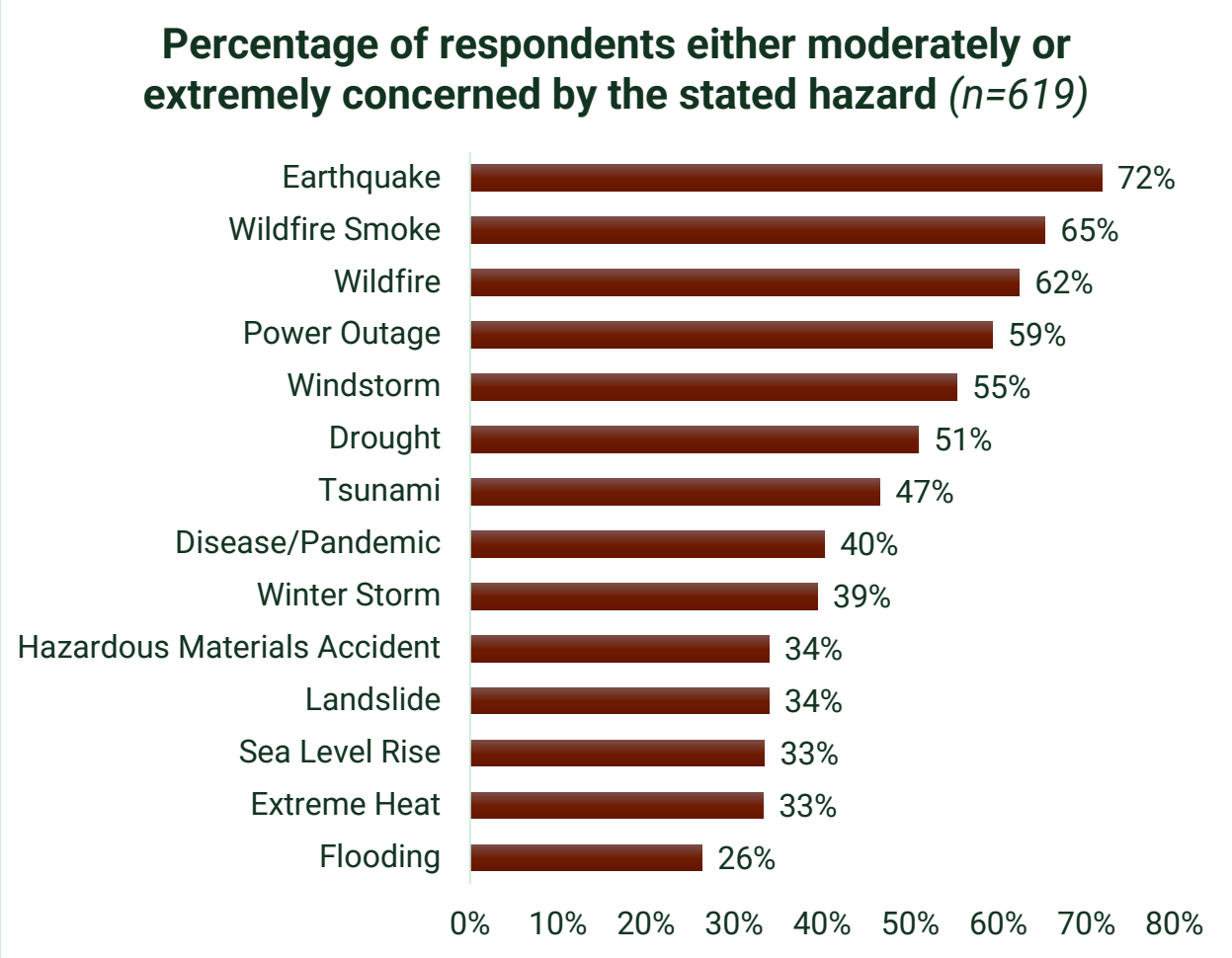
4. Generally, how concerned are you about the impacts of natural and human-caused hazards in your community? *(Please indicate one)*

Respondents were generally moderately or extremely concerned about natural and human-caused hazards (74%), with a smaller portion somewhat concerned (16.8%) and a much lower portion slightly to not at all concerned (9.3%).

Concern	Responses	Percentage
Not at all concerned	14	2.3%
Slightly concerned	43	7.0%
Somewhat concerned	104	16.8%
Moderately concerned	264	42.7%
Extremely concerned	194	31.3%

5. Please indicate your level of concern for each natural and human-caused hazard that may affect you, your household, and your community. *(Please indicate one response per hazard)*

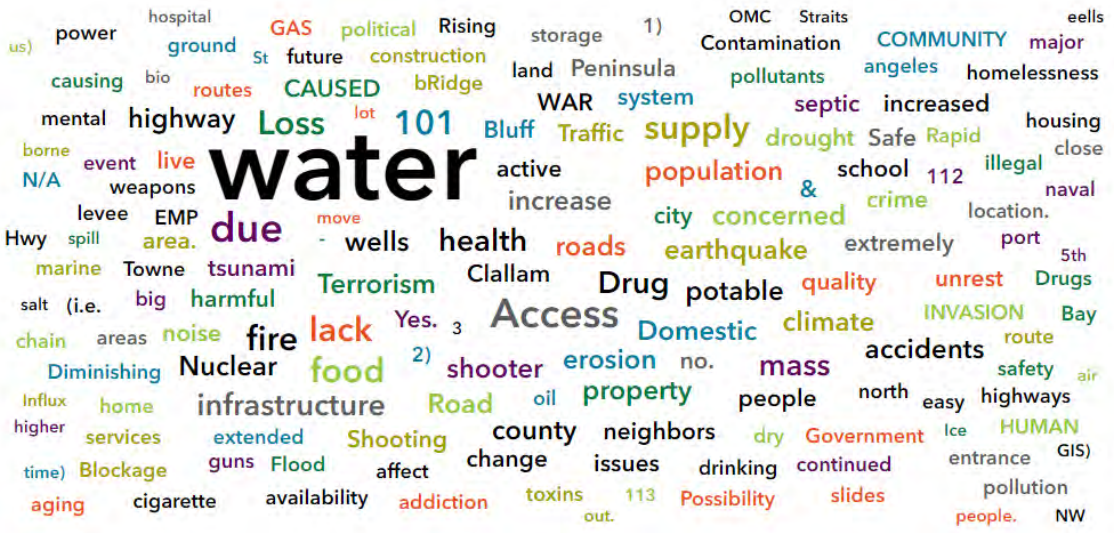
Respondents were extremely concerned with earthquakes (34%), wildfire (31.5%), and wildfire smoke (31%). Respondents were least concerned with extreme heat and sea level rise (19% and 18% respectively responded "not at all concerned"). See *Appendix B. Detailed Figures* for the distribution of responses by each hazard.



6. Are there natural and human-caused hazards that affect you, your household, and your community that are not included in question five (5) above?

The following themes were most cited by survey respondents.

- **Natural Disasters and Infrastructure Vulnerability:** Respondents voiced concerns about natural disasters such as floods, earthquakes, tsunamis, fires, and coastal erosion. Respondents also voiced worry about the vulnerability of infrastructure like bridges, highways, and water supply systems.
- **Public Safety and Security:** Respondents wrote about concerns related to public safety and security, including shootings, domestic terrorism, and drug use.
- **Environmental Hazards and Health Risks:** Respondents raised concerns about oil spills, hazardous waste, and water pollution and contamination.

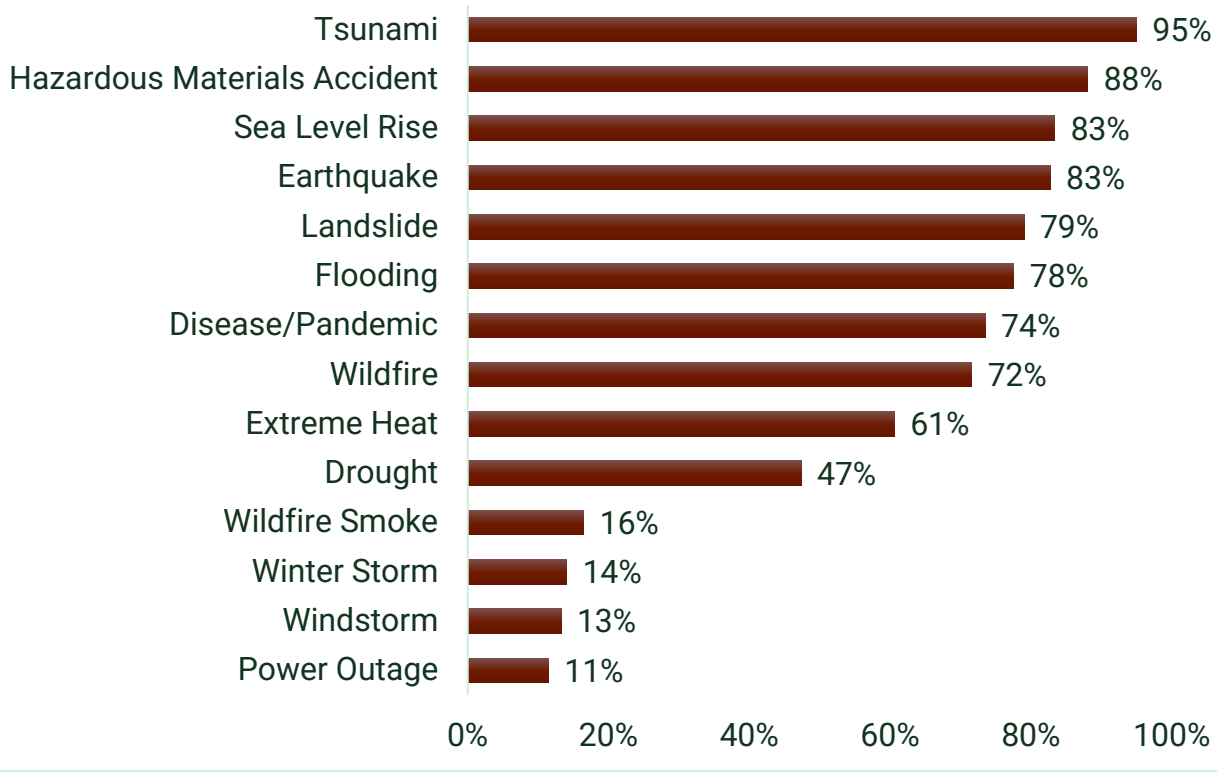


See *Appendix A. Open-Ended Responses* for verbatim responses to open-ended response.

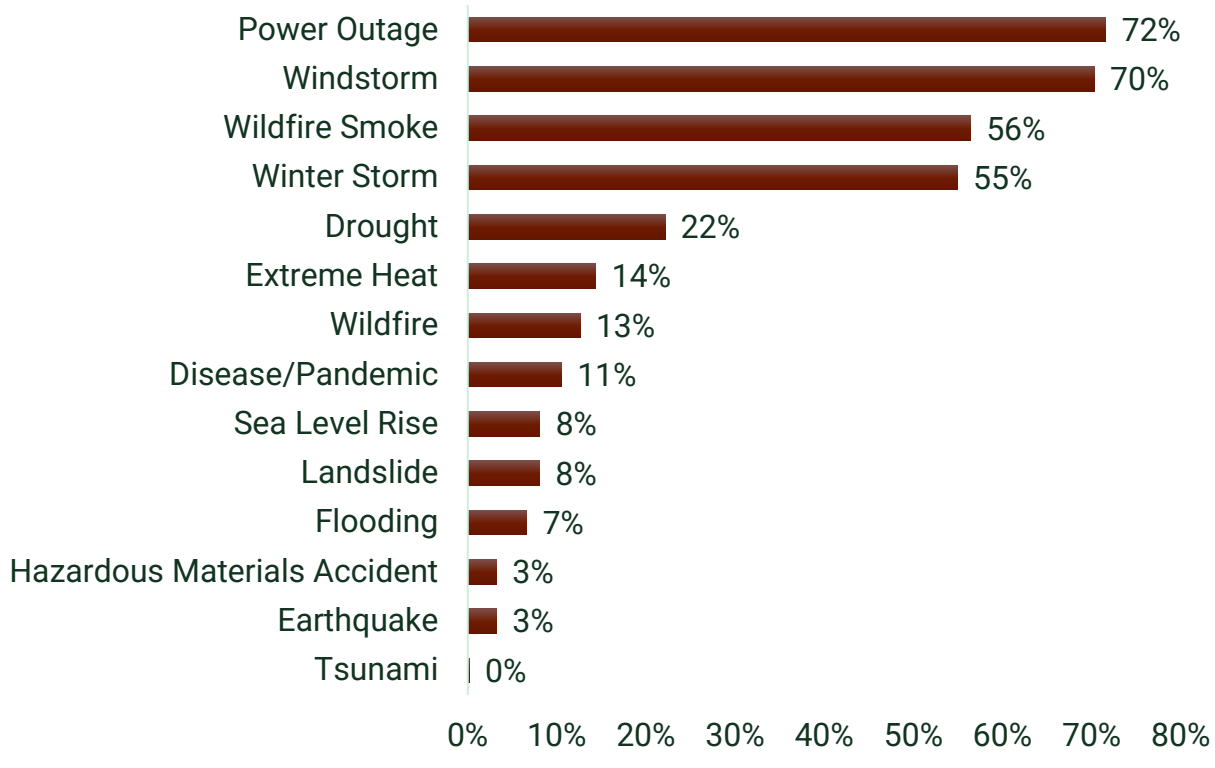
7. Which of the following types of natural and human-caused hazards have you or someone in your household experienced while residing and/or working in Clallam County? *(Please indicate one response per hazard)*

Respondents have experienced windstorms (43%), power outages (39%), wildfire smoke (17%), and winter storms (17%) **multiple times per year** while residing or working in Clallam County.

Percentage of respondents who have experienced the stated hazard either never or once or a few times in my lifetime *(n=619)*



Percentage of respondents who have experienced the stated hazard either once per year or multiple times each year *(n=619)*



Large groups of respondents reported that they have **never** experienced tsunamis (89%), sea level rise (69%), earthquakes (44%), extreme heat (31%), flooding (58%), landslides (63%), wildfires (53%), drought (27%), and hazardous materials accidents (73%) while residing or working in Clallam County.

See *Appendix B. Detailed Figures* for the distribution of responses by each hazard.

8. A number of community-wide activities can reduce risks from natural hazards. In general, these activities fall into one of the following four (4) categories. Please tell us how important you think each one is to consider pursuing. *(Please indicate one response per category)*

Respondents found preparedness, coordination, and response actions as most important (78% of respondents indicated “very important”), followed by education and awareness programs (67%), and local plans, and regulations (59%).

Activity	Not Important	Somewhat Important	Very Important	Total number of responses
Structure and Infrastructure Projects: Construct "brick and mortar" public infrastructure and building improvements to eliminate or reduce hazard threats, or to mitigate the impacts of hazards. Examples- new culverts, stormproof windows, etc.	2%	19%	78%	611
Preparedness, Coordination and Response Actions: Ensure that a framework exists to facilitate and coordinate the administration and enforcement of planned activities. Integrate prevention/mitigation activities into all local community operations.	3%	29%	67%	614
Education and Awareness Programs: Education and community outreach to raise awareness of overall or hazard-specific risk and generate support for individual or community-wide efforts to reduce risk. Examples- school programs, mailed information, etc.	7%	34%	59%	613
Local Plans and Regulations: Integrate mitigation into local bylaws, ordinances, and	7%	45%	46%	606

regulations to protect vulnerable resources and reduce risk. Examples- development restrictions in flood zones, capital planning for mitigation projects, etc.				

9. Based on your knowledge and experience, do you have any project ideas that would better support you, your family, or your fellow community members to prepare for and respond to natural and human-caused hazards listed in questions #5 and #7. Some examples include cooling or warming centers, signed evacuation routes, etc. If "Yes", please describe.

Approximately 40% of respondents answered “yes” and shared project ideas, including:

- Infrastructure improvements, such as alternative evacuation routes, better signage, building retrofits, and road maintenance.
- Community education and awareness, including public meetings, announcements, and school programs.
- Emergency preparedness, including stockpiling emergency supplies and creating shelters or hubs for disaster relief.
- Technological solutions, such as real-time monitoring networks, improved communication systems, and alternative power sources like solar.
- Coordination among government agencies, community organizations, and residents to enhance resilience and emergency response capabilities.

See *Appendix A. Open-Ended Responses* for verbatim responses to open-ended response.

10. Climate change can increase the frequency and severity of natural and human-caused hazards. Do you have ideas for how to adapt to or mitigate the effects of climate change? If "Yes", please describe.

About a third (36%) of respondents answered “yes” and shared project ideas, including:

- Implement water conservation measures and increase water reserves.
- Develop renewable energy power sources such as solar and wind.

- Encourage public transportation and carpooling to reduce emissions.
- Preserve forests and natural habitats to mitigate climate change.
- Educate the public on climate change and climate impacts.
- Promote recycling and composting.
- Improve disaster preparedness and response.
- Expand infrastructure for electric vehicles.
- Address wildfire risks through forest management and community planning.

See *Appendix A. Open-Ended Responses* for verbatim responses to open-ended response.

11. What factors make members of your community more vulnerable during a hazard event? Consider evacuation, sheltering in place, or recovery actions. *(Select all that apply)*

Most respondents said that age and disability status were important factors that increase vulnerability (76% and 71% respectively). Other factors, like lack of vehicle or reliable transportation and chronic illness, were also seen as increasing vulnerability (46% and 49% respectively). See *Appendix A. Open-Ended Responses* for verbatim responses to open-ended response.

Vulnerability Factors	Responses	Percentage
Age (children under the age of 18 or seniors over the age of 65)	471	76.1%
Disability Status (e.g., mobility, sensory, or developmental)	441	71.2%
Lack of Vehicle or Reliable Transportation	282	45.6%
Single-Parent Households	154	24.9%
Income status	246	39.7%
Limited-English proficiency	158	25.5%
Chronic illness	301	48.6%
Living in a vehicle, couch-surfing or temporary shelter or hotel	197	31.8%
Other (please specify)	72	11.6%

12. Is your home or business located in a designated floodplain or flood zone? *(Please select one)*

Most respondents indicated that their home or business is not located in a designated floodplain (83%), with 7% indicating that their home or business is in a floodplain and 10% indicating that they do not know.

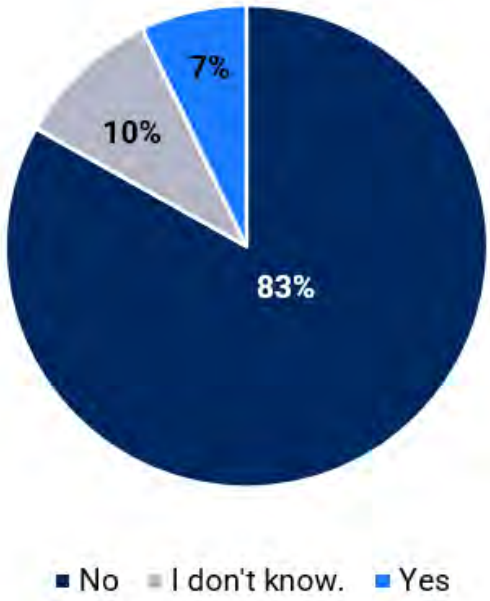


Figure 1: Percentage of respondents with a home in a designated floodplain or flood zone (n=563)

13. Do you currently have flood insurance? *(Please select one)*

The majority of respondents (90%) do not have flood insurance; 10% do have flood insurance.

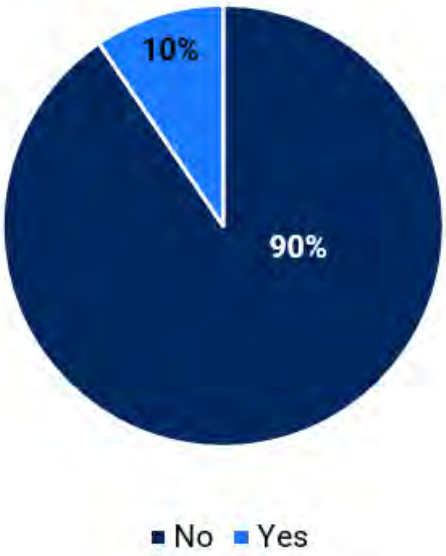


Figure 2: Percentage of respondents that have flood insurance (n=557)

14. Have you taken actions to protect your home and/or business from impacts of hazards? If "Yes", please describe.

About half of respondents responded “yes” (48%). Overall, respondents described taking steps to protect their home and business with insurance, home fortification, emergency supplies, landscaping, community preparedness, and self-sufficiency. See *Appendix A. Open-Ended Responses* for verbatim responses to open-ended response.

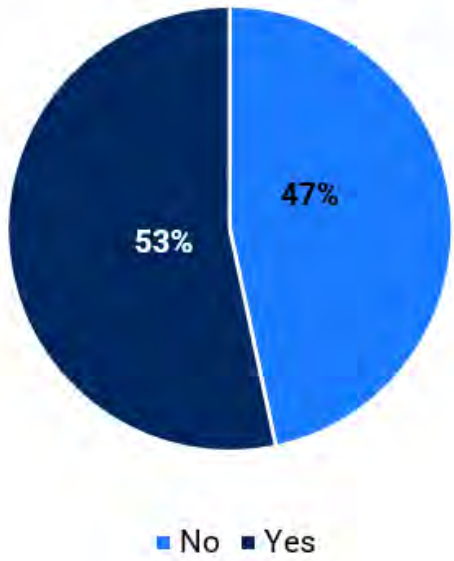


Figure 3: Percentage of respondents who have taken actions to protect home and/or business from impacts of hazards (n=557)

15. Does your family have a 30-day supply of food and water at your home in case of an emergency? ***(Please select one)***

Most respondents (57%) responded “yes,” their family has a 30-day supply of food and water at home.

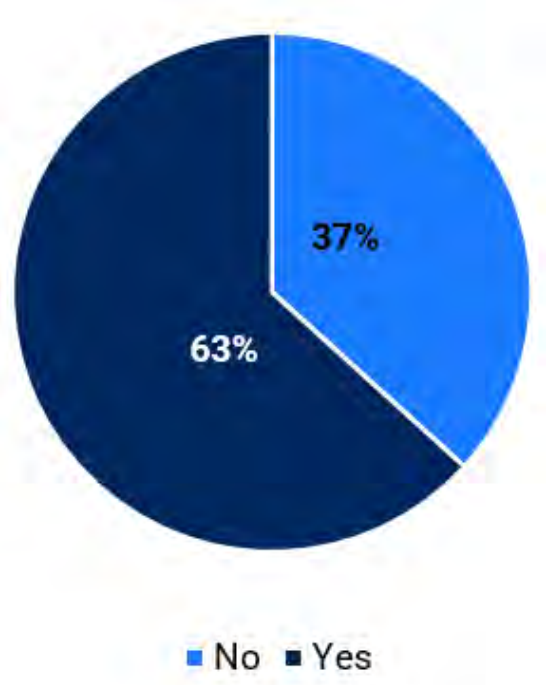


Figure 4: Percentage of respondents who have a 30-day supply of food and water at home in case of emergency (n=561)

16. If you answered "no" to the previous question, what is your reason? *(Select all that apply)*

When answering no, more than a third of respondents indicated that their reason was a lack of storage space for emergency supplies (37%). Another third cited limited funds to purchase emergency supplies (36%) and almost a quarter said they have not considered emergency supply needs (23%).

Reason	Responses	Percentage
Have not considered emergency supply needs.	67	23.2%
Lack of storage space for emergency supplies.	107	37.0%
Limited funds to purchase emergency supplies.	103	35.6%
Not concerned about hazards.	12	4.2%

17. Is there anything else you would like to tell us about natural and human-caused hazards or climate change risks in your community, including ways to mitigate risk?

About a third of respondents (30%) shared additional thoughts and opinions. Key themes included:

- **Preparedness and Infrastructure:** Respondents highlighted the need for improved infrastructure and emergency preparedness strategies. This could include creating emergency supply kits, ensuring multiple evacuation routes,

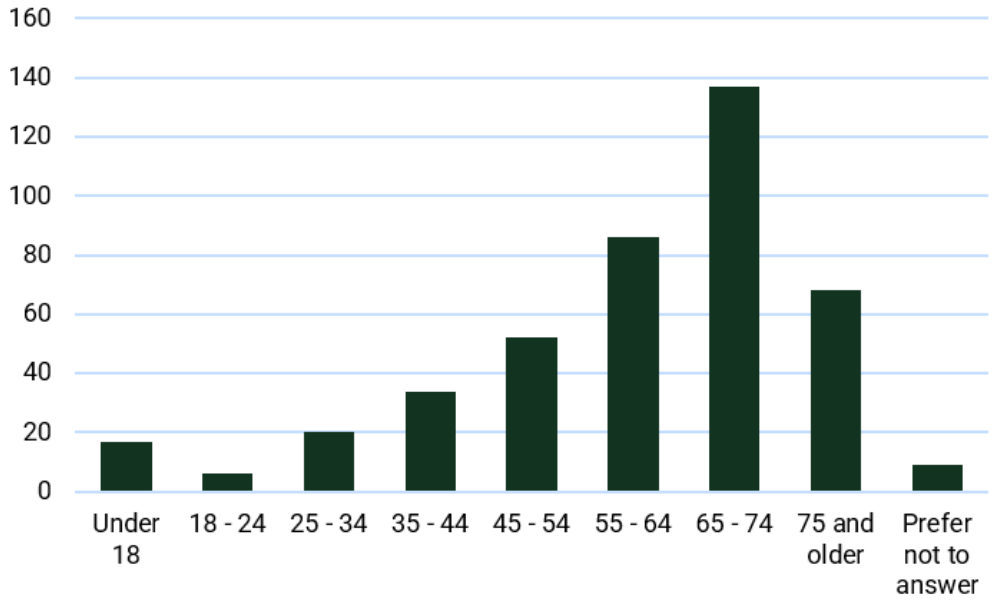
maintaining roads, improving communication systems, improving electrical and water infrastructure, and ensuring that critical services like medical care and emergency shelters are readily available and accessible after disasters.

- **Community Engagement and Education:** Respondents emphasized the importance of increased public awareness and preparedness for disasters. Respondents suggested community education programs, training sessions, neighborhood meetings to review disaster plans, and involvement of local businesses and tribes in training efforts.
- **Support for Vulnerable Populations:** Many respondents stressed the importance of meeting the needs of vulnerable populations, including people who are homeless, disabled, elderly, and without transportation. Recommendations included establishing central locations for homeless support, ensuring accessible evacuation plans, and providing emergency kits to low-income residents. Respondents also suggested specific support for single mothers and mutual aid.
- **Climate Impacts:** Respondents expressed concerns about climate change impacts. Suggestions for increasing climate adaptation and resilience included water conservation measures, wildfire prevention strategies, sustainable land use planning, and development of alternative energy sources. Respondents emphasized the need for long-term strategies to address rising sea levels, flood zones, and other climate-related hazards.
- **Policy and Regulatory Recommendations:** Respondents voiced the need for policy changes and regulatory actions to enhance disaster resilience. This may include prohibiting new developments in high-risk areas, improving emergency communication protocols, and securing funding for critical infrastructure projects. Respondents also suggested policies to mitigate human-caused hazards, like regulating fireworks and controlling deforestation.

See *Appendix A. Open-Ended Responses* for verbatim responses to open-ended response.

18. What is your age group? *(Please select one)*

Respondents were more likely to be older individuals. The largest age group to respond were those 65-74 years old (32%), followed by those 55-60 years old (20%) and those 75 and older (16%).

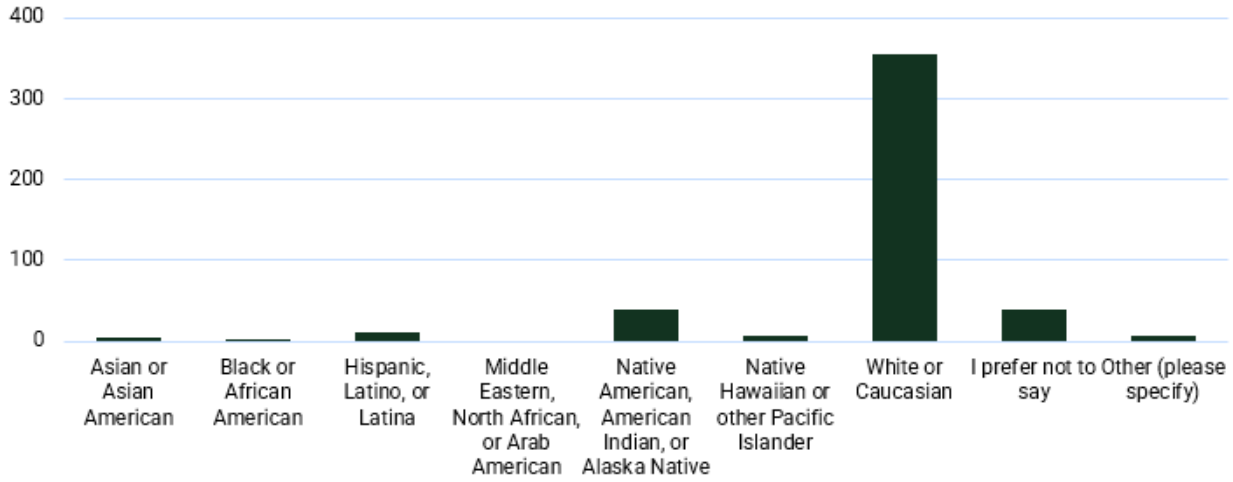


Age Group	Responses	Percentage
Under 18	17	4.0%
18 - 24	6	1.4%
25 - 34	20	4.7%
35 - 44	34	7.9%
45 - 54	52	12.1%
55 - 64	86	20.0%
65 - 74	137	31.9%
75 and older	68	15.9%
Prefer not to answer	9	2.1%

19. What is your race and ethnicity? *(Select all that apply)*

The majority of respondents were white or Caucasian (76%), followed by “prefer not to say” (8.6%) and those who identified as Native American, American Indian, or Alaska

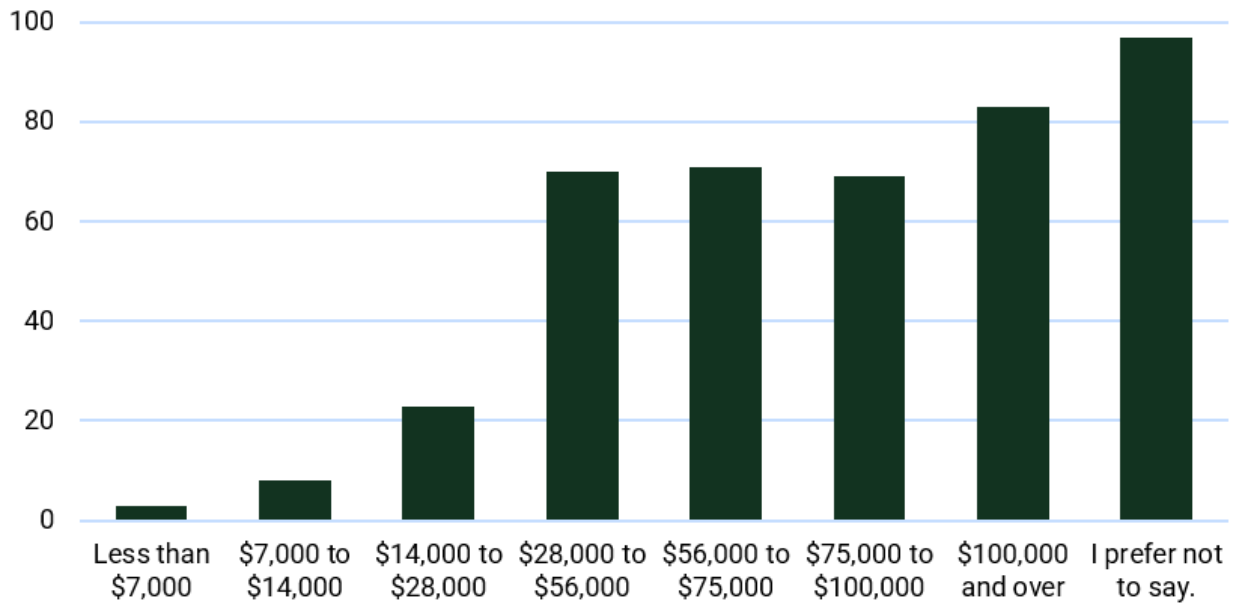
Native (8.4%). See *Appendix A. Open-Ended Responses* for verbatim responses to open-ended response.



Race/Ethnicity	Responses	Percentage
Asian or Asian American	4	0.9%
Black or African American	2	0.4%
Hispanic, Latino, or Latina	11	2.4%
Middle Eastern, North African, or Arab American	0	0.0%
Native American, American Indian, or Alaska Native	39	8.4%
Native Hawaiian or other Pacific Islander	6	1.3%
White or Caucasian	355	76.3%
I prefer not to say	40	8.6%
Other (please specify)	8	1.7%

20. What is your approximate household income? *(Please select one)*

Respondents were relatively spread across the household income spectrum, with the largest group being those who make $100,000 and over (20%), followed by the income bracket levels of $28k-$56k, $56k-$75k, and $75k-$100k each having a similar level of representation (~16%).



Household Income	Responses	Percentage
Less than $7,000	3	0.7%
$7,000 to $14,000	8	1.9%
$14,000 to $28,000	23	5.4%
$28,000 to $56,000	70	16.5%
$56,000 to $75,000	71	16.7%
$75,000 to $100,000	69	16.3%
$100,000 and over	83	19.6%
I prefer not to say.	97	22.9%

Appendix A. Open-Ended Responses

This appendix includes all **open-ended survey responses verbatim**.

1. Please tell us what Clallam County jurisdiction you reside in or please provide your Tribal affiliation. (Please select one)

Response	Number
Clallam Bay	11
Joyce	3
Clallam Bay	2
Diamond Point	2
Joyce	1
Clallam bay	1
Jefferson County/ Discovery Bay	1
Puyallup tribe	1
Visitor every other month	1
Unincorporated area north of Sequim near the Dungeness River	1
makah and cherrokee	1
I have a Sequim mailing address 98382 but I live in at the far west edge of Jefferson County. I am a member of Sequim Cert under CCFD3.	1
no one	1
Alaskan Native	1
Neah Bay, not a tribal member	1
Boarder with Jefferson	1
Diamond Point	1
Clallam bay	1
County Area in Sequim City Area	1
I am on a CCFD3 CERT team, I am your grey area, I serve Clallam, mail address Sequim, County Jefferson with no access to Clallam EverRidge Code alert. Emergency Management Dept states it is a program issue cannot change.	1
Bell Hill	1
We own a home in Port Angeles, and rent a home in Sequim	1
Dungeness	1
clallam bay	1

2. Which of the following best defines your role in your community? *(Select all that apply)*

Response	Number
volunteer	3
School Employee	2
Volunteer	2
CERT	2
Nonprofit human services employee	1
CERT member	1
retired, but volunteer with Clallam Marine Resources Committee, Olympic Climate Action, and CERT	1
teacher	1
EMS	1
Member of community preparedness groups.	1
Senior citizen	1
I live between the city of Sequim and the city of Port Angeles, although my zip code is the one for Sequim. I think that makes me "unincorporated" but I'm not sure.	1
Active in CERT	1
Land-based non-profit director	1
Teacher	1
Visitor, have Family Members who live in Port Angeles	1
CERT member since 2015	1
Sequim CERT member under CCFD3	1
CERT member, CCFD3	1
voter	1
Sheriff's Department EOC and ARES Volunteer	1
Chief Operator, KSQM	1
CERT	1
Advocate and member of Center for Responsible Forestry, Olympic Forest Coalition, Olympic Climate Action	1
Tribe Employee	1
I am a volunteer with the Sequim Operational Area Community Emergency Response Team (CERT) program.	1
County volunteer (CCMRC Committee)	1
Surveillance technician	1
VOLUNTEER LEADER	1
Professor of geology, Peninsula College, I give public lectures on the coming Cascadia Earthquake	1
Special Education Teacher	1
Special Deputy Cold Case Unit Clallam County Sheriff’s Dept	1
Resident and CERT	1
Community Volunteer	1
CERT member in a housing project with 115 lots along Hwy 101.	1

Response	Number
retired Jamestown Elder living in Jamestown	1
Senior citizen still working	1

6. Are there natural and human-caused hazards that affect you, your household, and your community that are not included in question five (5) above?

Response
No [33 responses]
Domestic terrorism
Domestic terrorism
Influx of unvetted people.
Extended loss of access to Highway 101 - only one way in and one way out
Autonomous and Drone-based Weapons like those used in the Putin's invasion of Ukraine
Bridge vulnerability condition/age
Access to tsunami routes as well as fire department access are currently blocked due to the Towne Rd north access being closed.
(Follow GIS) concerned about OMC buying & developing at their current hospital location. Shouldn't they have been focusing on higher up? When the big earthquake happens (just matter of time) that area will be the first to be submerged
An oil spill in the Straits can have significant harmful health impacts. Benzene and other air borne pollutants can affect the nervous and pulmonary systems. People should be prepared to move upwind and as far away as possible from source contamination.
Seasonal population fluctuations
poisoned food supply
Transient population, Mental/Behavioral population; Unsecured weapons; Food Desert;
Crime, Animal encounters (bear and cougar), plastic and chemical pollutants, traffic, established wells dry due to new construction and increasing depth of government weld, salt water incursion in eells
Drinking water contamination
I am concerned about over harvested timber managed by DNR and the depletion of mature legacy forests along riparian areas and continued diminishing wetlands estuaries.
flood
I live in an elbow of the Clallam river. It has flooded under our house, it will do it again.
The future of potable water and population growth here.
rapid regional population increase

Response
drug needles bio toxins in the ocean
Active shooter
Increase in social/militant agitation
Drug addiction epidemic to which I am extremely concerned.
Solar flare EMP
Yes. Loss of easy access on and off the peninsula…road and hood canal bRidge failures
Bluff erosion
yes. tire waste storage and open leaking broken egines at 101 E 5th St Port Angeles creating enviromental damage, city will not do anything, big fire hazzards at same property due to illegal activities and trash storage
Infrastructure (Bridges and highways at risk of separating home from any viable alternate route
The possibility of nuclear war
only one main road from port angeles to sequim, need more than one exit route
Ice storms
Climate change....which is linked to or may exacerbate all but 3 of the items in #5.
vehicle exhaust
idk
Fires
Property investors profit motive undermines the availability of housing and affordable housing leading to artificial scarcity and an increase in the unhomed.
Terrorism; targets could be the Coast Guard Station, Pacific NW Nat Lab, Electrical Substation at Snow Creek, any municipal, federal or P.O. location.
No, but the topic of drought is especially concerning for our area. The glaciers are melting, and we lack infrastructure to store our winter waters. I wanted those dams gone, and have worked of the Elwhas restoration, but we need a way to replace the wate
No
1) Guns and irresponsible owners. 2) illicit drug production/availability
Invasive species
Safety from rising crime
water quality (drinking water as well as freshwater and saltwater habitat)
active shooter, political extremism, not enough doctors for emergency,
School shootings/violence
social/political disturbances
potholes in the roads
no.
My husband works on the waterfront in the marine industry and oil spills are a concern.
Old people driving

Response
Neighbors gunfire
Rock slides and land slides on Highway 112
Bluff erosion
Collapse of the US dollar
Nuclear war
Towne Road should not be extended onto the levee for the purpose of tsunami evacuation. The levee, and particularly its north entrance are fragile in the event
Traffic accidents due to uncontrolled intersections.
Flood
Safe and sustainable well/drinking water
overreaction to everything by community officials
Sudden loss of water for a continued period (not drought related)
Rampant crime and lack of police order
The clear cutting above our park has put us endanger flooding which will cause problems with out septic system and possible mudslides.
yes the crackheads/tweakers/ methheads or meth vans jus drugs in general
Too many rules regarding water usage in Clallam County (i.e., the "Dungeness Water Rule" is a human caused hazard). And, lack of local (to us) awareness of a communication and/or food and water distribution plan after stored supplies run out.
Access to medications and medical services in an event
Junkies and their garbage health hazard. Seems like an easy fix unlike other priblems
Piping the ditches
We have had several gas explosions recently. Is there more ways to prevent these?
Rising homelessness and need for mental health treatment.
potable water shortage
not sure
Groundwater pollution and water supply safety
Can't think of anything right now.
The naval base makes our region a potential target. It would be nice to have a warning system in place for those threats.
so many wells in the County overtaxing ground water. Wells runnin g dry.
Zombies
Lack of socialization causing greater mental and physical health issues
Vital businesses that cannot operate such as gasoline stations or stores.
Fire caused by highway-traffic; i.e. dragging chains, lit cigarette butts, etc.
Internet/telecom outages, supply chain blockage (transport of goods)
drug attics and people who smoke weed and other stuff.
Navy Growler planes causing adverse health effects on flora and fauna on land and over ocean. Noise, fuel pollution, EMF
nope, my home is fine
Mass shooting

Response
Civil Unrest
Bluff Erosion. Aging Power & Cable lines that are not well maintained and not buried.
COVID
Limited evacuation routes with limited capacity, especially during tourist season
accidents on hwy 101 that can close the roadway for hours/days if needed
active shooter, mass shooting, political unrest
Mass Shooting
Fireworks discharge in extremely dry areas. Firearms being discharged in areas of the county where it is no longer safe due to increased housing.
Rapid erosional events (channel migration, marine shoreline erosion, etc.): We removed natural structure from our ecosystems and allowed construction of infrastructure within dynamic erodible landscapes resulting in loss of infrastructure.
illegal dumping of hazardous materials (Midway Metals) overloaded septic systems where mutiple trailer/mobile homes are connected to one septic, water table drawdown
Climate change driven reduction in potable water supply is extremely concerning separate from a drought condition.
Vigilantism, militias, violent extremists
Loss access because failure of HW 101 major break and isolation
Commercial truck delivery services on the peninsula and availability of HC Bridge.
I live in diamond point, there are no working fire hydrants should Miller Peninsula SP be developed and allow campers and cigarette smokers who n the Park.
mass shooter events, mass highway accidents, highway infrastructure failure without an earthquake, public building (i.e. school, city hall) integrity post-earthquake
Food security
Coastal erosion, not as a direct result of sea level rise
no water due to old city water pipes that our water comes from
Diminishing ability to have sufficient amount and quality of water for the area.
Climate change
Drunk drivers
Yes. Clear-cutting the forest. Safe road entrance off roads such as Old Gardiner that are sharp angles that create blind spots and accidents.
n/a
Challenges to food resiliency and potable water souring.
crazies on the loose-zombies
water, sewer line breakages
Fire
Water concerns for toxicity/hazardous/contaminated
EMP
Government

Response
HUMAN CAUSED DESTRUCTION, WMD, GAS RELEASE, WAR, COMMUNITY INVASION BY THOSE WHO HAVE WALKED IN THE SOUTHERN BORDER
Cyber attacks
Chem trails from massive increased flight pattern over county
tsunami, fire, earthquake and power outages. But they don't keep me awake at night.
Tourism impacts on tribal resources
The aquifer not being able to sustain all the domestic wells in the Dungeness River watershed.
Drug addiction & homelessness
surving if Peninsula is cut off from rest of State/world
Drugs, roads, lack of support, destruction of schools and property because of negligence by the superintendent of CFSD prioritizing Neah Bay over Clallam Bay, zero infrastructure or rehabilitation of roads on 112 and 113
The reservoir on Reservoir Road is just above my house. If it toppled over or sprung a leak because of earthquake or other disaster, the water would engulf my home.
Excessive, harmful noise levels from naval growlers.
I hope that it never happens, but with the upheaval across the globe, I am also concerned about armed conflict.
firearms and lack of respect for law and lives by men who carry and worship guns
toxins, bacteria, harmful elements in our food or water
Na
An increase in pest hazards such as more wasps and toxic weeds.
Our trees have been dying rapidly for the last few years (esp. red cedar) and we do not have the resources to remove them
wing walker bi-plane noise
The declining snowpack's affect on future water/stream supplies.
Cascadia Subduction Zone
Social unrest
Nuclear weapons, accident or attack, at Indian Island or Puget Sound
N/A
Cell reception during a hazard
Human-Caused hazard - The single lane highways that get us on and off the peninsula. Both cause EXTREME concern to our family. If anything were ever to happen, it would likely be incredibly difficult if not impossible to get out of the area.
Traffic accidents along 101, Ferry schedule issues
Water supply due to declining snowpack and other impacts from climate change
Nuclear actions/accidents
1) WSF system decline 2) National and global supply chain issues
Contamination of aquifers by heavy metals and poisons due to poor enforcement and oversight of manmade threats (dumps, farming and industry)

Response
Homless scumbags that are not from PA. Criminals with guns. Laws restricting what I can do with my property.
Domestic Terrorism or Criminal Terrorism
Neighbors use of propane
Blockage of Hwy 101
Fireworks
Yearly increased property taxes becoming unaffordable
Riot's, marauders, random attacks by the insane
Loss of ground and stream water
Access to West End. Concern is aging bridges, pipes and other DOT infrastructure.
Possibility of carbon monoxide given proximity to school bus parking lot where engines are often left running for long periods of time. Also concerned about neighbors who live close to major propane facility in case of explosion.
bad drinking water quality

9. Based on your knowledge and experience, do you have any project ideas that would better support you, your family, or your fellow community members to prepare for and respond to natural and human-caused hazards listed in questions #5 and #7. Some examples include cooling or warming centers, signed evacuation routes, etc. If "Yes", please describe.

Response
I support the reservoir water storage project.
diy effective smoke filters info to community; energy/water ed for emergencies (safety/survival around basic needs))
alternative routes from Port Angeles to Sequim If and when Sutter rd to Mt Pleasant rd anything inbetween those becomes impassible. There has to be a better option than going all the way around the mountains which in many cases would not be possible.
Liquifaction awareness
I would be available for planning and volunteering
I think the map that shows what parts of town will be underwater if a tsunami hits would be beneficial to have somewhere in the public. Perhaps down by the harbour.
Community center for neighborhood that could be stocked up for disasters
We live on a dirt road of 9 houses. We've set up a text/phone tree to check on each other. We personally have stock piled water and food for 100 days. Every 90 days, we practice immediate hook up of our trailer for bug out. We try to encourage neighbors .
Microgrids for the West end of Clallam County

Response
Shelters for housing loss or cut off during natural disaster
We need more water capture. Relying on snow melt and glacier melt is not going to get us into the future. Additionally we need better education on water reduction, and enforcement of water restrictions.
For The Big One--earthquake and tsunami--I fear the lack of of travel infrastructure: Will all the bridges on 101 (or 101 itself) collapse or be damaged, essentially trapping us and making aid difficult? I'd love to see plans for alternative routes
Send out more literature about these issues to the public. Ie: social media, electric bill statements with literature, and other material for community meetings. To draw awareness for preparedness. Follow CERT Program.
Establishing supply routes to also include Jefferson County, should we become stranded on the peninsula
Better dissemination of natural/human hazard preparedness information to residents
Set up a more functional and city wide alert system for Tsunami. Current once cannot be heard downtown inside any buildings. Spread speakers throughout the city with a very loud sound.
develop a realtime monitoring network for weather --precipitation, streamflow, wind etc?
Building codes that would reduce Earthquake damage, public education regarding Earthquake retrofitting & funding to encourage it.
Ability to communicate when normal communication methods are out of commission.
Paved and signed evacuation routes i.e. many evacuation routes use logging roads. These should be improved to ensure access when needed.
more climate action, cooling and warming shelters, current capacity depressing. Housing and food access on daily.
Adding stop signs to uncontrolled intersections with high traff like 6th and Chase
improved tsunami messaging-- can hear alarm from my house (monthly testing) but spoken message is unintelligible- improve in some way? Tests don't deliver to phone/app alerts-- testing to include app alerts would let people know app is set up correctly.
Off the grid power generation and telecommunications. Train your police for drone swarm warfare.
Large scale water storage reservoir(s) and small scale cisterns, centers organized for those needing warming/cooling/relief from smoke
Update the stormwater/sewer system in Port Angeles so it can absorb our growing population.
Rainwater collection, plant fruit and nut trees on all public paces where they will mostl likely thrive, multiple "city garden" plots of land, including shared gardening tools and materials, cummunity skill-swap events
Buy or construct and store temporary bridges that could be used to maintain ability to move supplies and emergency personnel.

Response
Relocation of school campus, clean water supplies/system
Join CERT
Need laws to conmandeer heavy equipment and stockpiling coverts bridges and power towers for more rapid return operational status
place large sealed potable water canisters or barrels up at the top of tsunami evacuation routes.
Have food and water at your house, most important the county could do is set up a medical tent at the airport.
Wildfire planning.
Retrofit /condemn unreinforced masonry buildings, rezone all tsunami & liquefaction zones, better public education, better local mapping & identification of active faults, landslide areas, etc.
PERFORM SEISMIC RETROFIT OR UPGRADE ALL SCHOOLS IN THE COUNTY FOR USE AS EMERGENCY SHELTERS.ON ALL SCHOOLS
We need to continue to educate community members about the natural hazards associated with climate change and the natural hazards present on the Olympic Peninsula.
There needs to be a much louder effort to engage community members in preparedness for the CSZ earthquake and tsunami
Free workshops on emergency preparedness, maybe 2-3 hours long. Need to have broad announcements about workshops - send to Sr centers, school districts, etc. to include in newsletters
Fire breaks, forest tinder management, development restrictions in risky areas
how to landscape and keep their land more resistant to fires, 24 to 72 hour emergency preparedness and provide low cost kits to community members. Enhance city and county infrastructure rehabilitation.
Shelters for cooling, warming, evacuation with generators! Immediate food/medicine drop & distribution for areas cut off by downed bridges due to earthquake. ID elderly. ID "EMERGENCY THINK" so buses can be crowded, hunting ok out of season, etc.
better response for short-term, sudden incidents. Long range planning and coordination seems good to me but I've witnessed some fails in the short-term. This is especially true with volunteer groups such as CERT.
enforce existing codes in PA, address hoarding and drug houses that increase the fire hazzard risk and enviromental damage
Local power generation NOT including Solar or wind, maybe small nuclear
A second east bound way out of Port Angeles. A single gravel lane, occasionally maintained but block from public use except in the event of a loss or closure of Hwy 101. Possibly from Mt. Pleasant to Deer Park Rds.
All power lines should be underground
creat hazard zones to integrate into planning overlays, with associated permitting requirements

Response
Earthquake preparedness classes, including topics on how to increase your home's resilience to damage.
more auto escape routes in earthquake tsunami forest fire
Being limited to 255 characters doesn't allow for me to give my complete thoughts. I will sum it up by saying Diamond Point is a lot like Paradise California (Camp Fire) with our 1 road in & out, heavy trees &, above ground power lines, etc
Public Service Announcements increasing awareness of CERT
WE NEED THE TWEAKERS CRACK HEADS AND METH HEADS GONE
Earthquake resistant bridges and better emergency distribution of goods after an earthquake
More buildings for folks to gather if and when they are forced out of their homes due to the effects of earthquake or other natural disasters.
Online maps of emergency centers where food, fuel, heat, water can be obtained
support resilient local communications infrastructure. Build a community storage facility for supplies. Promote community relationships that foster collaboration in
Stop trying to scare people about everyting. HAve a simgle guide available to all with a list of resources, a list of "things to have on hand", a list of emergency contacts.
warming center
Pre-staging disaster supplies in strategic locations around the county in areas that will be cut off from contact in the event of a disaster.
Why are CERT classes only offered on the east end of the county? This seems backwards. The West End is more likely to be cut off from help. People here are helpful, let's teach them them what to do.
Improve community-centered responses in areas where people may not be able to easily access shelters or other emergency responses.
Bonneville crews nearby
How to obtain reasonable cost shipping containers for large community storage for food, drink, equipment at outer ends of the counties.
More education on the change of a major cascadia event. Update Tsunami maps. Establish a Volunteer Medical Corp so we have medical help in case of a disaster (maybe partner with Jamestown)
Protected (earthquake 'proof') back-up generators in small communities and cities to provide backup power/water in case of a catastrophic event such as a 9.0 earthquake.
Prepare to be ready to make decisions for my neighbors and my survival by having water, food, meds, etc. on hand, having escape routes planned, and heed instructions from fire, police and other emergency personnel.
Events to get people started with emergency kits for home and car. start with bins/bags and laminated lists, hard drives and computers to upload vital records, water filter straws, etc. Check back with them to see what help they need to finish the box.

Response
Hwy 101 from Port Angeles and Sequim metro areas: all converge into a two-lane highway out of the area. We are crippled trying to get out of the area for a disaster. We need a secondary road system when Hwy 101 is inaccessible.
-More water storage, wind power
Create a BELOW GROUND RESERVOIR for use by farmers to supply their needs without degrading the river habitat for salmon. New public buildings in or near tsunami zones should be designed as tsunami refuge especially for aged and disabled residents.
Evacuation routes and evacuation centers
Already submitted to HMP steering committee
Climate Resiliency Plans for all cities in Clallam Co.
Construct or remodel structures that can act as cooling, warming, clean-air, and community resilience center in as many local neighborhoods as possible. Because power outages my co-occur with other extreme events these centers should be microgrids.
warming centers, clean air (actual purified/filtered air, not just indoor) centers during wildfires
Need for more fire hydrants in our area
Increased data on hazard prone areas (LIDAR floodplain mapping, downtown protection structure surveying, infrastructure seismic updating)
Create more reserve water catchment to catch the snow melt from the mountains
Warming/cooling centers,evacuation routing w/planned routes ahead of time.
Solar power grid
A comprehensive county wide disaster awareness & preparedness campaign, using a 9.0 earthquake scenario model as a target event.
More outreach by CERT, discount pricing on emergency foid items
Continuing maintenance of the Discovery Trail to avert landslides.
Support for residential solar and distributed power grid and backup batteries.
Landscaping for drought conditions and wildfire resistance - public education and demonstration
Educate local governments about water use, grants to improve/ See 17
For tsunami evacuation building infrastructure such as tall platforms that people and livestock can congregate on in sudden emergency. Build a few of these massive structures complete with huge elevators and wide easy to negotiate steps
Educating the community is essential. I continue to learn great deal through my involvement with CERT. I think any support the county can offer CERT and other community awareness efforts would be very worthwhile.
Water use education. Decrease in snow pack is one of biggest threats.
Better door to door training and communication

Response
Identify forest service roads that can be used for transportation and/or evacuation should Hwy 101 not be passable. Provide a map to residents of what areas of the county will most likely be effected by a tsunami.
Using various areas such as the high school, the fair grounds and areas both east and west of town for fema disaster relief
Too many to list here, worked Major disasters in a law enforcement capacity
Enforce building codes that require constructing buildings to better withstand earthquakes, etc., and do not allow construction in sites that are most susceptible to flooding, landslides, etc.
Frontage road ending at Palo Alto.
Additional water storage for Clallam County communities to deal with climate caused poor snow pack and early melting snow.
Better signing for evacuation routes.
Resilience hubs; a plan for energy resilience in our county
Since west end of the county can easily become an island in a natural disaster there needs to be caches of food and emergency supplies throughout the area.
County should have emergency supplies of food, water, shelters available for a 6 month emergency. not restrict water wells, emergency shelters etc. A 1 years supply of propane should be stored in a barge, for emergency use.
Part of Map Your Neighborhood in our area
A plan for ensuring water for a growing population on the whole North Coast. We are having longer drought periods, less snow pack, variable rainfall, and no reservoir to hold runnoff.
needs to be a strong defense / protection from unvetted people, without all else is a moot point.
Make sure citizens know where to get help and what WON'T happen in the event of an emergency. Some folks have high expectations on support, based on where they used to live. We're not Seattle.
Address the threat of nationwide fire setting arson terrorist attack. We have no way to prevent or stop a nationwide arson attack? It is what I would do if I wanted to hurt this country and that scares me a great deal.
Not sure if this is what you are looking for but structures are needed for evacuation for schools, houses, and businesses located in Tsunami zones
Water reservoirs throughout the county
Clear cutting is a disaster for the community, it causes erosion, flooding, possible landslides. It is a blight and an eyesore on the community. Also our community does not have a firehouse in working order. Our neighbors house burned to the ground.
Reduce wasteful utility usages
Enact changes to water law and treat water sourcing as a zero sum game
build critical infrastructure like fire, health care and police above the flood plain

Response
Coordination of local groups, meeting places, site-specific planning for fire safety and evacuation. Our roads are not designed for mass evacuation and upcoming road work and roundabout construction is only going to make matters worse.
More shelters people to drive the most vulnerable residents to them. Also programs to provide elderly residents access to portable air conditioners during heat episodes.
No more bulk heads, promote natural shoreline armoring, educate and start implementing water conservation. Promote native lawns that need watering and stop lawn watering especially when that watering is hitting roads and sidewalks. Stop floodplain buildi
Strategic farmland preservation for future food production and identify strategic water sourcing.
Practice more
1. Being better prepared for the Cascadia Event. 2. Better planning for sea level rise and storm surges from Climate Change.
Pave Towne Road immediately for alternative escape route and emergency services to reach us. Month long construction at Sequim-Dungeness/Old Olympic has snarled traffic, Towne Road is closed leaving only Cays. More escape routes the better.
Maintain logging roads. Help homeowners update earthquake safety of their homes. Food & water reserves in community groups. Protect food, fuel and medical (pharmacies) stores. Make fire stations earthquake resistant.
EMS and medical services, fuel, food and elder care.
Snow removal equipment to allow myself and my neighbors to get out.
improve early warning system (siren/message) for earthquake/tsunami event
Arsenic mitigation in private wells. The area is contaminated and needs to be addressed as a risk for anyone using unfiltered well water for personal consumption
Retrofit of the larger public water systems for resiliency: seismic (distribution), drought (source) and power outages (pumping).
Please provide alternate routes of escape from the peninsula in case of Cascadia earthquake
Require Bonniville Power to clear ALL trees that can impact their feeder lines to NW WA.
Identified evacuation routes for wildfires. Warning systems at firehouse identifies type of hazard. Different responses for different hazards.
support farms to produce food, create water storage areas throughout the county, rethink housing and lot sizes over 1/2 acre, too big!
Emergency water and food resources Forest cutting practices.
BurBury power lines along Diamond Point Road
integrate businesses with heavy equipment into a plan to clear debris from roads and clear other hazards in their areas. What they could do, who they could contact. Safe places for people to go. Medical and Vet resources plan. Pet facilities and food.
Promote rainwater collection on a residential basis. Promote microgrids and rooftop solar with storage for power outages.

Response
Expand CERT and Two Weeks Ready capacity in Sequim Operational Area - this is vital!
Significant base load power generation in the northern Olympic Peninsula is needed
Evacuation routes in case of Tsunami or wildfire. I was in Paradise, CA when the Camp Fire burned the entire town in a few hours. 20,000+ people needed to leave. All roads were gridlocked. It took hours to go only a few miles. 85 people died.
More County, State & Federal land acquisition projects along frequently flooded shoreline or river front properties.
Do not put a State Park (camping) on the Miller Peninsula
My experience: 30 yr career with a State natural resource agency. Not enough room to adequately explain project ideas.
a regional plan to deal with water shortages.
Open Towne Road again. Bury power lines or at least get them away from trees. Make Marine Drive in Sequim a one way road heading East to reduce vehicle weight on the bluff.
Support vegetable gardens, rainwater harvesting and storage, and composting toilets. All of these will be helpful in the event of a large earthquake.
Coordination of neighborhood disaster relief centers utilizing local businesses, church facilities, etc., as the hub for neighborhood relief and coordination efforts for response during a disaster.
water conservation efforts like rain barrels; conservation education to encourage homeowners to conserve water
Up date tsunami evacuation routes
With only one way in and one way out, our evacuation options are nil
Better and earlier snow and slush removal to avoid icing and slippery conditions More tree limb remoal
more emergency cell towers, more and better marked emergency response centers (fire/EMT/medical), maps in power bills with emergency routes and ERCs marked.
Emotional CPR. People need to learn how to CARE, vs “diagnose” as in MHFA. I have yet to see this survey mention ANYTHING about emotional resiliency. Do you seriously think these crises will be limited to being merely physically catastrophic?
Towne Road needs to be reopened. It is a vital artery.
Signed evacuation routes.Alarms like sirens. Contact info
Cooling and warming centers, regulations to slow climate change
Community needs grants and resources to help low income homeowners who find they were sold a home with haz mat floors, ceilings, etc. "Thats expensive to remove" is not helpful response nor a solution.
Information and emergency training info disseminated over local radio, newspaper and public event booths. Social Responsibility course materials and activities for high school students.
Widen and rebuild roads and improve clearance of trees from main power lines

Response
Clean up homeless camps
Relocation of the Clallam Bay school out of the tsunami zone and new school protecting children from earthquakes
Improve lines on roads for better night visibility; Mark evacuation routes and centers
no fireworks, open burning, trash can burning
County road Access routes not be artificially blocked by special interests would help save lives. Also, appropriate neighborhood planning in cases of emergency.
Plans for evacuation for people stranded by bridge failure ie 112 highway. emergency health concerns
Not a specific project but the predominantly elderly population needs special consideration
Preparedness information distributed to students in schools.
County wide prohibition and prosecution of fireworks violations.
3 day emergency packs offerred to purchase like a go bag for such emergencies. Re-engage in CERT teams for neighborhoods. Travel solar panels. Centers located in each neighborhood.
Leave Miller Peninsula State Park as is!
Wildfires will be more likely I'd Miller Peninsula State Park is developed. Egress from the area would be difficult because only 1 road available.
Neighborhood programs & "get=together"
Reroute of Highway 112
Equine emergency preparedness
Specific plans and regulations, particularly to address issues related to diminishing water availability and quality.
Expanded and targeted education programming
Provide information to the community about what vital resources will be available in case of isolation of the peninsula due to earthquake, tsunami
Complete the reopening of Towne Rd as a Road
neighborhood self-help groups
Know where the evacuation routes are. Keep a food and water supply available along with a first aide kit and /or the meds you need on hand
Install solar panels on the roofs of government buildings to provide electricity in case of power outage.
Current CERT Academy instructor. Former leadership in Sequim Operational Area.
ALL neighborhoods create detailed earthquake preparedness plans and maps.
I would like more information on a neighborhood-level plan in case of an emergency. We're in Happy Valley. Where is the nearest rally point following a major earthquake, etc.
shore up weak points of 101 to allow residents to evacuate the NOP.

Response
Finish putting together kit with food water, batteries, radio, flashlight, candles, etc. Create Community "Emergency Storage" for basic needs. Encourage residents to have an Emergency Go Bag.
Centers for public to be housed during disasters in regionally placed areas that people could go to if roads were not accessible.
Water conservation program
We are at the end of the supply line in the event of a real disaster. People don't get that the grocery store will be closed, zero communications, and no gas . I worked in environmental clean up post Katrina. Nothing for weeks.
MMore of what the county has been doing with its emergency preparedness campaign
Coordinate all resources
Cooling or warming centers. Town hall educational meetings for earthquake preparadness like we had a few years back. I live in a senior's apartment complex.
Fire-extinguisher use/maintenance in conjunction with the different Fire Classifications. Also, emergency ingress/egress routes in our unique geographic isolation.
In addition to the examples listed, purchasing backup tsunami warning sirens (to have on hand if/when another car hits the tsunami siren pole), letters to residents living in sea level rise/tsunami/high risk wildfire zones, adoption of Code Red
Affordable housing.. How can a community thrive without those to work and support our businesses?
Planning this now and becoming prepared because these things may happen at any time.
Prepared Public centers hardened and powered
Planned community meetup areas for after earthquake/tsunami. Meaningful water conservation regulations *before* seasonal drought kicks in.
Cultural burning refers to the Indigenous practice of the intentional lighting of smaller, controlled fires. Frank Kanawha Lake, a research ecologist w/ USDA Forest Service, & wildland firefighter of Karuk descent, .."The right dose to maintain the abunda
Map Your Neighborhood, Burying power lines
Non-bridge access to Black Diamond rd.
Stockpile supplies to mitigate a supply route cut-off. Re-Build local Dam for power/water storage
Having multiple designated routes in event of a wildfire.
I would like to see alternate power sources such as solar. I'd like to add solar to my house. Would be nice if there were incentives, or even information on solar options available.
Include awareness of and specific planning for natural disasters in public education curriculum, i.e. middle & high school
In-school preparedness for children, more public info seminars consistently offered (same days/times/locations

Response
Application on phone to suggest actions to preserve safety -local alerts by text could also be helpful.
No new mines, stop developing the peninsula, evict the paper mill, stop logging.
In case of wildfire - investigate possible evacuation route from Sequim area to 101 south of 104; create or improve this route
Best ways to communicate, tools to communicate after a hazard event
Discuss options for homeowners with wells. In case of long term power outages homeowners should be able to utilitze hand pumps to access well water. Experienced irrigators or someone with personal knowledge should hold a presentation on this issue.
County should ask satellite device owners to volunteer to share device numbers to help communicate in emergency. We need list with neighborhood. (Sort of like ham radio.)
Fire evacuation plans from Diamond Point if fire in Miller Peninsula park
Remove Growlers from our environmentally sensitive Olympic National Park and the Marine Sanctuary
Better local resources to get through the initial weeks following a major disaster.
Emergency Bridge access out of Forks
A "stuff the pack" event where you can go around and buy (or get things free) to create an emergency go bag.
Materials available ON LINE....charts, graphs, lists, instruction, videos
Providing a free program for building owners to bolt down bottom plates to stop buildings from collapsing in the event of an earthquake
Community resilience hubs/evacuation centers, more green infrastructure, forest mgmt to lower wildfire risk (prob outside county control, but impt); coordination with Canada, First Nations, and Tribes re oil spill response & cross-border support systems
Realistic descriptions of post disaster conditions and how to maintain/survive "in place" for one month. Allow people at least one month worth of extra necessry medications.
More evacuation signs & suggested meeting places
Safe Room
Making a list of food that can be stored long term in containers.
Keep sending emergency and disaster prepardness information to the communities.
build tsunami towers for downtown people will not make it up the hills
Utility resilience programs
Towne Road on the levee would be a potentially deadly tsunami evacuation route.
Support moving USCG from Hook to secure upland location; educational workshops on how a big Cascadia quake will affect our abilities to safely move around post bridges/overpasses collapses; safe water access sites post quake

Response
A heat-pump incentives and promotion program, targeted at low-income householders, would lower heating/cooling costs and provide essential air-conditioning during times of extreme wildfire smoke.
OMC should STOP expanding on the waterfront & immediately put effort into a plan to relocate
Two or more motor crossings of Morse Creek
More visible/readable signage for evacuation routes, certain services,
Home preparedness, e.g., food & water storage, power options, etc.
Water supply, access to other sections of the county
Bringing alternative energy, such as solar and including battery storage, to households or communities.
We need to market the Clallam Ready project more proactively and get more neighbors working together for mutual benefit.
I think there should be Conex Boxes that are stocked with food and water rations, as well as emergency shelter (tents, cots, blankets) outside of the tsunami zone. My community has two locations, but it is not enough for the size of my community.

10. Climate change can increase the frequency and severity of natural and human-caused hazards. Do you have ideas for how to adapt to or mitigate the effects of climate change? If "Yes", please describe.

Response
Stop developing on farmlands
Need to acknowledge the reality and increase water reserves
See ans to #9. Response to ongoing and worsening climate change needs to be akin to a countries response to war. If we (individuals, local communities, counties, state, countries) do not respond adequately the future will be grim….to say the least.
Please get the reservoir built for winter water storage so we have water in the river and for irrigation in the summer.
Preserve and not log our mature forests on the Olympic Peninsula, as they help us mitigate climate change.
Encourage carpooling and public transportation. Discourage watering lawns. Avoid out of season produce. Try to avoid items with excessive packaging. Recycle plastic, glass and cardboard. Compost when possible.
Sorry, but the government at ll levels has done in the name of "climate change" is bankrupting the country. Hydro power is the cheapest, cleanest power available and we have elected officials removing (or wanting to remove) dams. Same with nat gas

Response
More Indigenous-led projects and ideas - for equity/justice & evidence-base that Indigenous control results in better solutions; mitigation via nature-based solutions & human health focus (e.g. cooling centers); adaptation via energy resilience work
Eliminate fossil fuels immediately.
Slowing population growth through education, greater adoption of carbon neutral energy sources, slowing habitat destruction/conversion, encouraging lower vehicle miles through smart development, encouraging public transport where appropriate
Good planning, and consistent educational messages from those in authority, backed up with scientific references
reduce carbon emissions, recycle, use renewable energy, use natural chemicals, etc.
Look at realistic true science which is on going & changes & not political speech regarding climate
Teach people preparedness, offer information and education locally
More heating/cooling centers defined, backup generators where appropriate
cultivating locally grown food networks, and food literacy small local buissnesses, broadening public transportation (sun service!), don't log legacy forests, protecting/restoring streams and salmon routs, non-consumer public events. please anything
Don’t over do it…. Most structures are built with large safety factors
Support the State's Climate Commitment Act.
Use public policy and resources to minimize and/or mitigate impacts before they happen.
Education cause-and-effect how we can make a difference loving mother Earth, our planet is dying
Ensure my propane tank is bolted down. Ensure my house has been retrofitted. Have emergency supplies in my car in case we have to leave quickly. Oh, sorry. I'm concerned about about a big earthquake.
The more older forests we have in Clallam County, the more resilient we'll be.
Emotional resilience work as peers.
Transition off of fossil fuels.
Increase promotion of water conservation efforts, promoting drought-tolerant gardening, removal of lawns or cessation of lawn watering.
More ev chargers, increased use of wind power and solar, the usual stuff. Technology innovation
Water resources management. Diversified, and local, power generation.
I wish i had ideas -- this requires teamwork and coordination between agencies.
Reduce water consumption, use drop hoses to water plants, how about incentives for implementation of dry scaping. Expand nearshore barriers, or buy up those sensitive area parcels to prevent development and implement natural protection measures.
The more older forests we have in Clallam County, the more resilient we'll be against climate pollution, wildfire, drought, habitat loss, etc

Response
Reevaluate impacts of climate change regularly and adapt accordingly. For example, if hotter and drier than normal, have stricter burn ban days. If water becomes scarce, limit water usage.
tax-breaks for home & business improvements for solar, better roofs, better windows, to cut down on energy. More recycling drop off locations around town to make it easier for residents & businesses to recycle, free car tags for hybrid & electric vehicles
Assess and adapt
Increase solar/wind power, more affordable electric/hybrid vehicles, reduce waste and landfilling, STOP CUTTING DOWN OLD FORESTS!
Stop Freaking out about it
Personal rainwater catchment systems required on all residences.
EV and solar grants
Buy window air conditioner for the poor
I am very concerned about slope stability in our coming years with high dry heat followed by heavy rains. If you go to the A street overlook, the edge has started to droop down the slope and I fear this for other slopes in the area.
We need much better recycling and composting programs for starters.
yes, remove the trailer on the bluff at Clark and Marine
Trim trees, clear brush, keep area around house clear in case of wildfire (we live near forest)
encourage and facility all actions above, by agency and by individual
As home gardeners, we're very concious of and working towards are need and ability to harvest and store rain water. Also anxious to replace our shingle roof with metal to mitigate exposure to hot embers. In-home air purifiers to mitigate smoke exposure.
Maintain working forests on the landscape.
More education perhaps on planting natural and drought resistant plants. Visuals of what it might look like in 10 years.. so plan now?
require solar for new construction, require every household own at least 1 EV.
Put early warning systems intp place telling population what to do immediately.
Drive fewer miles, reuse plastics
Plan, Do, Check, React.
Stop this "Climate Change" propaganda! There is no such thing! Unless you are a communist.
Provide a strike team to rescue residents in case of fires, floods, earthquakes and wind damages
Water storage. Power Outage mitigation
Water conservation, natural shoreline armoring no rip rap or bulkheading. increase buffers to creeks and rivers. see question 9.
See above. Get local utilities/PUD to do more renewables on local basis. Also grow local food adapted to changing climatic conditions.
Stop construction of new housing developments

Response
Increase NO Burn times (including fireplaces) during poor Air Quality and public notification.
eliminate irrigation and prior use water rights. Implement water monitoring for EVERY USER, not latecomers only. Change water rights usage for commercial/agricultural use and require better conservation methods be employed.
Deregulate small-scale farming and home economic activities to promote resiliency and sustainability.
revision of water rules for Dungeness; making sure new housing developments are sustainable and that they do not deplete our aquifers.
Rainwater storage and resevoirs, limiting population influx, green/sustainable energy incentives
1) reduce use of ICE vehicles. 2) increase and improve access to public transportation
Give more support to local farmers, artisans, craftspeople, and small manufacturing to shorten our collective "supply chain".businesses.
Ban clear cutting - we need more trees to fight global warming. Institute recycling of glass, paper and metal..
The highways need to be widened. Right now there's not enough space to get people around an accident or slide and get them to safety. We saw this over the winter with morse creek and lately with the wrecks at sequim bay state park and Gardiner.
Solar power, less open burning, hybrid or fully electric automobiles.
Coordinate with DNR, USFS and NPS to develope/distribute wildfire prevention materials for Western Washington not just Eastern Washington. Links to FireWise and other organization that offer direction and grants to mitigate wildfires, especially roads
Stop logging, no fish farms, shut down the paper mill, invest in local artisans and small farms, evict large corporations from the peninsula.
Build defensive fire lines at key locations to stop or fight wild or intentional fires.
Stay informed and be prepared to act.
Solar power and use of hybrid car
Carbon free vehicles
implement some of the water restrictions practiced by Californians. Incentivize homeowners to have lawn substitutes, to landscape with native vegetation, to practice ut
More water storage, wind power, solar power
Congress must ignore the support of labbiest who don't support climate change.
Better planning for sea level rise and storm surges by 1) provide educational materials for new coastal homeowners and private and public buildings in the coastal zone. related to sea level rise
Plan ahead for any possible issues that may arise.

Response
Follow the Resiliency Plans, incorporate tham into the Comp Plans, follow the Comp Plans, involve the public in Resiliency & Comp Plan revisions, Inform citizens of Plan implemtations and revisions
Regulate timber industry to reduce clear cuts and manage wildfire risks. Encourage and support local organic food systems. Update electric infrastructure to support electrification and elimination of fossil fuels for transportation and heating.
Educate public on self-sufficiency. Examples include use and maintenance of chain saws. Basic first aid and how to properly stock your first aid kit. Training on emergency preparedness to include food preservation and storage and emergency supplies. e,
Electrify everything/generate electricity within communities. Store in bulk electricity/heat, water, and non-perishable food and medicines. Design and construct clustered communities away from shorelines/hazardous areas. Do intentional land use planning.
Awareness/mitigation of wasting water, improving breadth of recycling services, more burn bans, zero fireworks policy
Education to inform citizens of climate change effects and impacts
local food security/ag, water storage
Provide resources for humans to handle these natural/human caused hazards
Water/power restrictions during limited hours to get people used to not having it, increased wildfire awareness
Encourage more public transit, electric car chargers, outlaw all fireworks year round. Makes no sense to allow fire to be shot into the air during "no-burn" season.
Better preparation, food stash, generator & fuel, tree trimming
I wouldn't allow someone to build a house beside a river or seawater. I wouldn't expect anyone to protect my house from a wild fire or if I lived outside of corporated Port Angeles to put a house fire out. The rest
Promote good telebusiness opportunities for our area so people do not need to commute in such wasteful ways.
Less air, cruise ship & auto travel.
Reduce, reuse, recycle
Learn to do yoga so you'll be limber enough to kiss your keister goodbye.
Specific plans and regulations, particularly to address issues related to diminishing water availability and quality.
We need more education to address widespread climate science denial
More ride share/bussing to metropolitin areas. Less burning of fossil fuels. Better recycling programs. Keep houses away from cliff faces that are eroding. Maintain a certain distance from the forest to your house to prevent loss during a forest fire.
Stop clear cutting!
It’s poppycock

Response
We may by lucky, where we live, but must plan for less water, more fires, and possibly larger movement of people to milder areas, like here.
Support incentives to build more clean sources of power, create power grid redundancy for transmission lines and upgrade citywide power capacity to make the transition from fossil fuel to renewable energy viable. + incentives to for EV's / E appliance's
Require all clear cut logging areas be replanted.
Build more dams and reservoirs
Covered parking with solar panels. Off set the cost of businesses electric bill.
Increase tree planting where possible. To help with wildfires and ground stability.
1. Increase transportation options in order to reduce emissions. 2. Plan for drought. 3. Develop natural infrastructure to store and cool water.
Promote energy conservation, possibly an annual awareness day, with fact sheets and programs for all age levels.
Ensure every home in Clallam County has A/C
Do not develop Miller Peninsula State Park to allow overnight camping, and thus campfires and toss out cigarettes.
Reduce water use. Drought resistant landscaping. Build the reservoir. Live gently. Reduce wood burning and smoke.
Do not develop Miller Peninsula State Park. This conserves the aquifer and protects against wildfires
Light rail from forks to Port Townsend would be good to reduce traffic, reduce emissions, and add resiliency in case of a major road closure. If we start planning now it will be easier than once pop density has tripled.
stop emitting so much GHG and move off the shoreline
Stop topping trees (e.g. PUD), ban HOA restrictions on landscaping (e.g. plant and tree heights), ban all outdoor trash and waste burning, require owners of vacant properties near residential areas to keep their land mowed
We may face deficits in river and stream flows. Education on water use and storage needs to be addressed.
Educating the public—maybe a weekly article in the Gazette about conservation of resources, driving less/carpooling, buying local, etc
preparedness
We can't rely on snow for our water source and we can't deplete our ground water supply. We need an adequate reservoir system throughout Clallam County.
Solar panels on houses, large buildings, parking lot covers. Continued trend toward electrification of vehicles, especially fleet vehicles such as postal, school bus, delivery.
Stop allowing clear cutting of forests, this is contradictive in reducing high risk of wildfires. Bring in resources to help with power needs such as wind turbines.
Scrubbers for wood stoves, fireplaces.

Response
Population growth control, local emphasis on self-sufficiency, education, water use control.
County can promote education: solar and alternative energy fair, electric car fair, newspaper articles, podcasts, etc.
Reducing carbon emissions or reducing carbon impact.
We need an agency designated for helping to remove dead/dying trees on private and public lands. DNR land adjacent to our property is littered with dead and dying trees. Also: limit growth and development. We only have so much water as it is.
More electric vehicles
identify different strategies according to vulnerability categories -
Work to expand bus routes, active transportation routes, and increase complete streets in the County for the purpose of commuting, have incentives for energy and water reduction, stop allowing people to build on the bluffs.
Evaluate trends in more frequently occurring hazards, such as coastal erosion, winter storms, wind storms, etc. to identify community needs and being planning and assessment for what modifications might look like.
call climate change normal .
Encouraging use of mass transit, and other alternatives to individual use vehicles
We need to make sure that county permitting and zoning rules take climate change and natural/human-caused hazards and impacts into consideration when planning for development and restoration.
Climate change is the least of our short term concerns.
I'm an ARES/Red Cross volunteer. I will probably be the radio person for the Sequim Red Cross in a disaster. I can do everything on ham radio that I would do for the Red Cross at home and I have solar power for my radios.
Light exposure power systems that England uses that are light sensitive solar panels on the ground that feed her own batteries or fed back to PUD She says her electric bill is very low I'd like to try
Keep up to date on what's occurring and develop a strategy with neighbors.
Forbid all burns, even slash burns. Forbid all outside watering except for agriculture, including home gardens, and tree plantings.
1. Encourage and support residential solar array installations. 2.Residents should be encouraged to save roof rain runoff for gardens or toilets.
We all need to learn how to engage in more conscious decision-making about daily activities - how we use fossil fuels, water, harmful chemicals, etc. I individual actions help, but maybe more community discussion can lead to other positive actions.
I strongly disagree with this claim which is not backed by evidence. News articles in the Seattle Times are not evidence, and Cliff Mass has debunked them repeatedly. Regardless: support vegetable gardens, rainwater harvesting and composting toilets.
More strongly encourage residential solar installations and eco cars to mitigate it. Encourage/enforce green spaces.
Stop cutting down trees

Response
functional recycling; prohibition of styrofoam and other non recyclable/compostables; downward facing street lights; continue public transit with EVs
Educate public on water saving actions. Eliminate wasteful use of water.
Educate the public in CG implications, e.g. animal population changes like the mosquito carrying malarial microbes.
Continue effort to reduce fossil fuel burning
Personal preparedness for disasters (food/water/energy source). Create defensible space around home. Have ability to produce food on my own property.
decrease polution from airplanes cars trucks
Eliminate fossil fuel use as much as possible. Subsidize alternative fuels, e.g. solar, wind, electric vehicles. Improve
Explore the need for hazard zoning and high-risk hazard land-use ordinances, relocate essential service buildings away from the floodzone, create a mitigation outreach program that helps tribal members prepare for humancaused and natural hazards, etc.
It just takes money which a lot of people in my neighborhood don't have.
All those things we hear about-we all need to do them
We also need to work on lowering carbon emissions
Climate change will always happen naturally. Preparedness is the key to any disaster. Which will save lives. Having awareness is necessary to safety.
Increase solar and alternative energy tax credits
Climate will naturally swing just move with it can't hold onto past
I think more trees need to be planted to help with air pollution and to cool our region. It will also help to keep streams at lower temp which also impacts the food supply/salmon restoration projects. Create/build more facilities to hold consumable water
Educate the community about water-wise techniques and implement them before water shortages are declared.
Better planning and zoning and building code laws and enforcement - ex would be no more building along eroding bluffs and stream channels; provide incentives for people to move their homes back from bluffs.
Teaching facts that people will be more likely to respond positively to.
require all vehicles to have yearly exhaust inspections
Read the history books and get a realistic idea instead of politics
Nothing specific, but ensuring that our aquifers remain full in some way.
Greatly decrease use of fossil fuels
more solar powered things like lighting and heating public building
ban private fireworks and fireworks sales during summer months
public education
"Climate change" is a non-scientific political construct. Ignore it.
Keep the government out of it and let private enterprise fix it.

Response
I think weAgain planning and setting up for lack of water in the summer. This will be our largest local impact. Additionally we need to invest in local renewable energy production.
Wildfire hazard is increasing so we are taking action to reduce fire hazards on our property such as thinning out trees and brush, etc. We have taken steps exploring more ways to collect and store water to reduce the possibility of running out of water.
Working remotely seemed to help everything. Having less people on the road, less congestions and pollution. Our waters seemed to heal rapidly during covid. And less emissions seemed to help our air/co2 counts.
Encourage the use of soar and stitch petroleum.
develop and implement a plan to reduce wildfires from threatening urban areas
Begin to educate the community on serious water conservation
Water restrictions enforced!
No but I am willing to implement what knowledgeable professionals recommend
Have demonstrations on how to retrofit homes to use evening cool air to replace heated air overnight with smokey air in mind also.
get rid of 99% of the human population
County planners, trust lands administrators, farmers and ditch companies should consider developing emergency plans to feed our Peninsula. If there are no deliveries of food to the Peninsula then we must learn to feed ourselves,
Prepare for sea level rise and drought.
Develop additional water storage for Clallam County communities.
Create wetland buffers along Marine Drive (replace wood lot). Create vegetative buffers along fragile coastal areas (along trails, etc)
Replace my lawn with perennial plants that are drought tolerant. install water efficient appliances, and household fixtures.
Water rationing in late summer, studies on the need for future fresh water reservoirs
clear area around house and/or barn to prevent wildfire spread. plan to cool just part of house in extreme heat, to prevent power outage. same in winter storm - just heat part of house.
Be prepared for being self sustaining for an extended period in case of isolation from the mainland
See No.9, above
Reduce, reuse, renew, recycle / Emission free lifestyle
Create recyclable plastics, expand public transportation, plant native plants rather than non-natives to support local native wildlife and systems, set aside more natural areas
Build out the infrastructure for fast charging stations for EVs to encourage their use. Don't allow new houses in low lying coastal lands, and provide incentives for existing landowners to move inland.
A comprehensive county wide disaster public awareness & preparedness campaign.

Response
Buried power lines in areas with heavy trees. More than one road for an escape route. Total ban on fireworks especially in rural, treed areas. Better forest management.
True, but modeling inputs are wild guesses. Useful ideas have to begin there. To base ideas on the most extreme inputs yields far too much power to unaccountable bureaucracy. Education in the scientific process is critical and completely lacking.
Stockpile water; individual landowner forest stewardship; stockpile food; find a way to supply air purifiers to those who are especially vulnerable to wildfire smoke
Plant more trees and bushes to protect homes from sun and wind.
Ban cybercoin mining or require it be done off- grid using renewable wind/ solar etc. ; electrify public transportation,: incorporate electric minivans into rural CLALLAM County Transportation; grow forests do not cut them.
There was a very thorough look at the hazard to PA and a plan was made - what happened to it?
water conservation using native plants and environmentally sound yard and garden practices
There needs to be support and opportunity for water catchment and retention! With the loss of Lake Adwell there is no large reservoir system in PA.
Restrictions and education
Facilitate more electric car charging stations.
Incorporate PRAYER to change the weather or mitigate it's effects and or severity
Plant trees, reduce cutting, reduce asphalt/concrete pavement
Wean off Big Oil
more busses with more complete routes to increase usability. A program to allow residents to request mailers to be delivered to addresses (my neighbor waters their lawn at 2pm and washes their cars in the streets next to the storm drain)
have incentives $$$ for homeowner to reduce use of water and power, reward what you want people to do.
reconsideration of water rights, for preservation of river; thoughtful examination of the process of approving new housing, looking at water availability/sustainability (aquifers)
Provided resource names to retrofit our home to connect house to foundation. We can’t find anyone to do it. Plant more trees, require governments to mitigate their operational procedures and actions and not just do it on paper,
Stop logging
Limit building within a certain distance of the waters edge.
Enforce prevention in the Urban-Wildland Interface

11. What factors make members of your community more vulnerable during a hazard event? Consider evacuation, sheltering in place, or recovery actions. *(Select all that apply)*

Response
Living on marine bluffs, living in a tsunami hazard area, living on a peninsula that has limited road connection to the mainland.
Our highways can't accommodate a mass evacuation
lack of planning by individuals and families
Need of shelters that are specifically located as to be out of a flood zone, away from tsunami predicted areas and large enough to handle a large percentage of the population. Also. These could be designed for cooling and heating centers.
Location of residence (flood-prone? Slide-prone? fire-prone?).
Distinct lack of empathy combined with exploitative behavior.
Living along Hwy 101 which probably not be useable after a large earthquake or tsunami event. Also being only 100 ft above sea level could increase chances of tsunami damage.
Owning beloved animals you cannot abandon
residing near flood zones or wildfire-vulnerable forests
lack of technology (internet/smart phone)
Living in a tent or on the street. Lack of preparedness - no stored water or food or propane heater, etc.
Humans who don't care about other humans.
If bridges on 112 fail we need evacuation for emergerncy health situations
Temporary power storage/generation.
We have one way in/out to our community on Diamond Point Rd, especially if there's a wild fire that engulfs the park
Lack of understanding about an event's impact
No reliable technology for receiving emergency information.
Failing to be prepared. Failing to take it seriously. OMC failing to be prepared to handle a disaster.
Senior people (which is most of Sequim) can't walk FAR or FAST in an emergency.
households affected by violence, drugs and guns-worship and hate.
Access to safe travel routes is limited in my area unfairly. Also, property insurance rate increase due to blocked county Access roads.
Elderly (over 65) population
Unwillingness to accept the possibility that one of these hazard might occur.
Total dependence on US 101, which is not in the best of shape, for disaster help and resupply.
Having rescue/ambulence, etc type vehicles have access to our area.

Response
One road in & out with power lines crossing that road many, many times...Diamond Point Road
If young family members are at the home, and the head of household is not at the same location, educating people on where to meet. Then needing a backup plan, in case and most likely, roadway will be cluttered with, power lines down, road badly damaged.
Unaware - failure to reach them with public messages
There are a couple old mobile homes in our community.
Nothing
2-parent household but both parents work-- parents may not be available for contact every second of the day; 1 parent assigned to work in other communities (Forks, Clallam Bay, etc.) so not available to respond in a timely manner.
The County's ability to relay information throughout the community so that everyone is aware.
Lack of adequate policing. I do not feel safe even in my own home. During disasters looting and other criminal behaviors prevail.
Living alone, feeling isolated, no assistance.
Poor Education
animals - pets, horses, birds, whatever anyone takes care of
Volume of vehicles and few routes South during evacuations.
Limited evacuation routes to handle the expected traffic.
Lack of access or interest in informational resources
No one is making efforts to improve the location
smoking
Lack of belief there is an issue/risk
Not having affordable housing..
Limited roads, sliding soil, water/snow slides
Lack of knowledge about hazards and/or willful ignorance due to political ideology.
People dependent on food banks for daily needs are unable to stockpile emergency supplies.
Humans would rather not think about hazards or challenging future events so, we don't prepare.
Only one road in and out for Diamond Point residents
lack of knowledge on prevention strategies.
Common sense
Regarding a massive tsunami-generating earthquake, ignorance of the true extent of the damage.
Not following the news
Towne Rd closed for evacuation
Limited evacuation routes due to Towne Road closure.
Lack of education on how to prepare and what to do during a hazardous event.

Response
Rural housing and lack of neighborhoods
Drug addiction, criminal activity
Only one road out of Port Angeles.
Electric vehicle with insufficient charge at time of evacuation
Tourism
The fact that most are going to rely on the government to provide help
Access to water is paramount.
Pets.
Lack of preparation and practice.
Lack of disaster pre-planning.
Women.
Medication needs and ability to operatge home medical equipment.
Rural around Forks - possibility of being cut off from services
I just want to add that sometime when the lights are out for extended period of time we usually have to purchase other food than what we have on hand that we can eat without a stove etc and that is an added expense many cannot afford
nothing

14. Have you taken actions to protect your home and/or business from impacts of hazards? If "Yes", please describe.

Response
Earthquake insurance
Earthquake insurance
But not enough...we have some extra food, water and dry goods
go to bags; food and water supplies
cutting brush, road maintenance
We keep vegetation away from the house and have an evacuation/preparedness plan - extra food/water
We grow and raise our own food, store excess food, and keep healthy to avoid reliance on the medical system.
securing item for earthquakes, water storage for use in emergency, generator hook up for powering house, food storage, member of DART
fireproof landscaping
emergency food and water and power back up
I have food and water stored in case of emergency.
Firewise
Generator
stored human food and water. wood stove. 4 months pet food lots of flashlights. CERT members.

Response
Clearing of ditches, limbing up trees,
strengthen the building and tied them to the foundation, capacity to filter water, created a neighborhood network to work with neighbors, have generators and long trem food storage,
Maintaning vegatation around the house to resuce wildfire risk, anchoring bookcases and wall hanging items, securing closed kitchen cabinet doors
We have started to make an emergency supply of items for short term survival
Create defensible space around home. Gather supplies and plan for natural and man made disasters through CERT programs.
Reduced trees, extra insurance
Secured propane tank. Emergency supplies.
Generators for power, and general comprehensive earthquake preparedness
Keep building well-maintained, uninterruptible power supplies for critical electronics.
Food storage, fire extinguishers, structure stability,generator, barbecue & fuel, education/preparation.
Shrubbery away from house, attend tsunami awareness/preparation presentations
removing trees and brush that were close to house
Seismic preparations.
No trees near the house for fire safety
Strapped water heater
Water, food stores, communication plan, back up battery fir Cpap
We have gathered essential tools for recovery efforts, anchored the house down to reduce seismic caused movement, we have an immediate action plan that we review and refine annually.
We have kits for survival
Fiited my hot water tank and my propane gas tank to the wall for safety
Stocking on emergency supplies for the home.
Stock up on food water repair materials
Earthquake retrofit, roof repair/maintenance, woodstove maintenance
See 15
Earthquake coverage.
We stay informed about the things going on around us. We've prepared for an event where we are cut off from town.
secured tall, heavy furniture to studs in walls
Tree removal, generator, solar
alternate water supply and power
Obtain flood insurance, look into moving to higher ground, etc.
removed trees that could fall on the home
we have go bags for each family member and kits in our vehicles
Hired arborist to thin dangerous trees
Water and food storage, CERT

Response
clearing surrounding brush, surge protectors on electric posts, equipment for emergencies
CERT training
Emergency kit, radio, water, food, etc.
Earthquake proof construction, all valves, breakers, LPG lines w/shut-off valves, food and water stored for extended lack of services, generators, fuel is stored
I keep a supply of food, bottled water, and firewood.
clear brush, generator, large freezer, need large propane tank
Stocking food and other supplies to be able to be on my own for 30 days.
Emergency Food & Water. Emergency generator.
We have begun to change our landscaping around our house to make us less vulnerable to fire. We have begun to stock up on food, water and medical supplies in case of emergency
Removed some tall trees near the home. Work to clear boundaries of dry vegetation in warm months to mitigate fire-spread risk.
We bought in an area that is not in a tsunami zone, flood zone, and has significant clearing around the home. We are on a paved road with an easily accessible hydrant. Solar and generator are in the budget soon.
Have trees checked for health.
strapped propane tank
Removed dead trees, keep brush back, secure furniture to the walls
Earthquake retrofitting, backup generators
Generator installed; clearing of brush away from house; medicine kits and food/water storage
Keep combustibles away from my home
Alternative fuel (wood) for heating and cooking. In process of accumulating emergency food and water
Emergency rations and plans and drills for the family
We try to keep a defensible space around our home as best we can. We are trying to remove things like bark & keep trees trimmed up, etc.
Emergency kit, food and water
Landscape maintenance for wildfire prevention (removal of ladder fuels). Structure and roof maintenance.
We have a whole house generator; emergency preparedness bins; no plantings up against house; I've gone through CERT (I'm a team squad leader); ongoing emergency preparedness trainings...
Supplies, live south of Tsunami zone
We have prepared for many contingencies
A little - I've installed 700 gal of storm water tanks.
back up generator
Lots of earthquake preparedness

Response
Prepping
got a generator
New building. Energy efficient. Considering solar panels.
retrofitting house to foundation, propane tank straps in place
clear vegatation around home
Second well, new roof, adding fruit and nut trees, extra storage for emergency supplies
Emergency generator, large 'Costco' room for extra supplies, taking steps toward self-sufficiency (green house, orchard, nut trees, chickens, raised bed gardens)
We have a plan are members of cert
Emergency food/water supply
Insurance on our house
Keep yard clean of debris, no burning when dry and hot etc
eliminating unnecessary vegetation.
cleared some trees - but not enough to prevent house burning if forest fire comes through
Extra supplies, batteries, earthquake kit, etc.
Made a comprehensive home emergency mitigation plan using a 9.0 earthquake scenario, built grab-go bags and vehicle kits and have stocked up all appropriate supplies at home.
My home is powered by solar. Above ground water strorage. Volunteer for CERT
Emergency supplies, MYN participation, Go Bag, 911 vial
Remove tree branches that are too close to wires
We are prepared to protect our home
30-foot vegetation clear-zone.
Clearing trees that could be impacted by wind storms
Full house generator
Stay aware of local situations, keep yard as free of flammable materials as possible, keep flashlights and lanterns in good condition, keep a supply of batteries, plan evacuation routes, and of course food, water, and blankets.
See answer to question #15.
Planted trees. House it hurricane strapped. 30 days food and water
fasten water heater to wall, food and water storage, moved trees away from house, metal roof, wood for fires
basic earthquake preparedness
Defensible Zone
Food and water storage for sheltering in place.
I have earthquake insurance.
Trenching. Ditching to channel flow
Monitored fire alarm system
Covering exposed pipes, ensuring quality roof, installed HVAC unit to relate temp

Response
We have a generator, earthquake insurance, emergency preparedness supplies, member of CERT
Continual removal of flammable brush.
have emergency kits in each car, and preparedness kit at home.
Rainwater collection
Since I have a newer home my focus has been on ensuring that we have a good emergency kit in the house, along with alternate cooking systems with fuel.
Emergency preparedness kits
earthquake insurance
build emergency supply stock, communicate with neighbors, keep property clear of trash and excess junk to reduce fire risk and limit rodents which can spread diseasa
I have renters insurance for my house.
Insurance and keeping defendable space around our home
replacing the lawn with perennial plants is a multi-year process.
we have some supplies of food and fuels, a fully stocked RV, firewood, and a generator.
Trying to reduce fire hazards but we could use individual guidance for our location. I wish firefighters could be available to make onsite recommendations for homeowners
Fire resistant building materials
Cut trees and brush down away from home and road easements
lots of mulch in the garden to help retain moisture in droughts, new windows that are more efficient to help control house temperature
we have: anchored propane tank, propane generator with dedicated tank, backup propane heat, 2 solar powered generators. filled water barrels = 400 gal, reservoir of 250 gal at well, food, water, first aid supplies, tarps, tents.
Anchored house to foundation, food stored for at least two weeks, along with tent, tarps, blankets spare clothing, water, cash. All in metal garbage cans by man-door in garage.
We have hardened area around our home to protect from wildfires by removing highly flammable plants but nothing we can do about neighbor's Leyland cypress that is close to our home.
Fuel reduction
trimmed or cut trees that would fall, insurance, & a highly secure structure earthquake or windstorm will only cause minimal damage.
Did some straps and anchors under our house. Tied the post and beams together and anchored all the post to the concret footing
Only in having a plan and keeping on hand emergency supplies.. food to lighting.
But not for all hazards and not sufficiently
Food & water storage, power options, etc.

Response
Clearing brush and trees near to the house to address wildfire risk. Collect rainwater for landscape/garden use to reduce pressure on low-volume well. Solar power (but no backup yet).
Earthquake and wind-resistant construction; earthquake insurance
Emergency equipment, medical supplies, generators
Clearing dead trees, cutting branches up 6-10 ft and clearing brush
Planted to keep erosion down.
I have an umbrella coverage as well.
Stored water, supplies, taking classes/seminars by Jim Buck.
Landscape mitigation to protect home from fire. Bluff erosion mitigation. Safety straps on all heavy household items in case of earthquake.
keep landscaping away from house
Backup generator and emergency provisions
Metal siding & roofing, building away from the river, forestry work to mitigate fire hazards and improve forest heslth
Earthquake insurance - umbrella policy
Emergency food/water/shelter, generator
No trees around my house
food and water storage
helping city workers by keeping my street drains clear
cleared vegetation away from buildings
Keeping trees away from the building
Earthquake supplies and plans
Back up generators to run water well and septic system. All residents of the community should have 30 day food and water supply. Cert team has stored medical equipment that may be needed.
We store emergency water and food supplies.
In the process of buying a generator.
Seismic positioning, emergency power supply, water storage
Keep brush away from building
Gathering of basic supplies at home, meetup plan with partner
remove juniper trees from side of house
Fire threat reduction measures.
We have emergency action plans and have worked on reinforcing the ground around our house
Tie-downs
added extra support on roof trusses
Shrub and tree removal, sandbags, emergency supplies and water ready,
Cut trees back away from home in case of wildfires or wind
Defensible space around home(Wildfire)
Removed trees and debris from around house

Response
Vigorous maintenance, up to date homeowners insurance, emergency preparedness measures (food, water, temp. shelter, first aid), awareness of shut offs, household evacuation plan,
Trim trees
Storage of water, food, alternative power, HAM, & more
Cleared area around our home of trees and brush
Have generator, MYN group
Home insulation & other improvemnts
Home and landscape to reduce risk of wildfire burn. Alternative fuel for winter- due to ice freezing this year that froze exit to outdoors will work on issue. Began monthly preparation plan for food and water issues in disaster. Preparedness.
Landscape to prevent fire spreading. Organizing Preparedness kits
Homeowners AND Earthquake insurance
Cleaned out the overgrown yard left by former owner, paint exterior as well as some repairs to the siding and roof
Earthquake retrofit on older home. Use will and ditch water sparingly. Keep shrubbery close to house trimmed. Earthquake kits in garage with several weeks water and food.
Fire prevention
Metal roof; cleared danger trees from house; whole house backup generator; house sited on highest elevation.
Metal roofs, cement siding
Family Emergency Supplies; onsite generator/propane; site mitigation - trees/vegetation
Earthquake preparedness
Fill was brought in to raise the house up
power sources for outages
Insurance; making sure we bought a newer house so it would be up to seismic building standards.
No falling tree hazards, generator, cistern for fresh water, two-week supply of dried foods
Land management for wildfire, in coordination with DNR.
Defensible space, trees are cut back so they don't fall on house, water and food stored
Our house has stored water and food and a propane heater.
1) Earthquake insurance
Essentials for life and safety to last for months
Gravel around home for fire mitigation, metal roofs,
Food water stored. Smoke detectors. Fire extinguisher. Aux power generator.
Permaculture
Insurance, removal of danger trees, security

Response
We have secured bookcases, cabinets, and the water heater against falling over during a big quake
Cut firebreak
I have kept trees away from my home to decrease being burned by wildfire.
Earthquake preparedness and supplies
House earthquake bolted to foundation, keep area clear of dead trees,
SEISMIC RETROFIT HOUSE, DEFENSIBLE SPACE FOR FIRE, 6 MONTHS SURVIVAL SUPPLIES
making sure shrubs and dead trees are removed once a year after our last big wind storms helps not fuel the fires
Well built to the highest standard
Own a generator, camp stove, and emergency lighting to get by during power outages.
Took down a large, diseased tree.
Have "short-term" (21+ days) emergency food/water/housing/medical supplies
Followed published guidelines.
Proper insurance
Reducing fire-prone plants around the house.
Keeping the area around my house free of trees. Keeping grass short. Stocking food and water. Stocking firewood. Learning foraging.
Generator, solar battery, rainwater collection barrels
Insurance
Created defendable space to avoid fire, some backup solar power
My house is a good distance from the forest edge in case of a forest fire.
Updated to conserve energy. Back up power.
Keep brush away from home, and have 30 day foord and water on hand. ECOM ability.
Clearing brush around house. Keeping grass moiste
Sprinkler system installed, tried to build to earthquake standards but it was 30 yrs ago not sure how to update
Go bag
Earthquake retrofit
Secured large pieces of furniture. Secured propane tank. Maintain a fire line on property east where the elderly homeowner is unable to cut her grown
seismic retrofitting, fire sprinklers, vegetation buffers
keeping it from getting less damage.
Fire zone area around home
Installed Simpson Strongtie framing ties in one of our structures to increase wind and earthquake surviablity..
Newer home built to current standards. Landscaping somewhat fire safe.
Being prepared with emergency supplies.
Insurance
Member of CERT.

Response
go bags
Joined CERT, adding water/food storage
Rolls of plastic to cover windows in case of earthquake, storage of food, Jackery. House is fairly new.
Level land; no tall trees nearby; have a generator; newer home built to high wind standards.
Emergency kits, go bags, ladder to evacuate from high level room, food for over 30 days and water for a few weeks.
We are working with DNR to reduce fuel load on our forested property. We've cleared underbrush from 1 acre of our land and are doing another acre this spring. DNR has a great program to support landowners in doing this.
Keep area around house free of excessive brush. In the process of finding someone to secure house to foundation.
Power, water. Food, disaster preparedness

17. Is there anything else you would like to tell us about natural and human-caused hazards or climate change risks in your community, including ways to mitigate risk?

Response
No [12 responses]
Better communication to the public at large about various shelters, evacuation routes, emergency supplies available, transportation for those in need to get to shelters, etc
Again stop with the climate change propaganda! There are scientific studies showing climate change is not real. Are the ones who made this survey communist? If not, try using the brain in your head, and stop believing what your told, and think for yourself for once!
I do not think the City cares enough about informing the community, specifically Port Angeles. The Council has not monitored the Fire Department's programs to keep the citizenry informed. Our roads are not maintained to a level that aids in mitigating risk. There appears to be no effort below the County emerrgency management level to inform the citizenry in Port Angeles about hazards and mitigation.
The homeless junkies are a greater hazard than your bogus climate change cash grab
I cannot overstate the importance of education in our community. If schools, churches, businesses, social clubs, etc. would take steps to educate their employees/members about natural and human-caused hazards, climate change risks, and ways to prepare and survive, the community would be better postured to deal with the effects. In that same vein, I would like to see the county do more to support Community Emergency Response Teams. Just imagine how much more prepared our community would be if EVERY Clallam County resident became an active member of CERT!

Response
If there is a committee or group helping with this from within the community I would be willing to help with input and support
My biggest concern is my workplace which is a school. We need a safe place to go and supplies for all in case the time in the safe place is lengthy. Also since we are very rural all the above needs are heightened. We also need more than just a generator set up in the gym. We need a way to keep the other buildings functioning in a power outage. This would not only help the school but the community also to have a place to come to.
See comment above about having more free workshops on emergency preparedness. Concerned about traveling & getting supplies after major earthquake, especially since some areas have limited routes - like getting to the west side of PA, Hwy 101 between PA & Sequim, etc.
Consider the island effect of collapsed bridges in the event of a big quake or flood event. Stage/develop microgrids with such isolation in mind.
I'm so old I've gone through several "fear mongering" situations, hyped up about climate change, coming ice age (didn't happen) computers crashing and life stopping (2000 y2k, didn't happen) sun flares, tornados (Midwest most of my life, never experienced one) global warming, now bundled into "climate change" (since cooling and warming didn't pan out). I'm all for being prepared for natural and man made hazards, but won't let fear of something that probably won't happen in my remaining years, to live in fear and rule my life. Of all the "hazards" above, drought probably concerns me most since moving to Sequim. Maybe there is plenty of water, given how many new housing communities are built every year, but hopefully some thought is put into constructing reservoirs, wells, water collection etc, so in low snowfall winters such as this year, we will be covered.
Please continue to prioritize work on these issues as they are critically important! Thanks.
Water usage and costs are a concern, noting population growth and age of water systems.
Everyone should work to wean ourselves off of plastic. Most things we buy are wrapped in unnecessary plastic. Plastic water bottles should be phased out.
The Tragedy of the Commons tells us we must adapt to climate change because we will never pull together to stop it
Tourism brings folks who may not think about these hazards or respond well. The influx of new people and the fact that there are lots of retired folks also have an impact on the area.
Every individual needs to know and understand that regardless of income and personal situation we can all make a difference. The common refrain; "I'm just one person and whatever I do won't make a difference to climate change," That's true is we use it as an excuse to do nothing. However, a single snowflake might be insignificant, but a slow, steady build up of individual snowflakes becomes an impressive and undeniable force.

Response
Is there a plan for nuclear events? Is there a designated safe place? Is the County prepared for this and can they advise or remind everyone without causing a panic, how to best be prepared and what they should do?
Port Angeles must addresss the problem of open/public defecation from encampments and illegal RVs both on public streets and private property. as it stands now it is all just flowing into the watershed, city does nothing, time for county to step in and get things under control
I have 9 acres I am cleaning up but in drought and wildfire, unless my neighbors do the same, it's mute. I am willing to work with CC emergency services to educate my neighbors as well as make a plan for equine preparedness. Judy Sarles
I feel people in Port Angeles are not fully educated about the destruction a major earthquake will do. To my understanding there is no evacuation plan in order in cause of a major hazard. OMC fails to be getting involved with the community as to how they can be of assistance.
If we had a vibrant network of Clallam Ready neighborhoods, that would become a potent means of communicating with and coordinating our local residents.
In the event of a severe earthquake, people may not be able to travel to an emergency shelter. For example, the BPA power line, if it came down, could obstruct people's ability to move from the foothills to Port Angeles. Emergency supplies, such as a large water pump and filter system, and training in how to use that system, could make the difference between people being OK and people struggling.
I work for a water/fire/mold mitigation company. We would like to work with the community to help everyone become prepared for an emergency. And we would like to be part of a plan that helps if the need ever arises.
The big problem I am having as a CERT Captian is getting my fellow community residents to acknowledge the preparedness for a major disaster. For 1 year now I've been campaigning for preparedness and it's hard to get participants. Our community is in Gardiner Washington. Outside of Sequim. We are a wide spread community. We need to get the word out!!
Community based education regarding first aid and some self sufficient techniques such as how to make potable water or shelter building (Barefoot Architect). Gracias
County has done a good job preparing for emergencies. Constant education and re-education is always needed.
We need to have a more robust power grid and power transmission infrastructure to ensure that the change to electric power will not tax the system unduly. We also have an unreasonable level of outages on the west side of the peninsula every year. One would imagine the reason for this is purely economically motivated. Bonneville and or local PUD's are not interested in / capable of spending the money or the resources and effort to actually clear the transmission lines right of ways back to an actual safe distance… And almost every storm, every year, trees take out the lines in some way. I don't expect people who lose their power every time the wind blows a bit gusty to ever

Response
feel secure in switching away from fossil fuels and helping to mitigate climate change.
Worried about non-preppers inflicting violence to get what they need.
I worked in an emergency management for the better part of 40 years. I know this is a pipe dream, but I wish the realtors in town would explain to people moving in from other areas of the hazards and the facts of living in a rural community. There are so many transplants here that have no idea that they are actually living in an area that can be easily isolated, and have hazards of its own. The fact that people that have recently moved here are asking who to call at animal control to get rid of the deer on their property I think clearly underscores the lack of common sense.and education some of these people have about the area.
Biggest issue is water reserves. We need more. Replace the dams.
Thank you, training, education at several levels, Church, schools, businesses, etc.
Each and every one of us all is only one real bad day from being homeless. Ask yourselves right here and now if homeless people have a right to exist. Information and psychological warfare is being used to wage wars of attrition against us in our own living rooms. Fentanyl has people dropping like flies. It's all interconnected and it's all building toward something and whatever that might be we need to be read to fight.
The most common fear I hear from everyone I know, including myself, is that we do not seem to have a plan for how Clallam County is going to keep a sustainable water supply for our burdgeoning population.
Eliminate Fireworks, encourage removal of highly flammable ornamental plants, PAVE and OPEN TOWNE ROAD Immediately!
No
Power outages have plagued my home since we built in 1986. Our local power lines are underground so our feed must be above ground and susceptible to damage. It has gotten much better, but when the wind blows, we still prepare for the lights to go out. I'm concerned about our drinking water supply. I know the dam removal was not supposed to interfere with our water supply, but it seems like it has. Our water rates use to go down in the summer to encourage lawn watering and beautify the town. Now we are penalized for using over a certain amount of water (usually when I water my lawn) and also penalized for that extra water going down the drain. Which it doesn't, it's going on my lawn. The price of the water and the drainage of that water goes up after a certain threshold is reached. I hadn't heard of water restriction prior to the dam removal. Has the removal of the dams impacted our ability to have enough drinking water in case of an emergency?
I want to know more. Is thirty days standard or best practice specific to our location?
Could the County stash WW II-style Bailey bridges near the vital bridges so emergency vehicles can access isolated areas in case road bridges fail in an earthquake? Require/Award HOAs who design emergency response plans.
Communication communication communications

Response
Neighborhood based groups sounds like a good idea, but they would need to be gathered every couple years because there is so much change within a neighborhood. so it sounds like a great idea, but isn't really practical. Perhaps the city/county can help us establish a neighborhood "storage shed" that would have essentials in it for all to access. Without shooting each other over the contents. Would also have to be exceptionally secure because everything gets broken into and contents ransacked. For good reason when folks are hungry or without shelter.... as so many arenow.
No, but thank you for sending out this survey!
Climate change is real. It is better and more efficient to make infrastructure changes to mitigate the effects now than to wait until infrastructure is damaged because of climate change and sea level rise.
Communities should organize for safety, social and support in life and disasters.
no thank you.
no.
Availability to medical supplies (e.g., diabetic/heart), access to area if highways (e.g., 101 Highway) / bridges (e.g., Hood Canal floating bridge) fail, alternatives to loss of utilities (electrical/telephone/wireless/internet), and collapse of emergency services (medical/fire/police) become critical issues. The chance of assistance for a major local emergency from "outside" organizations (at least in the short-term) is questionable ... especially if other areas in the State are also effected. Besides "warehousing" needed materials, perhaps supplies/service can be logistically provided by sea and/or air from Canada/other Washington locations/Oregon sites. Prior arrangements for same is critical. But you know all this already. $$$
If this summer is dry I would like to see a county wide ban on fireworks of all types with some mitigation to the tribes for their loss of income from the sale of fireworks.
For fire emergency, local fire districts should coordinate with owners of heavy equipment to aid in major forest fire fighting.
One concern I have is making sure that families with young or handicapped members, have adequate plans for regrouping, supporting, and recovering following a disaster.
I think man-made climate change is B.S.
I would like to see a county-wide effort to get the word out to people on how to protect themselves against fire by changing their landscaping. And also better prepare the community for the possibility of disasters. The CERT program is doing the best they can to prepare and be ready for disasters but the wider community needs to hear about the possibility of disasters and how they can prepare for them.
Definitely in need of Community Emergency Response Team , training for our community so those who are interested in volunteering can do so and add resources to our community here as we continue to see climate changes, tsunami levels changes and earthquake evacuation areas are maintained for us . . Help us.
Hwy 101 is the only road out of Port Angeles and Sequim populated areas. We need another road out. One accident, one tree across, one landslide, cripples the whole county and we cannot evacuate. We have seen this over and over when all of town

Response
needs to get out. It is not safe to limit the communities in Clallam County to only one road out.
Flood and tsunami insurance are prohibitively expensive. My property tax is already so high and keeps going up, which makes other things, like insurance, less attainable.
For my immediate community I worry about being cut off if we have an earthquake, as I live up Blue Mt Rd and expect Emery Creek "bridge" to break. I worry about power loss in my all-electric home. I worry about food insecurity. For Clallam County I worry about all the impacts of climate change -isolation, drought = food shortages; impact to shellfish and finfish, partly for the ecology of the peninsula and partly for food shortage. I worry about Emergency preparedness, which the County has planned for so well, but the County is small in population and isolated and will be on our own for a while if we have a major disaster. Mitigation is community preparedness through information and the steps the County has been taking and should continue.
The county should consider having another right of way running East and West South of Port Angeles and Sequim another exit out , (possibly Blyn area Township line 29 and 30 North)
As our county grows and more residents are recent arrivals to the Northwest, we need to continue to educate new arrivals and residents to the natural and climate change induced hazards present on the Olympic Peninsula. Human-caused hazards also need to be assessed and mitigated..
You are ignoring the hazards presented daily by guns which are likely to become even more pronounced in emergencies by those who believe they are victims every day.
I lived in Miami when Hurricane Andrew devastated the area. I know what it is like to deal with the aftermath of such a disaster, and the necessity of self reliance.
Stop all logging and clear cutting of forests Stop manufacturing gasoline engines in cars More wind and solar power use Convert to vegetarian lifestyle Tax corporations in order to expand all renewable energy solutions
Poepl have told me they don’t plan to prepare for the Big One as they are old and will die anyway. The problem is, statistically, they won’t die, they will live miserably or die a slow death after the event due to a lack of preparation.
It would be good to have occasional get togethers with neighbors to get to know them better. It is important to know the folks around you so you understand their needs.
State Park (camping) for Miller Peninsula -Fires ; One road in, one road out. Only escape in wildfire is to the beach in hopes boats will pick up residents. There would be major congestion and the older population here would not be able to walk to the beach for escape. Getting our beloved pets out in case of fire. Although we have an airport, planes can't fly in smoke.
Looking forward to learn of any training / community outreach. Also, neighborhood watches, etc.
Why have you not asked whether people have earthquake insurance? Port Angeles will not be able to rebuild without insurance payouts! It seems you are oblivious to this fact, you should be pushing people to get earthquake insurance as well as flood.

Response
Forks looses power way too much. Get Bonneville crews stationed in our area.
I'm pleased to see that you are taking a multi county approach.
Additional equipment including aircraft for fire fighting, evacuation, and emergency supplies would be helpful.
Attract and train more citizens to be prepared to survive in the aftermath of a natural disaster.
The cities and County have an opportunity to sign up volunteers for disaster PRIOR to the disaster. In a disaster you won't be able to do background check. Should develop an approved list BEFORE the disaster. Medical Reserve Corp is an example.
current action on climate change, and so most hazards, feels like it's done at hashtag level. It does not feel as if we, regional area, are seriously commited to action, unless it is readily achievable we need supports for the unhoused who are most vulnerable to many hazzards if our area needs to be evaccuated, is there a system to transport people who are disabled or lack transportation? meeting places? awareness for those with transport to check on others? I wonder what closing out chain and big box stores might look like to help small buisnesses flourish what something akin to a victory garden program might look like I understand there is work being done to work on such things, and not all of it's seen but like . . . is crab fest something we really want to buckle down on in this era of overfishing and extinction?
In 16 the answer I wanted to provide was I never thought of having 30 day emergency supplies - we keep about half that. We need to corral all the homeless in PA in a single location so they can receive communication and support during a hazardous event. There seems to be no support for people who have no way in and out of their property other than a private road like we do - heck, the city isn't even maintaining public roads so we could evacuate in an emergency or emergency services could get to us. This is a very real issue.
Priority should be to move people out of flood zones (3 crabs, Seashore lane ect..). No more hard armoring of the coast or rivers. Implement water conservation year round not just when there is a drought. Improve irrigation infrastructure and only allow irrigating crops at night. Educate the community that roads may liquify and that they will have to escape on foot in the event of an earthquake/tsunami.
In other countries with single mothers they have a community house (shared kitchen) that allows support from each other (shared child care while others work) etc. We can't keep ignoring this issue. Incentives for those who want to rise above their living conditions but do not have means to do so. This is a HUMAN-CAUSED HAZARD. This may not be the right venue to address this issue, but while all the planning is being done, please consider areas that might work for these shared communities.
People camping unsafely, including the homeless, contribute to human-caused hazards. The homeless problem creates multiple risks, and has gotten so much worse recently. We need to deal with the problem we have but not in a way that makes our location appealing to even more homeless people. The solution should be compassionate, but not create an undue tax burden for tax-paying families already

Response
struggling to make ends meet. This topic is difficult, but our community is already suffering because of it. It will only get worse if we don't do something about it soon.
Evacuation routes for natural disasters are limited in my area due to special interests and politics. ALL county agencies and special interest groups that support limited natural disaster and fire access to my community will be held responsible for any subsequent damage.
I believe the biggest concern is the condition of our roads and the fact that Port Angeles only has one way in from the east and one way out from the west, except by boat.
FEMS'S NATURAL RISK INDEX DOES NOT ACCURATELY REPRESENT THE COUNTY AND MUST NOT BE USED IN THIS PLAN.
I think lack of storage space for a 30 supply of food and water is a common problem but it would be cool if the foodbank could run a donation program and give out kits to those struggling financially but have the storage space.
In a disaster there are not enough police and sheriff deputies for adequate protection from looters, etc. There are no adequate communication systems to warn residents and visitors of imminent hazard. We need to decrease our dependence on fossil fuels and improve alternative energy sources for residents at a reasonable price. We don’t have electrical power many times each year and the electrical infrastructure of our country is outdated, unprotected. Our communication systems are very fragile and subject to sabotage. We don’t even have cell phone reception and frequently cell towers are down. Our 911 system is fragile and subject to sabotage and failure. Cell phones are our only means of community communication and this system is unreliable.
Providing emergency kits for the community that can be kept in their cars.
There needs to be a push to make preparedness supplies easy and cheap/free to obtain through a centralized distribution mechanism, much like the city of Joyce did.
We're also in CERT but would be deployed by ARES in a disaster.
Not at the moment.
I would like more concrete plans on dealing with hazardous mail that comes in. Last year several county's election offices were hit with white powder being mailed to them and yesterday (3/19) Kitsap County had an envelope with white powder hit their courthouse. it is imperative that Clallam County begin to take steps to prepare for a similar event in our county including written processes and procedures for how to properly evacuate, who should be called, and how to shut down election offices/the courthouse at large and ensure that voter's ballots are secure while also ensuring that people are protected.
My concern is the Cascadia Subduction Zone. If that gives way: bridges will be out, roads will be impassible, the harbor will be choked with tsunami debris, many homes will be destroyed. We will have to rely on each other, help our neighbors as best we can. We will need temporary shelters, water purification filters, first aid supplies and first aid knowledge, non-perishable food and cooking supplies, fuel for generators,

Response
flashlights and batteries, generators, ways to stay warm and dry, warm clothing and bedding. Being as Clallam County is bisected by numerous streams and rivers, we will be landlocked by rivers, unless we walk and ford swift rivers on foot. In addition to our home stores, we should store emergency supplies at our local community Granges, schools, public buildings, fire departments and churches in each populated area of Clallam County, in sufficient quantities, to mitigate water crossings and assure barrier free access to emergency supplies.
Encourage businesses such as Costco and Walmart to get all employees CERT trained on company time - both administrative and floor personnel. Encourage the tribe to get all casino, restaurant, and hotel employees to also get CERT trained.
Prevent clear cutting trees on steep slopes above established homes. Notify adjoining property owners before substantial environmental changes are made to a property. Do not allow slash burning without prior notification of homes impacted by the smoke.
Lack of reporting on possible hazards of local "terrorist" mentalities, those who will take advantage of planners and those who have prepared to take over. How to handle crime, threats, boundaries....to at least consider the possibilities of these issues.
Downtown Port Angeles has areas below sea level and with expected rising sea levels, a committee should be started to come up with options for how to address it.
Water will be a growing concern along with excessive heat over the next decades and the county needs to plan for this. Along with this, wildfire---we've been fortunate over the past decade, with no major fires in the valley, but with drought comes a growing risk. We need public education and monitoring/enforcement of outside fire use. All in all, people are used to watering their lawns and burning their yard waste, and so public education is necessary.
Thank you for this survey and financially/materially responding to the results as a priority!
Get over it
clean up rainier mill site . and help with jaun de fuca sea life decline . grew up here . the decline is alarming.
I feel our county has the tools necessary to handle most unforeseen hazards. I think it all starts with public awareness and education, which I haven't witnessed. In the event current strategies were raised to the next level, I think our preparedness would be inline. One critical issue that needs to be addressed, is unvetted people. Without a strategy for managing those individuals all the other hazards are a moot point.
Again added expense of a disaster Such as food Generator Gas Batteries for light s etc may cause a huge hardship on folks with limited income Also some kind of check list to make sure everyone is ok Like one person on each block check on residents to ensure their safety Such as what if an elder fell when the lights went out and could not reach a phone to contact anyone
Start charging NON Clallam and Jefferson County residents who come to our counties and indulge in our beautiful parks, ONLY TO FIND THEMSELVES STUCK,

Response
LOST OR INJURED IN THE PARKS! THEY THEN USE OUR RESOURCES FOR FREE TO HELP THEM GET ON THEIR VLOGGING YOUTUBE WAYS....THAT MONEY CAN GO TOWARDS THE EMERGENCY SERVICES TO KEEP THEM STOCKED UP AND READY FOR COMMUNITY MEMBERS DURING A DISASTER...
Follow the preparedness planning strategies put in place by the Joyce community. Get the city of Port Angeles Fire Department and Police Department more on board and willing to be open to taking on a more active role in coordinating education and preparedness with the community beyond simply stating that "they have a disaster policy down in the books" or that they've "got it covered." Thumbing through those books will do no good once a disaster has hit.
As a member (and current president) of Olympic Climate Action, our members are willing to work with helping the county deal with planning efforts, including mitigation and adaptation efforts.
There seems to be little involvement of citizens in incorporating the existing P.A. Resiliency Plan and County Resiliency Plan into existing Comp Plans. There seems to be minimal information regarding what's being done with the Comp Plans and how to stay informed.
Would just like to have more earthquake resistant buildings, such a s schools and large buildings that would house people in an emergency. Roads and bridges designed to withstand events. What do we do if there are fires, but power is off, cutting down water supply. Perhaps long term, distributed solar would allow more resiliency.
Come up with plan to increase communication among community members. Neighbors can help each other better if they can communicate. Encourage HOAs and community associations to brainstorm emergency plans. Example:list of satellite communicator numbers if cell phone towers fail during earthquake, locations of ham radio operators, who is our local CERT volunteer, and do we need more? Who is most vulnerable? What if you aren't home when earthquake happens but your spouse, children, pets are? How do you get word to theme, or let a neighbor know your spouse/child/pets/farm animals are home alone and you can't get home anytime soon.
We need to implement more water-efficient systems across the board. That will become our biggest challenge in the future. Accessing/providing clean water will be a very important engineering and community planning challenge.
BE AWARE, BE PREPARED, BECOME MORE KNOWLEDGABLE ABOUT THE RISKS.
Should have free training. Get churches, especially LDS church involved. They are big on being prepared. They can train other churches. Fire department can do free disaster preparedness classes, which goes beyond what the average person is trained for. The more people that are trained, the better. In an emergency, even those that can’t physically do the work themselves (seniors and handicapped) can be trained so they could advise someone that is not trained.

Response
Stop creating rules to mitigate risk. It doesn't help and further makes individuals complacent and ignorant of natural resources and how to take care of them.
We are overburdened by regulation and rules that create a dependence on the food system, medical system, and educational system. Deregulating these areas would allow people to establish local systems in a complex web that is more resilient and sustainable. Every home should have some level of food production or personal food connections, some knowledge of health and basic medical aid, and some ability to care for themselves and their families without county, state, or nationwide support.
We have no phone service when the power goes out because CenturyTel has no battery backup due to theft problems. A cell tower that served our location would solve that. Being in unincorporated Clallam Co. we have no police here and only limited State Patrol personnel. This is a real potential hazard in natural emergencies.
Glad you are addressing this issue.
Continue on going education & awareness training. What plan is there for community medical services in the event of major catastrophic disaster's ?
30 day supply??? I would love to see neighborhood education...small areas that meet together to learn, to share, ...so when a hazard happens, neighborhoods already have the bond to take care of each other.
Every vehicle should have a go-kit so that if you're stuck somewhere you can stay warm (1/2 tank of fuel, blankets), shoes capable of walking long distances, especially in inclement weather, 1 gallon of water per person.
More practice needed in the community is needed.
Parcels of land that contain dead trees that have fallen to the ground. The ground is dry and cluttered with flammable dead and rotting trees/l. Fire hazards such as this can cause files that spread to nearby homes. temperature controlled Sprinkler systems mounted on building roofs.
Do not allow private fireworks
No. Thanks for doing this good work.
I can't stress the need to put our winter water in reserve. We need water capture infrastructure to make sure we have water when snow levels or low, or when the glaciers fully retreat. I also think we could be a great source of carbon sequestration through biochar;, 10,000 years institute is trying to do this with Scotch Broom.
Very concerned especially now with advanced technology in the hands of bad actors of intentionally caused hazards such as laser weapon technology to cause fires such as is now happening in Texas despite the cold weather and what happened in Maui. Very concerned of open border letting in unvetted people...in the millions...drug cartels establishing in communities/ trafficking.
This summer is likely to be a drought. Increasing the population and number of homes without a reservoir is stupid. The other looming threat is wildfires. We need to develop and communicate plans rapidly as this isn't an "if" but a "when".
I want new county boundaries drawn from Gardiner to Maynard (tip of Discovery Bay). I am trained to serve Clallam. I need to benefit from it and have the proper alert

Response
system. I am retired and have learned more about disaster preparedness in the past year from my CERT training at the Academy, than I have in my lifetime and I grew up in the mid-west tornado belt and winter storms, and lived 20+ heat in AZ.
Honestly, out of the 5 Operational Areas, Port Angeles is the furthest behind in education and preparedness.
I live in a forest area, so fire prevention and response is my main concern.
Inform people north of the new Dungeness levee that it is potentially a deadly tsunami evacuation route.
Most of the hazards in our area are not controllable via human intervention. Basically, safety and preparedness are the primary actions that should be taken by our residents.
We are isolated here. If one bridge goes out, supplies will be delayed, medical help hindered, etc.—even between Sequim and Port Angeles. We should have an emergency center (doesn't Joyce have one?).
Having multiple ways to get information to the public. Convincing public that they are their own first responder.
It's up to the individual to change. Organization around preparing and managing the future only works when people have devoted themselves to the righteousness of living in a way that honors our sustained existence on earth. Don't place the human ego upon your interaction with nature, we are animals first, humans second. Start with educating the children about our future and the options they might have.
Clallam County needs to work with the Cities and PUD to secure FEMA BRIC grant funding for regional projects that will increase resiliency to climate change and earthquakes. Focus on water, wastewater and electric utility resiliency. Everything else is secondary or lower on the priority scale. As a community (County) we need to be prepared to be cut off from the 'mainland' for 2-4 weeks minimum.
It's not that we have no supplies at all, but we live in 800 sq ft and there's only so much room. Prices for things have also gone up too--we can barely afford the monthly necessities.
Wildfire concerns. If Miller Peninsula State Park is developed into a destination park, the chance of wildfire increases. Diamond Point Road is the only road in and out of the area. It would be next to impossible for residents and campers to evacuate on that road at intersection with HWY 101. Water concerns. Creating that park may cause salt water intrusion into our aquifers as water demand increases.
Major disasters have far more survivors than casualties, but plans must be ID'd for possible surviving child or elderly if rest of family gone. Let community know ham radio may be only communication and their priorities: disaster, mitigation, supplies then family contact. Need way to utilize volunteers who want to help with known area to report!
More needs to be done to incentivize families to make small incremental changes in their lifestyles and preparedness. Having a prepared citizenry should be priority #1.

Response
#2 is looking a "low-hanging fruit", minimal cost preparations (maps, signage, out-reach) #3 is looking at major infrastructure build-outs.
We have food stored, however it probably needs to be replenished.
More CERT training for rural areas. Designated community members in rural areas to reach out to in case of emergency.
Again, we need an agency in charge of specific fire risk evaluation, guidance, and assistance with removal of hazards such as the rapidly growing number of dying trees. Our property has become a hazard due to the sheer number of standing dead trees, as have many neighboring properties and public lands. We also need more over-site of places/public lands where people tend to do stupid things like lighting fireworks and getting drunk and lighting campfires. Also possibly drone surveillance of wild lands to monitor wildfires, especially during or after lightning storms.
Most people do not have air conditioning. The County should consider setting up cooling centers for those in need. When there is a major risk from wildfire smoke then the most vulnerable need either personal devices or a public space with capable filtration.
Being able to evacuate in a timely and planed order.
Get people to prepare!
grants to improve/ replace residents' existing wells if they are impacted by decreased aquifer levels due to county or city over permitting, put more turn lanes on hwy 101, retrofit schools in CLALLAM county, post hunting season on DNR gates to inform hikers, desalinate water, position water/food and emergency supplies in structures along Hwy 101 for the unprepared tourists or warn all visitors via road signs and radio as they enter the area about the need for preparedness, teach basic first aid in schools, make it easier to dispose of yard waste including fallen trees- use them for lumber, plant forests— don't decimate them, put environmental scientists on decision-making committees or at least require their documented input on plans with environmental impact. Strengthen electrical grid for increased demand using renewable sources. Require solar systems to have "switch to off-grid use" during power failures instead of switching off completely.
My planning horizon is more like 5 days rather than 30; my plan would probably stretch more than 5 days but not all the way to 30 days
Very important to get to know your neighbors
Don't know if response recorded above. I am concerned about the ability for local response in the short-term. While long-term planning seems adequate, adequate/appropraite responses to immediate events seems lacking. Also, local responders and planners seem indifferent to outside questions and concerns. Some volunteer organizationa are more enamored with the CV of higher profile volunteers than they are with the demonstrated abilities in local exercises. Also, it appears that Map Your Neighborhood no longer exists. There is a lack of transparency and openness to comments among many responders organizations. There is also an arrogance among some in the first responder community. As an former military EMT

Response
and health care professional I have been discouraged by participation in local programs and events.
We do not have a reunification plan for the schools.
CERT has been a fantastic resource for learning about and preparing for disasters. They should have more funding and input.
1. There are many ways to deal with drought. Not watering lawns - celebrating brown lawns! - maybe with awards fir the brownest. Outreach and prominently placed demonstration gardens with drought tolerant and fire-resistant plants. 2. Land use planning and building permits - don't allow residences on bluffs, in forests, in wetlands. Facilitate permitting to move homes back from bluffs. 4. Protect groundwater from contamination. Facilitate ground water injection. 4.While we are at it, Septic 101 and 102. They create awareness of water usage, as well as prevent pollution of groundwater.
Work BEYOND your traditional mental health allies (PBH, OMC, Salish BH/ASO, OCH, etc.) and REACH OUT TO FIND PEERS. While Jefferson County has the Recovery Cafe and Kitsap hopes to start one… WE HAVE NOTHING. The establishment story they tell, while well intended, only speaks from that of employees. No one there openly and consistently speaks of having personal experience with emotional distress. All these disasters have emotional components yet there is no outreach to the very people who can speak to what actually helps. Its NOT Mental Health First Aid
Winter storms and landslides routinely close roads. The power goes out every winter for various durations. An earthquake will close roads and shut the power off for a very long time. The West End needs to be self-sufficient in an emergency. After Hurricane Katrina, help did not reach some rural counties and small towns for a month. The responders were all busy in the cities and larger communities. I am concerned that if something really bad happens Clallam County and especially the West End will be among the last to be helped while responders are busy in the I-5 corridor.
Awareness campaigns. Community building for food resources
Natural disasters, including what you call climate change, are exactly that, natural. Stop acting like you can prevent everything and anything from harm. Concerned about flooding-don't build on the water; concerned about wildfire-don't build in the middle of the woods; concerned about earthquakes-don't live in a quake prone area; concerned about pandemics-don't elect people like Jay Inslee, Joe Biden, Cuomo etc who sell out the country to the likes of Anthony Fauci and lock up vulnerable seniors in germ plagued nursing homes and prevent them from seeing their relatives.
The current highway system is easily blocked by vehicle wrecks, that means it will fail easily during any natural event. There is no plan or infrastructure for dealing with regional water shortages, which are going to become common since the Olympic Mountains are having reduced snow packs.
Local governments aren't always monitoring conditions that are already changing due to climate change. For example, aquifer supplies may be declining but very little data is collected or examined to determine if so. Also, wildfire smoke from other areas can

Response
be a huge impact, not just smoke from fires here. I know someone who moved here from Vashon Island because she heard that the wind along the Strait prevents wildfire smoke buildup in our air !! Little does she know...
Prosecute criminals. Discourage/evict homeless migrants.
EVs overtax the grid and cannot be relied upon during power outages. Their use should be universally discouraged.
Re: 16, I have limited funds and also limited time to dedicate for preparation, between work and family care obligations. I am not Indigenous, but have seen how Indigenous leadership benefits the whole community! There are multiple federally-recognized Tribes in the county, please continue to partner and support their capacity and ideas! I am concerned about natural hazards but also failing infrastructure, and the limited evacuation options on the peninsula. Thank you for being proactive and creating this survey!
After reading quite a bit about the Paradise fire, Eagle Creek fire & Lahaina fire I think we need to be more proactive about really limiting fireworks even further, protecting our residents by developing more escape routes, burying power lines where appropriate, educating the community in areas of increased risk like Diamond Point, possibly considering using the tsunami sirens as a warning system for wild fires, etc. I realize all of these things are complicated & cost money but wildfires come with huge costs as well.
Sequim has severe entitlement and a distinct lack of boundaries combined with the believe nobody is entitled to anything and civil rights only belong to people who make a living wage and own property.
I'll think about it and see if I have any usable ideas to impart later.
In our case we have trees that worry me during heavy winds which occur every few years...and I do not have the ability or funding to deal with them. PUD does a fantastic job keeping power lines cleared...maybe a program to help clear difficult trees?
I see power poles being replaced on a regular basis. But as power poles age, I cannot understand why those lines are not getting placed underground. Almost all of our power outages here on the peninsula involved trees falling on lines, or poles getting knocked over. It seems ridiculous that they have not been buried already.
Three times a year education of community by review of disaster plans, review of emergency supplies, review of evacuation routes. Would be wonderful if it were neighborhood meetings where these items are review and expectations of the role of community members are spelled out.
Wild fires are the most immediate risk. The Cascadia Subduction Zone is only a matter of time, but only God knows how much.
Recovery periods of great concern do not believe government really prepared with real results of these disasters too superficial hand wavering over them All words no acts or plans
many roads off 101 are dead end. Only one way to go in or out. Need more slightly developed paths to link more roads together for better access

Response
Thanks for doing this survey; I appreciate the chance to voice my concerns.
Take map your neighborhood/ CERT training.
When highly motivated we are amazing at responding to critical needs unfortunately we are rarely highly motivated and have short attentions spans. We also are very poor at preparing for things before there is a perceived critical need. Our political system rewards not preparing and punishes those who encourage preparation and planning ahead. We inadvertently will pay much more to repair damaged infrastructure post "emergency" rather than spend a small amount on retrofits or maintenance. This does not set us up for effective response to natural disasters. Our systems also favor aid to those who need it the least. Thank you to all the folks who toil behind the scenes to try to overcome these human tendencies.
If I was one of these illegal immigrant terrorist's and I wanted to hurt this country, I would wait until the peak of summer drought and send 1,000 cars with 1,000 boxes of road flares in every direction and I would burn it. If they figure this out and we have not taken precautions ... we're done.
I need to review the 30-day supply of food and water. I have the food but the water seems to be a challenge. It goes bad in the plastic, are there alternatives?
Mitigation efforts were attempted to help Sekiu and Clallam Bay by CFSD; however, the township has no plan created to assist people who live in the area. The only institution is the prison and the state nor the county has a plan for this area. The superintendent of CFSD has prioritized Neah Bay over Clallam Bay for relocation. Children's lives are at stake and the same with the townspeople. The only place for refuge in a disaster but the effects of tsunamis and earthquakes will decimate the building. Total destruction for the town.
Where am I supposed to store 30 days of water? Now is the time to consider large scale projects that challenge existing paradigms. It will only get harder as population density increases.
Cyber attacks on utility infrastructure Your income levels stop to early at the current housing cost a family can make just over 100k and be going pay check to pay check
We have supplies for a week, but have not gotten supplies yet for a 30-day period. We know we should do it - it's just what to do with supplies that can go bad and need replacement frequently?
There was a push for emergency preparedness a while back but it seems that it has died down and unfortunately it is NOT something people should just forget about. There needs to be more opportunities for citizens to get the ongoing information, training, and support they need to learn about and understand potential threats and disasters we could possibly face whether natural or man made. I earned an A.A.S. in Homeland Security and Emergency Management several years ago and I know that being prepared makes all the difference and can actually mean the difference between surviving a disaster or emergency or not. Hurricane Maria decimated Puerto Rico while I was earning my degree and because all my family on my father's side lives there I made another trip back down and I saw first hand what can happen after

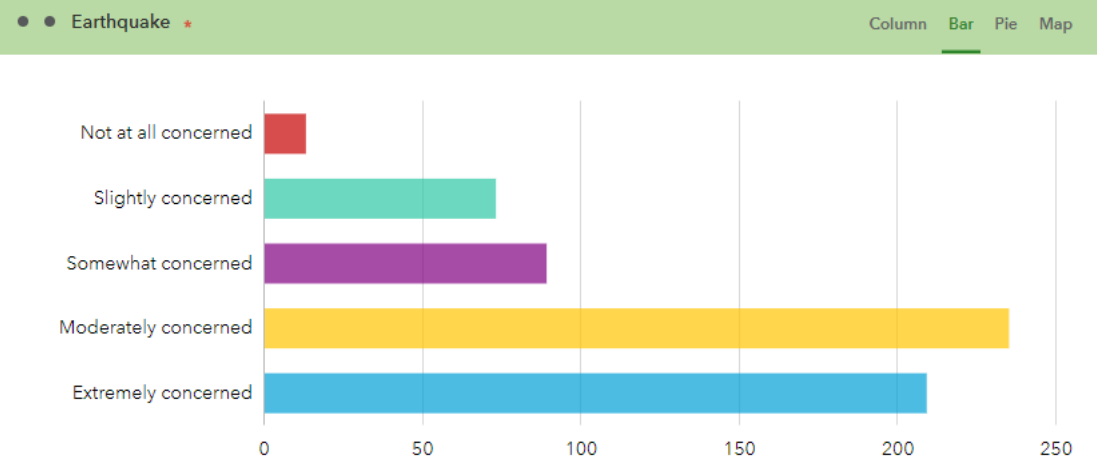
Response
a major disaster. We NEED to be prepared for the Big One. Nature doesn't have a timeline. We all need to be vigilant, to be prepared for it or any other disaster that could strike.
In disaster scenario planning - consider the differences in human needs whether it should happen during the tourist season vs off-season
We are losing our most important source of water (particularly in the summer) because of the melting and soon to disappear ice pack in the Olympics. Continued growth will begin to outstrip our ability to support residential growth as well as agriculture's need for water . We need to have more storage sites for water when it is raining without dams on the water. the Off Channel Reservoir is a good option. We also need to know what is happening with our aquifers. The City of Sequim and PUD are proposing new wells, some that go beyond the 3rd aquifer. What is the affect of new demands on these aquafers?

19. What is your race and ethnicity? *(Select all that apply)*

Response
white, African American, Native American
Sicilian
part hispanic, part white
Born and raised in the U.S. Does that make me a native American?
White and Hispanic/Latino
Native American - Oneida
multi-ethnic

Appendix B. Detailed Figures

5. Please indicate your level of concern for each natural and human-caused hazard that may affect you, your household, and your community.

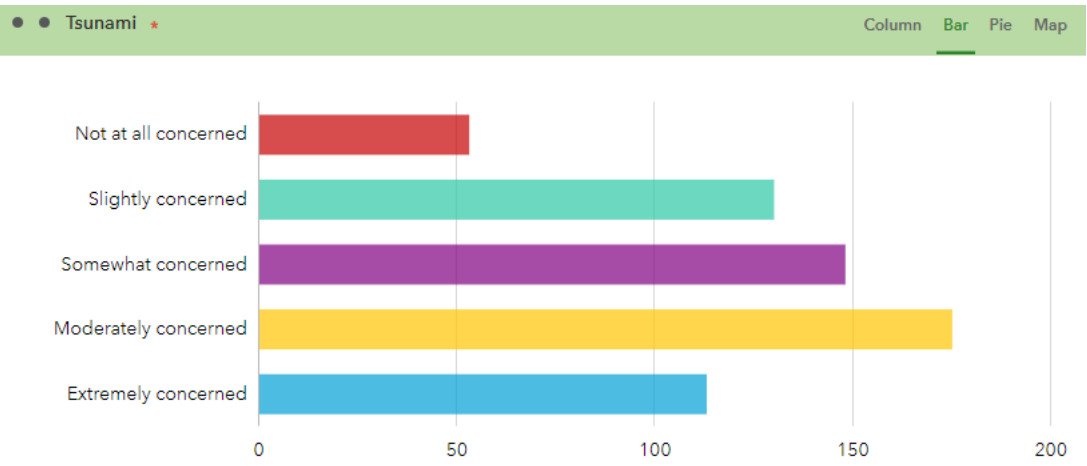


Hide table

Empty categories Sort

Answers	Count	Percentage
Not at all concerned	13	2.1%
Slightly concerned	73	11.79%
Somewhat concerned	89	14.38%
Moderately concerned	235	37.96%
Extremely concerned	209	33.76%

Answered: 619 Skipped: 0



Hide table

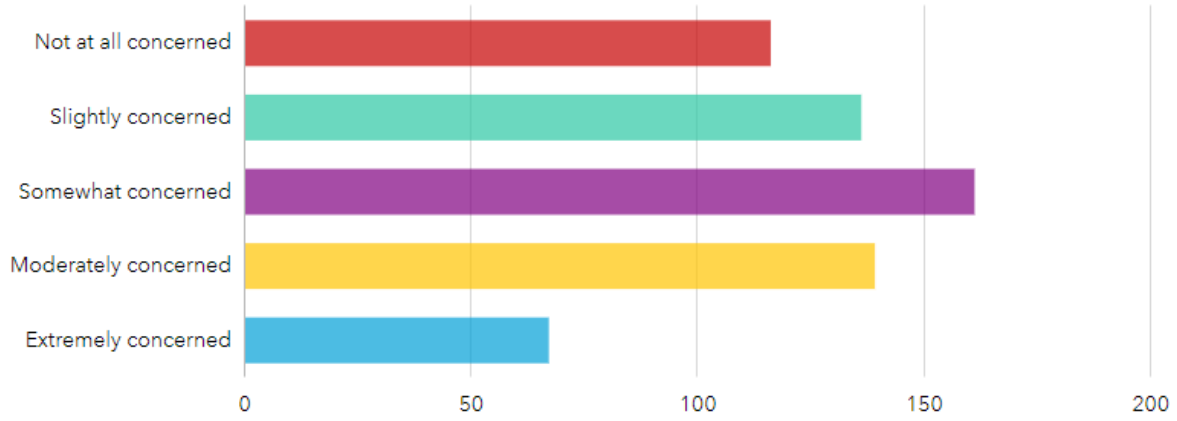
Empty categories Sort

Answers	Count	Percentage
Not at all concerned	53	8.56%
Slightly concerned	130	21%
Somewhat concerned	148	23.91%
Moderately concerned	175	28.27%
Extremely concerned	113	18.26%

Answered: 619 Skipped: 0

Extreme Heat *

Column Bar Pie Map



Hide table

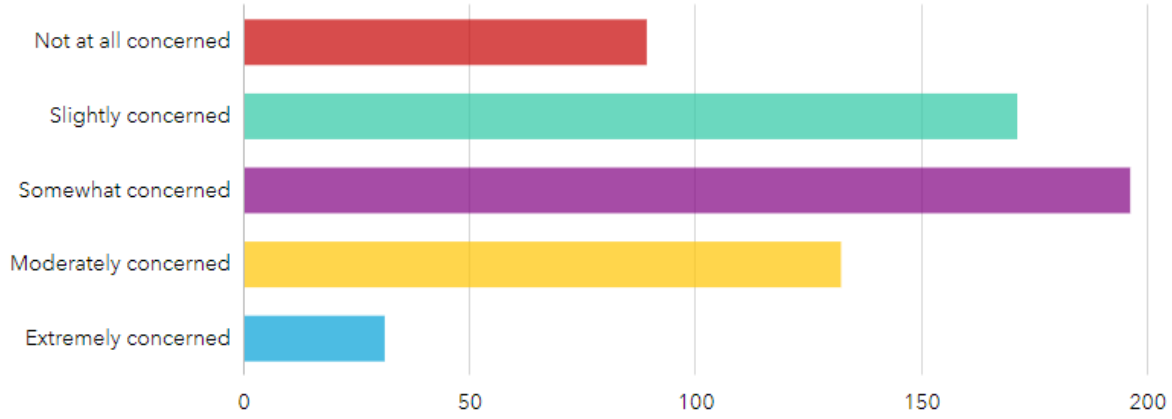
Empty categories Sort

Answers	Count	Percentage
Not at all concerned	116	18.74%
Slightly concerned	136	21.97%
Somewhat concerned	161	26.01%
Moderately concerned	139	22.46%
Extremely concerned	67	10.82%

Answered: 619 Skipped: 0

Flooding *

Column Bar Pie Map



Hide table

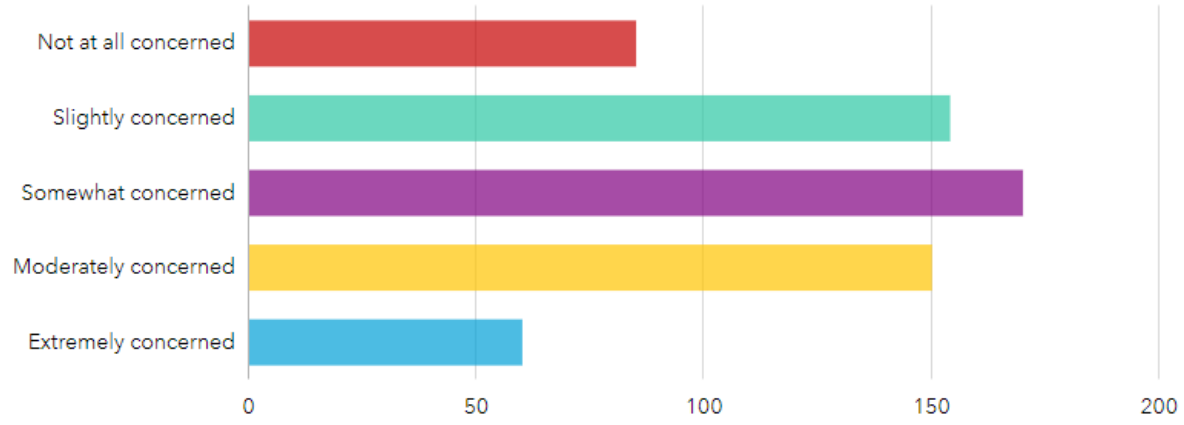
Empty categories Sort

Answers	Count	Percentage
Not at all concerned	89	14.38%
Slightly concerned	171	27.63%
Somewhat concerned	196	31.66%
Moderately concerned	132	21.32%
Extremely concerned	31	5.01%

Answered: 619 Skipped: 0

Landslide *

Column Bar Pie Map

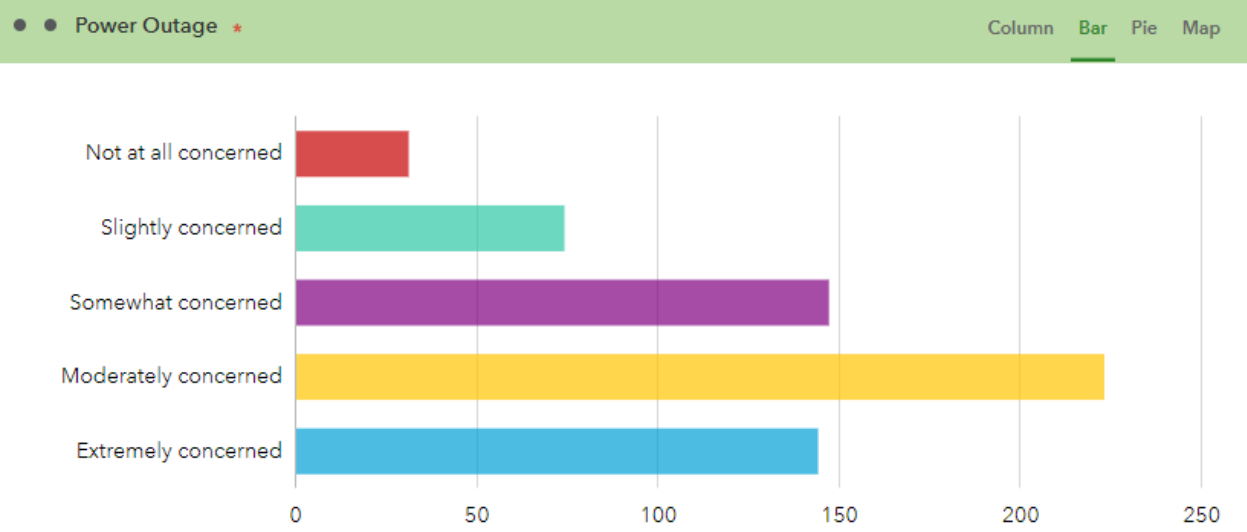


Hide table

Empty categories Sort

Answers	Count	Percentage
Not at all concerned	85	13.73%
Slightly concerned	154	24.88%
Somewhat concerned	170	27.46%
Moderately concerned	150	24.23%
Extremely concerned	60	9.69%

Answered: 619 Skipped: 0



Hide table

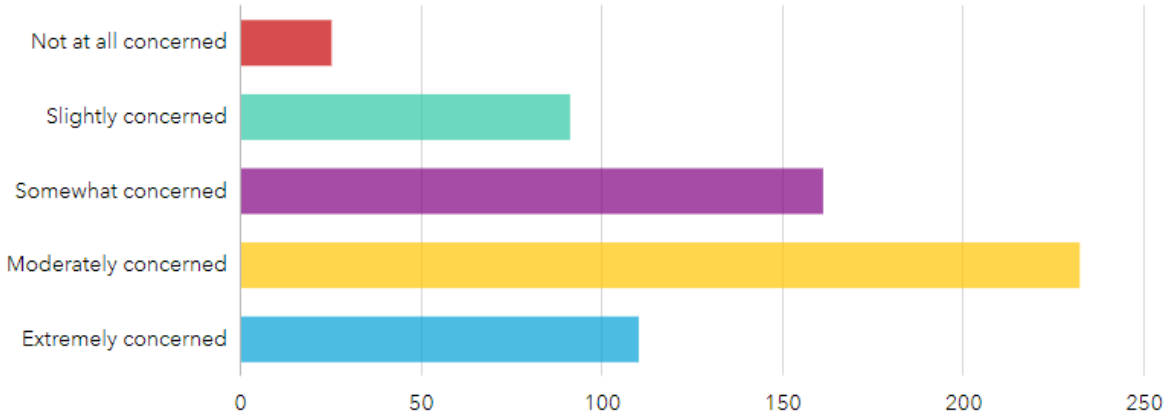
Empty categories Sort

Answers	Count	Percentage
Not at all concerned	31	5.01%
Slightly concerned	74	11.95%
Somewhat concerned	147	23.75%
Moderately concerned	223	36.03%
Extremely concerned	144	23.26%

Answered: 619 Skipped: 0

Windstorm *

Column Bar Pie Map

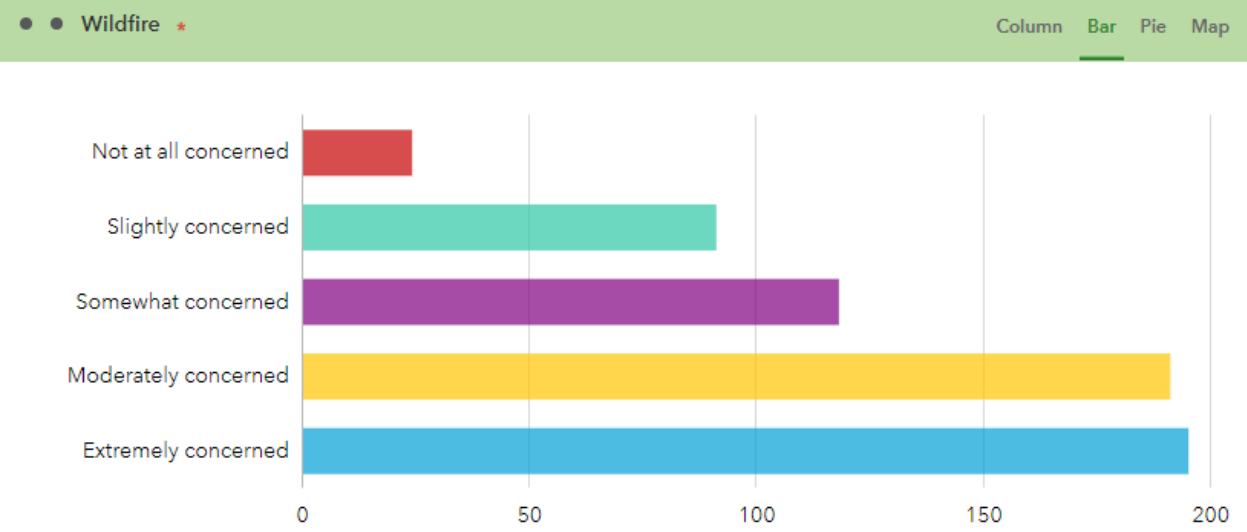


Hide table

Empty categories Sort

Answers	Count	Percentage
Not at all concerned	25	4.04%
Slightly concerned	91	14.7%
Somewhat concerned	161	26.01%
Moderately concerned	232	37.48%
Extremely concerned	110	17.77%

Answered: 619 Skipped: 0



Hide table

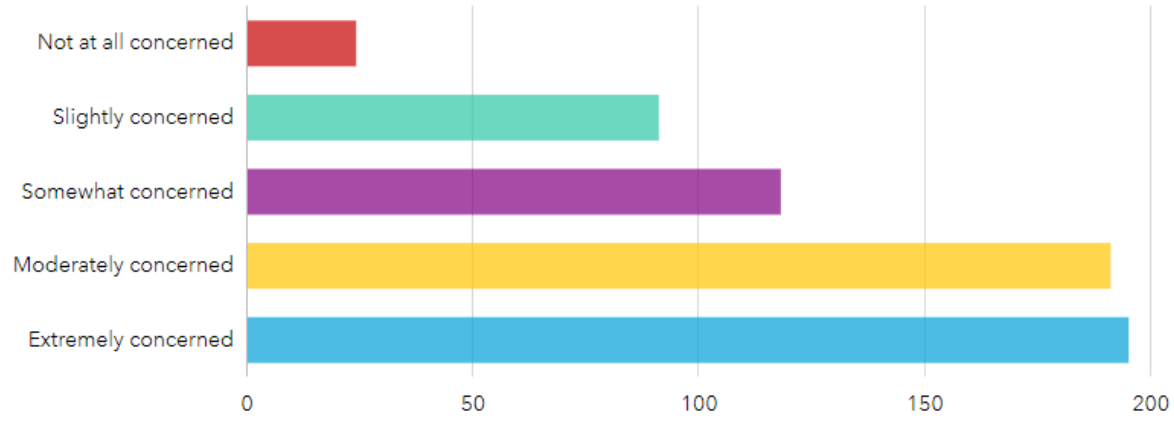
Empty categories Sort

Answers	Count	Percentage
Not at all concerned	24	3.88%
Slightly concerned	91	14.7%
Somewhat concerned	118	19.06%
Moderately concerned	191	30.86%
Extremely concerned	195	31.5%

Answered: 619 Skipped: 0

Wildfire *

Column Bar Pie Map



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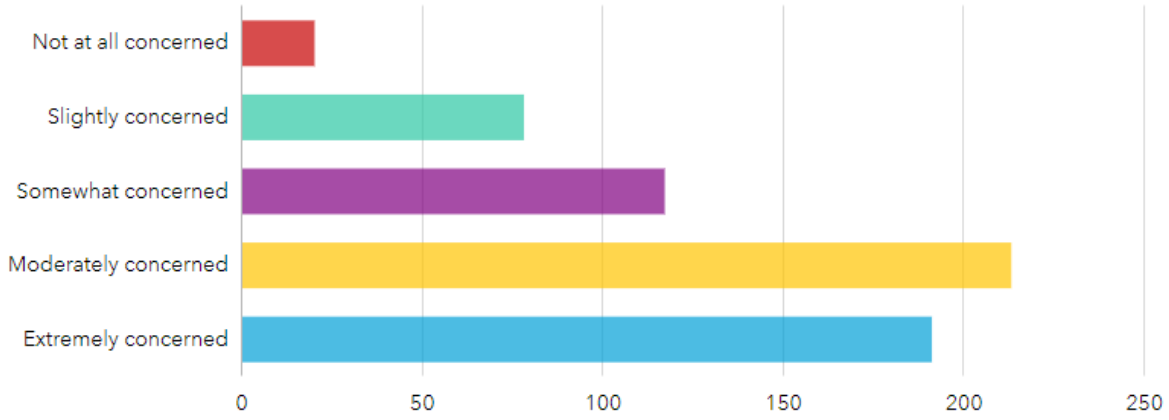
Empty categories Sort

Answers	Count	Percentage
Not at all concerned	24	3.88%
Slightly concerned	91	14.7%
Somewhat concerned	118	19.06%
Moderately concerned	191	30.86%
Extremely concerned	195	31.5%

Answered: 619 Skipped: 0

Wildfire smoke *

Column Bar Pie Map



Hide table

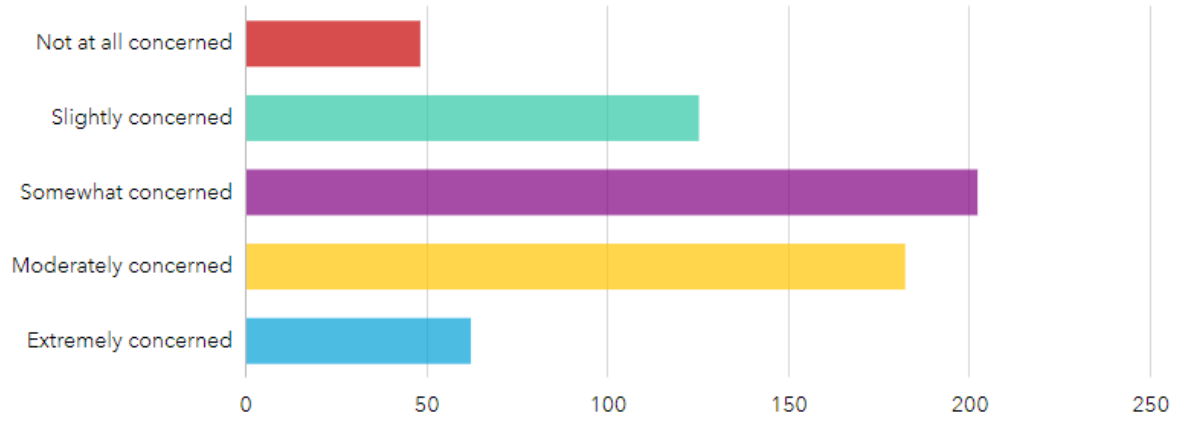
Empty categories Sort

Answers	Count	Percentage
Not at all concerned	20	3.23%
Slightly concerned	78	12.6%
Somewhat concerned	117	18.9%
Moderately concerned	213	34.41%
Extremely concerned	191	30.86%

Answered: 619 Skipped: 0

Winter Storm *

Column Bar Pie Map



Hide table

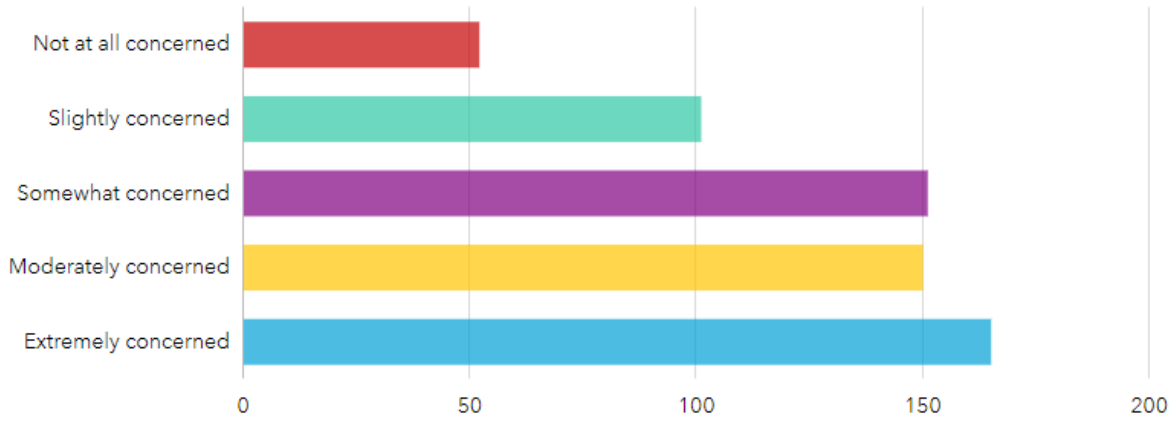
Empty categories Sort

Answers	Count	Percentage
Not at all concerned	48	7.75%
Slightly concerned	125	20.19%
Somewhat concerned	202	32.63%
Moderately concerned	182	29.4%
Extremely concerned	62	10.02%

Answered: 619 Skipped: 0

Drought *

Column Bar Pie Map



Hide table

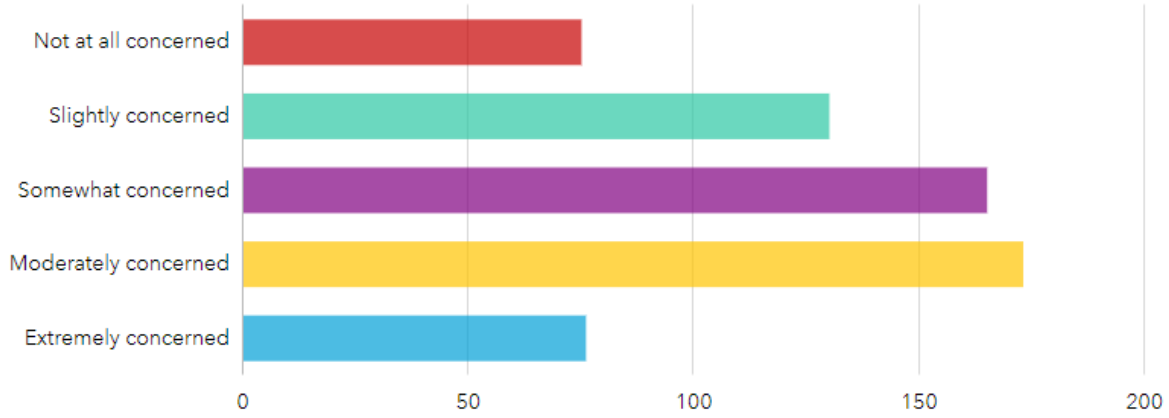
Empty categories Sort

Answers	Count	Percentage
Not at all concerned	52	8.4%
Slightly concerned	101	16.32%
Somewhat concerned	151	24.39%
Moderately concerned	150	24.23%
Extremely concerned	165	26.66%

Answered: 619 Skipped: 0

Disease/ Pandemic *

Column Bar Pie Map



Hide table

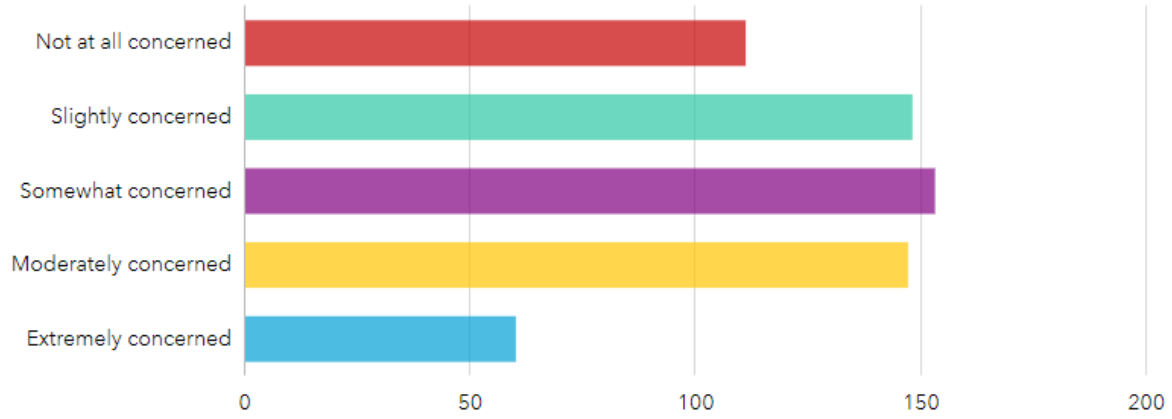
Empty categories Sort

Answers	Count	Percentage
Not at all concerned	75	12.12%
Slightly concerned	130	21%
Somewhat concerned	165	26.66%
Moderately concerned	173	27.95%
Extremely concerned	76	12.28%

Answered: 619 Skipped: 0

Sea Level Rise *

Column Bar Pie Map

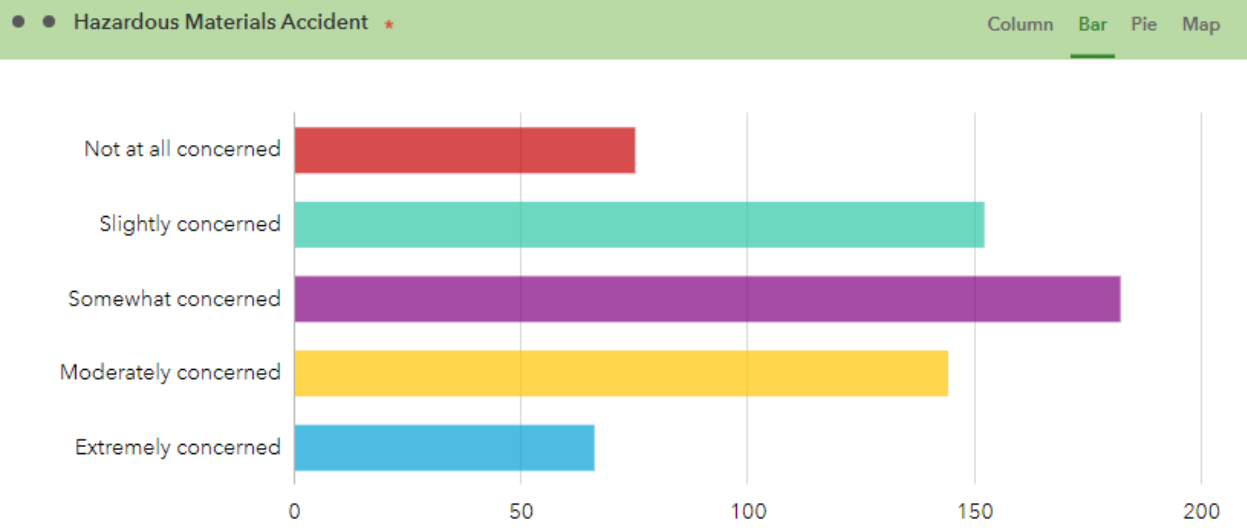


Hide table

Empty categories Sort

Answers	Count	Percentage
Not at all concerned	111	17.93%
Slightly concerned	148	23.91%
Somewhat concerned	153	24.72%
Moderately concerned	147	23.75%
Extremely concerned	60	9.69%

Answered: 619 Skipped: 0



Hide table

Empty categories Sort

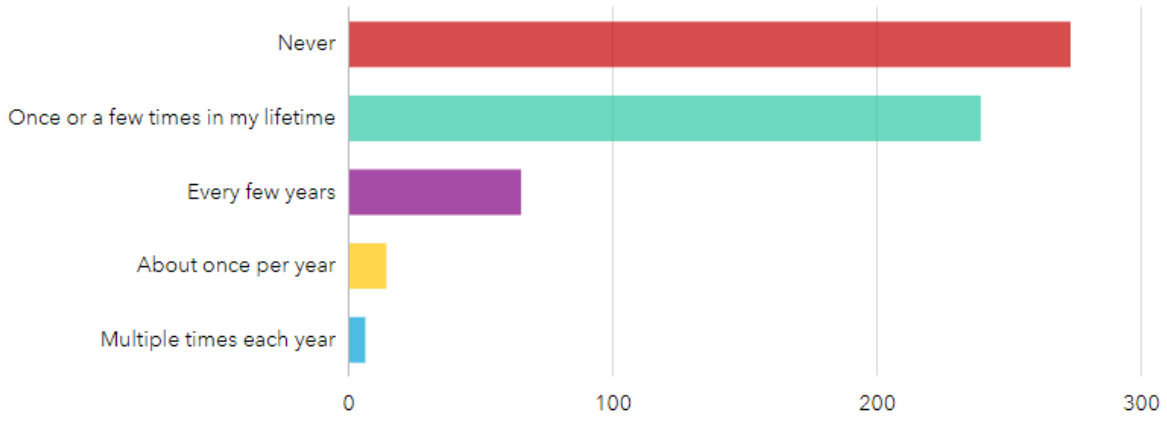
Answers	Count	Percentage
Not at all concerned	75	12.12%
Slightly concerned	152	24.56%
Somewhat concerned	182	29.4%
Moderately concerned	144	23.26%
Extremely concerned	66	10.66%

Answered: 619 Skipped: 0

7. Which of the following types of natural and human-caused hazards have you or someone in your household experienced while residing and/or working in Clallam County?

Earthquake

Column Bar Pie Map



Hide table

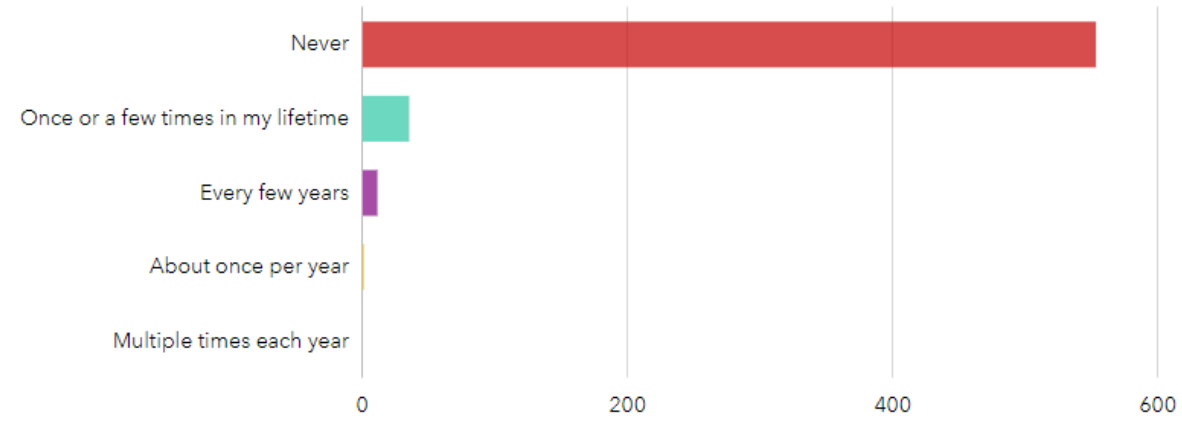
Empty categories Sort

Answers	Count	Percentage
Never	273	44.1%
Once or a few times in my lifetime	239	38.61%
Every few years	65	10.5%
About once per year	14	2.26%
Multiple times each year	6	0.97%

Answered: 597 Skipped: 22

Tsunami

Column Bar Pie Map



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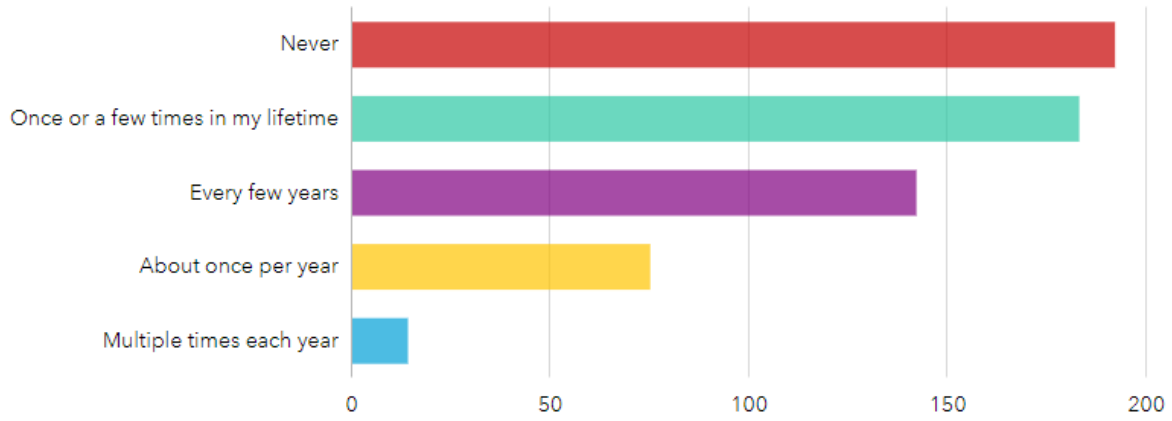
Empty categories Sort

Answers	Count	Percentage
Never	553	89.34%
Once or a few times in my lifetime	35	5.65%
Every few years	11	1.78%
About once per year	1	0.16%
Multiple times each year	0	0%

Answered: 600 Skipped: 19

Extreme Heat

Column Bar Pie Map

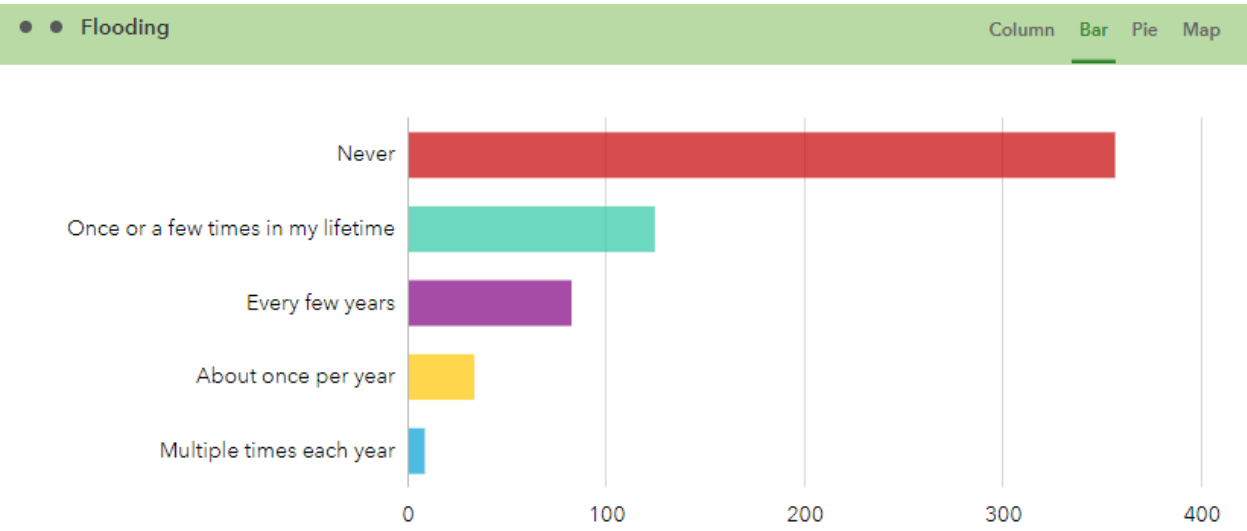


Hide table

Empty categories Sort

Answers	Count	Percentage
Never	192	31.02%
Once or a few times in my lifetime	183	29.56%
Every few years	142	22.94%
About once per year	75	12.12%
Multiple times each year	14	2.26%

Answered: 606 Skipped: 13



Hide table

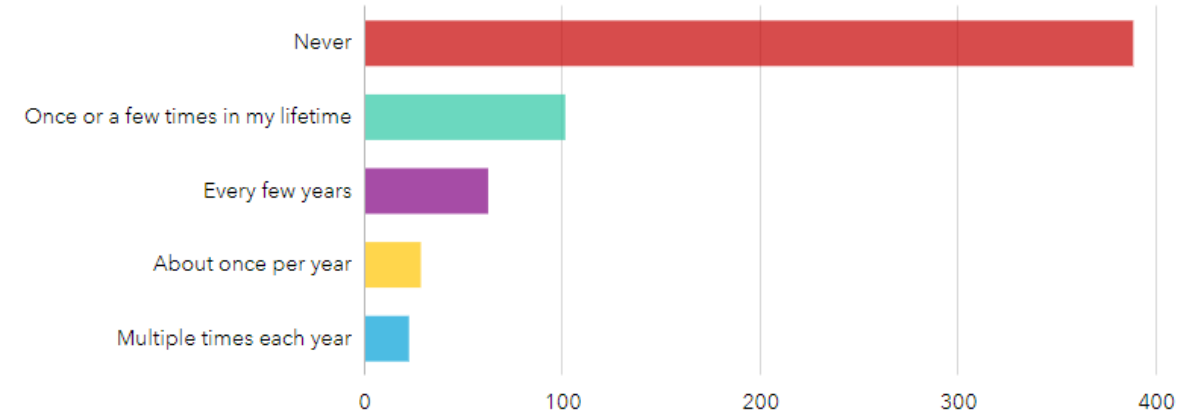
Empty categories Sort

Answers	Count	Percentage
Never	356	57.51%
Once or a few times in my lifetime	124	20.03%
Every few years	82	13.25%
About once per year	33	5.33%
Multiple times each year	8	1.29%

Answered: 603 Skipped: 16

Landslide

Column Bar Pie Map



Hide table

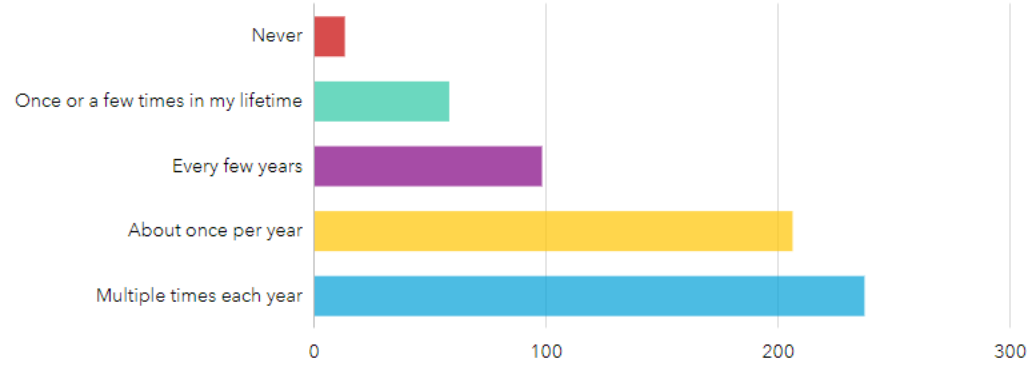
Empty categories Sort

Answers	Count	Percentage
Never	388	62.68%
Once or a few times in my lifetime	101	16.32%
Every few years	62	10.02%
About once per year	28	4.52%
Multiple times each year	22	3.55%

Answered: 601 Skipped: 18

Power Outage

Column Bar Pie Map



Hide table

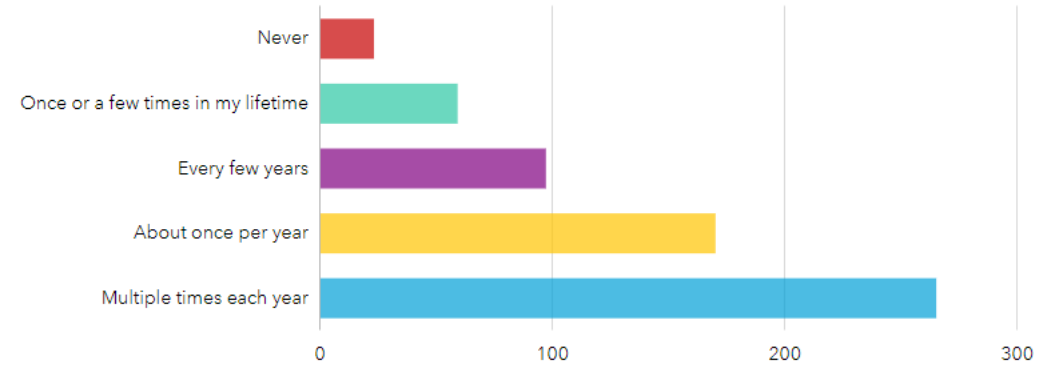
Empty categories Sort

Answers	Count	Percentage
Never	13	2.1%
Once or a few times in my lifetime	58	9.37%
Every few years	98	15.83%
About once per year	206	33.28%
Multiple times each year	237	38.29%

Answered: 612 Skipped: 7

Windstorm

Column Bar Pie Map

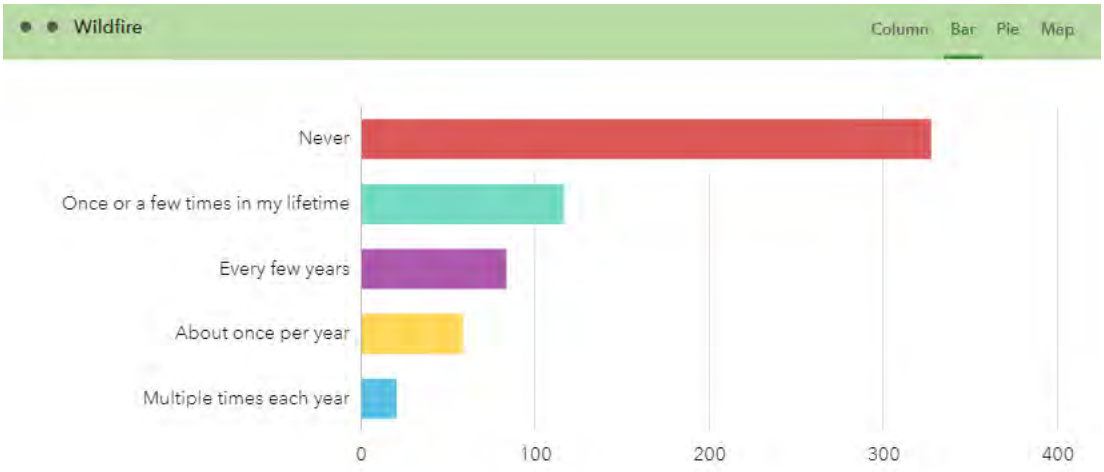


Hide table

Empty categories Sort

Answers	Count	Percentage
Never	23	3.72%
Once or a few times in my lifetime	59	9.53%
Every few years	97	15.67%
About once per year	170	27.46%
Multiple times each year	265	42.81%

Answered: 614 Skipped: 5



Hide table

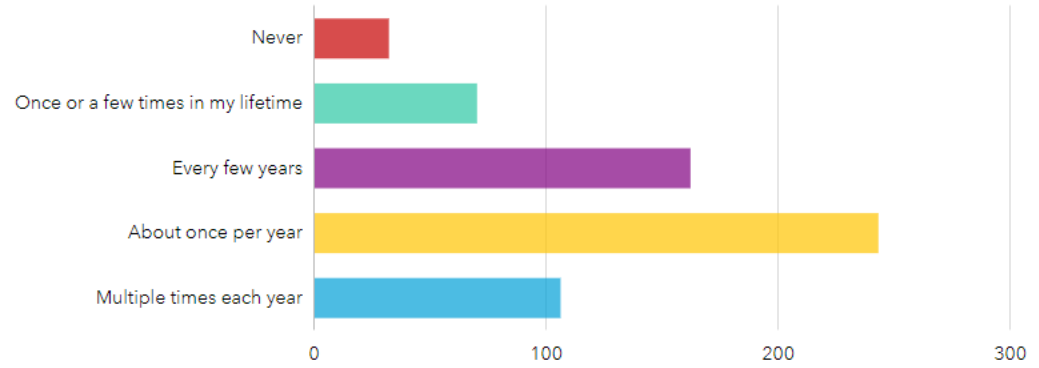
Empty categories Sort

Answers	Count	Percentage
Never	327	52.83%
Once or a few times in my lifetime	116	18.74%
Every few years	83	13.41%
About once per year	58	9.37%
Multiple times each year	20	3.23%

Answered: 604 Skipped: 15

Wildfire smoke

Column Bar Pie Map

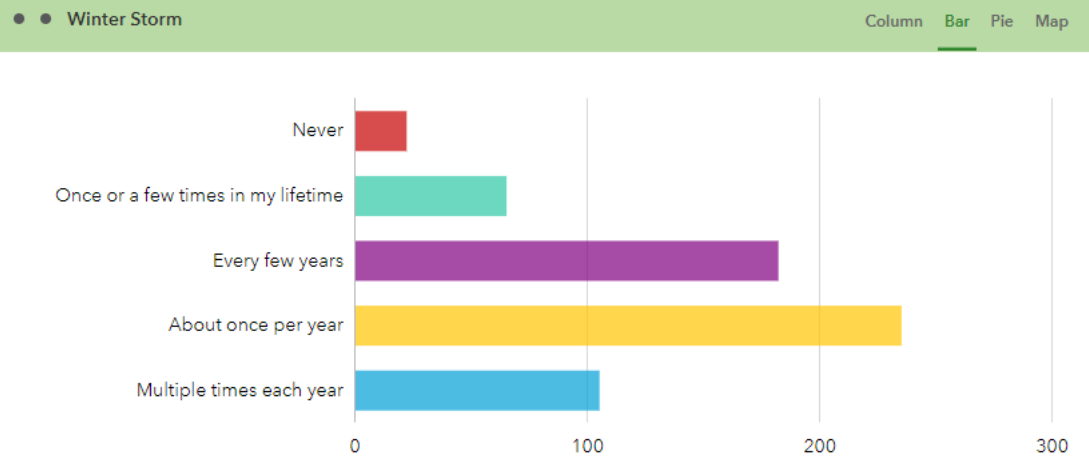


Hide table

Empty categories Sort

Answers	Count	Percentage
Never	32	5.17%
Once or a few times in my lifetime	70	11.31%
Every few years	162	26.17%
About once per year	243	39.26%
Multiple times each year	106	17.12%

Answered: 613 Skipped: 6

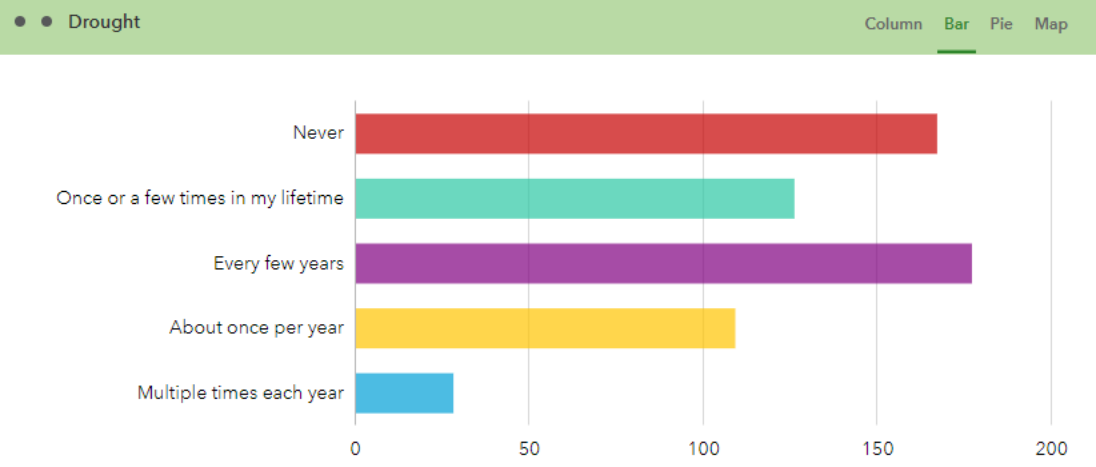


Hide table

Empty categories Sort

Answers	Count	Percentage
Never	22	3.55%
Once or a few times in my lifetime	65	10.5%
Every few years	182	29.4%
About once per year	235	37.96%
Multiple times each year	105	16.96%

Answered: 609 Skipped: 10



Hide table

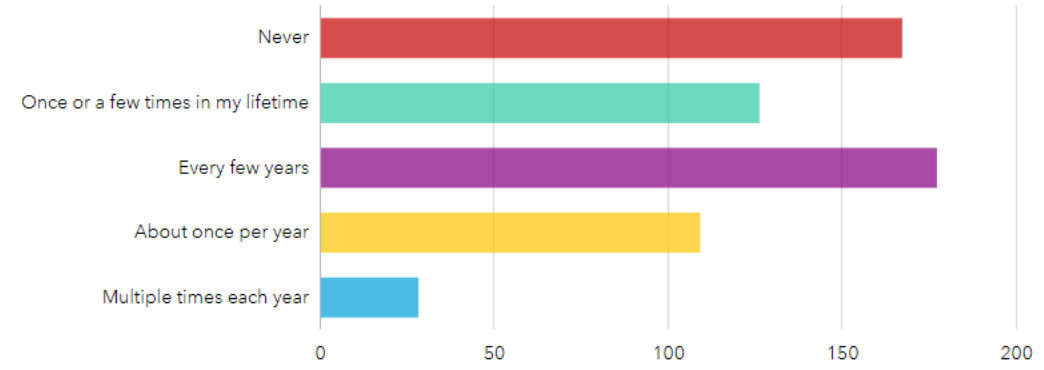
Empty categories Sort

Answers	Count	Percentage
Never	167	26.98%
Once or a few times in my lifetime	126	20.36%
Every few years	177	28.59%
About once per year	109	17.61%
Multiple times each year	28	4.52%

Answered: 607 Skipped: 12

Drought

Column Bar Pie Map



Hide table

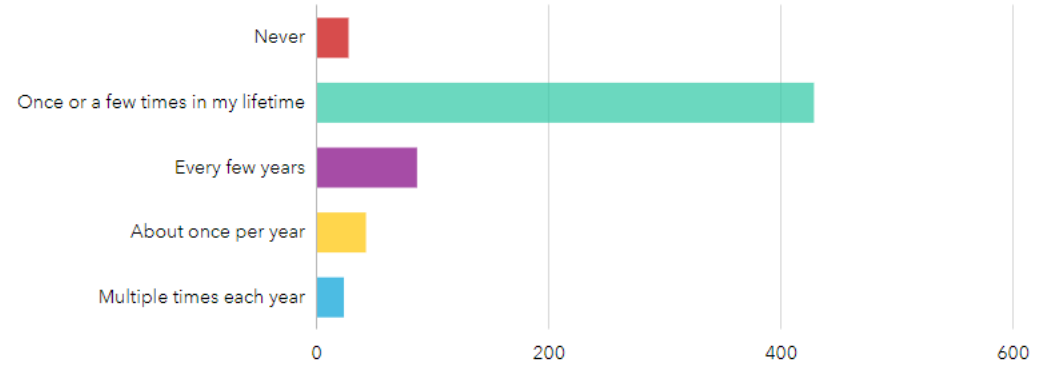
Empty categories Sort

Answers	Count	Percentage
Never	167	26.98%
Once or a few times in my lifetime	126	20.36%
Every few years	177	28.59%
About once per year	109	17.61%
Multiple times each year	28	4.52%

Answered: 607 Skipped: 12

Disease/ Pandemic

Column Bar Pie Map



Hide table

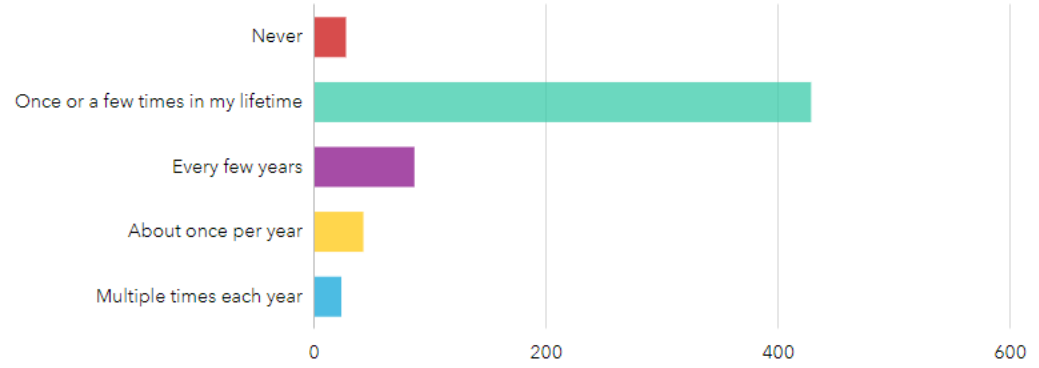
Empty categories Sort

Answers	Count	Percentage
Never	27	4.36%
Once or a few times in my lifetime	428	69.14%
Every few years	86	13.89%
About once per year	42	6.79%
Multiple times each year	23	3.72%

Answered: 606 Skipped: 13

Disease/ Pandemic

Column Bar Pie Map

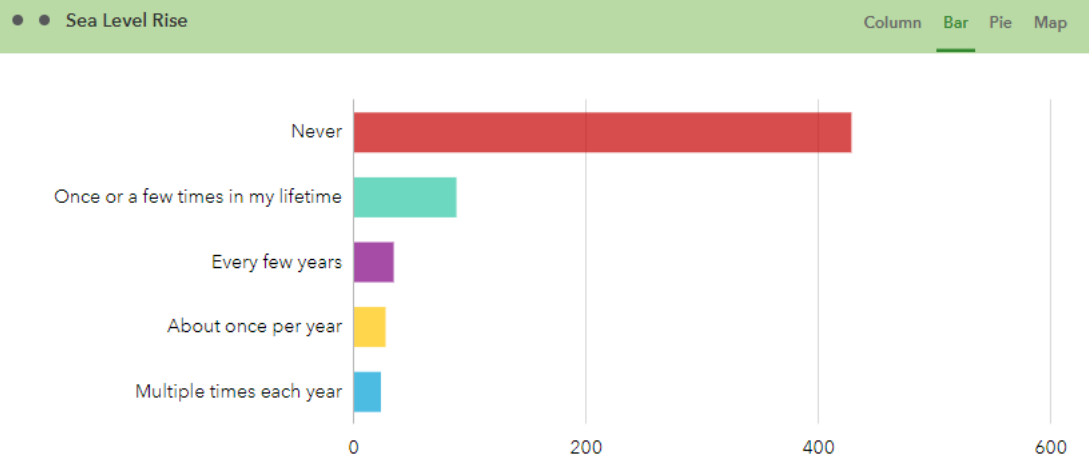


Hide table

Empty categories Sort

Answers	Count	Percentage
Never	27	4.36%
Once or a few times in my lifetime	428	69.14%
Every few years	86	13.89%
About once per year	42	6.79%
Multiple times each year	23	3.72%

Answered: 606 Skipped: 13



Hide table

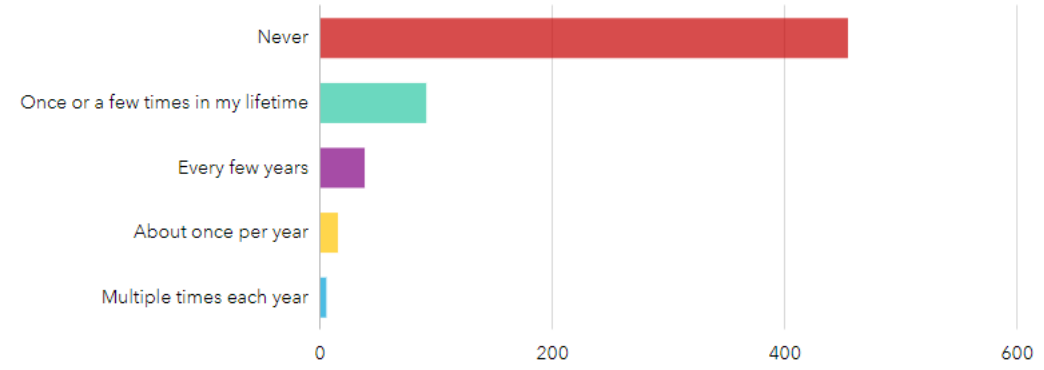
Empty categories Sort

Answers	Count	Percentage
Never	428	69.14%
Once or a few times in my lifetime	88	14.22%
Every few years	34	5.49%
About once per year	27	4.36%
Multiple times each year	23	3.72%

Answered: 600 Skipped: 19

Hazardous Materials Accident

Column Bar Pie Map



Hide table

Empty categories Sort

Answers	Count	Percentage
Never	454	73.34%
Once or a few times in my lifetime	91	14.7%
Every few years	38	6.14%
About once per year	15	2.42%
Multiple times each year	5	0.81%

Answered: 603 Skipped: 16

APPENDIX C.3

KONP Home Show Public Outreach

Hazard Mitigation Project Ideas

Identifying solutions – Clallam County is currently updating their Hazard Mitigation Plan, which will help our community access federal funding to address the hazards that most concern you. Do you have a project idea that helps reduce risk in the area? Tell us more!

Name (Optional):	**Jurisdiction:** ☑ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	**Location of Project**
Access to fuel	Peninsula wide
Potable Water	" "
Communications	" "

Hazard Mitigation Project Ideas

Identifying solutions – Clallam County is currently updating their Hazard Mitigation Plan, which will help our community access federal funding to address the hazards that most concern you. Do you have a project idea that helps reduce risk in the area? Tell us more!

Name (Optional): Gordon Gardner	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	**Location of Project**
EarthQuakes	

Hazard Mitigation Project Ideas

Identifying solutions – Clallam County is currently updating their Hazard Mitigation Plan, which will help our community access federal funding to address the hazards that most concern you. Do you have a project idea that helps reduce risk in the area? Tell us more!

Name (Optional):	**Jurisdiction:**
Kate	☒ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	**Location of Project**
Possible Landslide on Gasman Rd	Nearest Street Juan de Fuca
Weeds + grasses in Drainage ditch Possible Flood Risk	Juan de Fuca + E Bluff W Bluff Intersection

Hazard Mitigation Project Ideas

Identifying solutions – Clallam County is currently updating their Hazard Mitigation Plan, which will help our community access federal funding to address the hazards that most concern you. Do you have a project idea that helps reduce risk in the area? Tell us more!

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	**Location of Project**
WILDFIRE IN OLY NAT. FOREST	SOUTH P.A. NEAR FOREST
THE EARTHQUAKE	EVERY WHERE.

Hazard Mitigation Project Ideas

Identifying solutions – Clallam County is currently updating their Hazard Mitigation Plan, which will help our community access federal funding to address the hazards that most concern you. Do you have a project idea that helps reduce risk in the area? Tell us more!

Name (Optional): Christine Brehan	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	**Location of Project**
Earthquake + Tsunami	P.A.

Hazard Mitigation Project Ideas

Identifying solutions – Clallam County is currently updating their Hazard Mitigation Plan, which will help our community access federal funding to address the hazards that most concern you. Do you have a project idea that helps reduce risk in the area? Tell us more!

Name (Optional): Nancy	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	**Location of Project**
Emergency Plans	Assisted Living facilities (Park View Villas, etc.)

Hazard Mitigation Project Ideas

Identifying solutions – Clallam County is currently updating their Hazard Mitigation Plan, which will help our community access federal funding to address the hazards that most concern you. Do you have a project idea that helps reduce risk in the area? Tell us more!

Name (Optional):	**Jurisdiction:**
Donna	☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	**Location of Project**
Big tree leaning towards street	Myrtle St next to Eagles

Hazard Mitigation Project Ideas

Identifying solutions – Clallam County is currently updating their Hazard Mitigation Plan, which will help our community access federal funding to address the hazards that most concern you. Do you have a project idea that helps reduce risk in the area? Tell us more!

Name (Optional):	**Jurisdiction:** ☒ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	**Location of Project**
Not at this time	
Ediz Hook	Tsunami More warning signs Beach
Safe Areas for Evacuation	Designated sites

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
Chuck	☐ Unincorporated County ☑ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Wildfire	
Earthquake	
Drivers on 101	Hwy 101
PwrOutages	

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☐ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☒ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
earthquake	Roads - not enough main roads in & out > need 4 lanes
wildfires	or alternate routes

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
Kim	☐ Unincorporated County ☑ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Windstorm	Sequim. seems to get a lot of windstorms with major debris. Some trees should be removed because they're dead.
Earthquake	WA is extremely over due for a major quake and I don't think citizens are prepared.
Wildfires	In ID they have better fire watch & responses to put out fires than WA does.

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): DAN	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
TRAFFIC	SPEED & NO THIRD WAY TO EXIT IN CASE OF DISASTER

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☑ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☑ Earthquake ☐ Disease ☐ Power Outages ☑ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
Nancy	☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident
☐ Landslide ☒ Windstorm ☒ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☒ Drought
☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Dead Trees	W 8th & G
Snow/ice & debris	8th St Bridges sidewalks

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☒ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☒ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Earthquake	Sequim – Downtown

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
K Hermann	☒ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): KAREN MITCHELL	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	Locations and Descriptions

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☑ Earthquake ☐ Disease ☑ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☑ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): Cody & Cassidy Taylor	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☒ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): LaShana	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm ☒ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): Hope	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☑ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☒ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☒ Disease ☐ Power Outages ☐ Wildfire ☒ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought
☒ Other (please specify below)

Anything Health related, Cell Service could use improvement

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
Louise	☐ Unincorporated County ☑ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☐ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
trees & Shrubs	at intersections - misc Areas

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
ROBERT ROUNTREE	☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☑ Earthquake ☐ Disease ☑ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☑ Windstorm ☑ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): LeeAnn A.	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☒ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Sink holes	port Angeles

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☒ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☒ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Morse Creek	getting home from 8th Race

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☑ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☑ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Hospital on cliff	County Hospital

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☒ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Landslide	Homes along 4th/5th overlooking Boat haven
Winter storm	-driving is hazardous

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☒ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm ☐ Winter Storm ☐ Acts of Violence ☒ Flooding ☒ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Windstorms	anywhere there are really large trees.

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☒ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
WILDFIRE	RURAL/FOREST INTERFACE
EARTHQUAKE	CRESCENT LAKE FLOODING AFTER EARTHQUAKE

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): Cindy	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☑ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☑ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	Locations and Descriptions
Old Landfill	End of 13 & I

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): Joe Barton	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☑ Earthquake ☐ Disease ☐ Power Outages ☑ Wildfire ☐ Hazardous Materials Incident

☑ Landslide ☐ Windstorm ☑ Winter Storm ☐ Acts of Violence ☐ Flooding ☑ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	Locations and Descriptions
	Valley Creek potential Landslide

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** Joyce ☒ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☒ Power Outages ☑ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☒ Other (please specify below)

Water Supply

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☒ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm ☒ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
Pamela Love	☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

off boarding at the ferry

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
car vs car	ferry terminal off boarding
car vs pedestrian	ferry terminal off boarding

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): Michael Donnelly	**Jurisdiction:** ☑ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	Locations and Descriptions
	I'm not overly concerned about these hazards.

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☒ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☒ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident
☐ Landslide ☐ Windstorm ☐ Winter Storm ☒ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought
☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
wildfire	in general - trees.

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
AARD	☒ Unincorporated County ☑ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm ☒ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☒ Other (please specify below)

lack of Chocolate

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Power Lines	Go Underground

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): Elizabeth	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☒ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	Locations and Descriptions

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
Donna	☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm ☒ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
	Same as hazard mitigation Project Ideas
Motorize wheel chairs	Eight + ↻

APPENDIX C.4

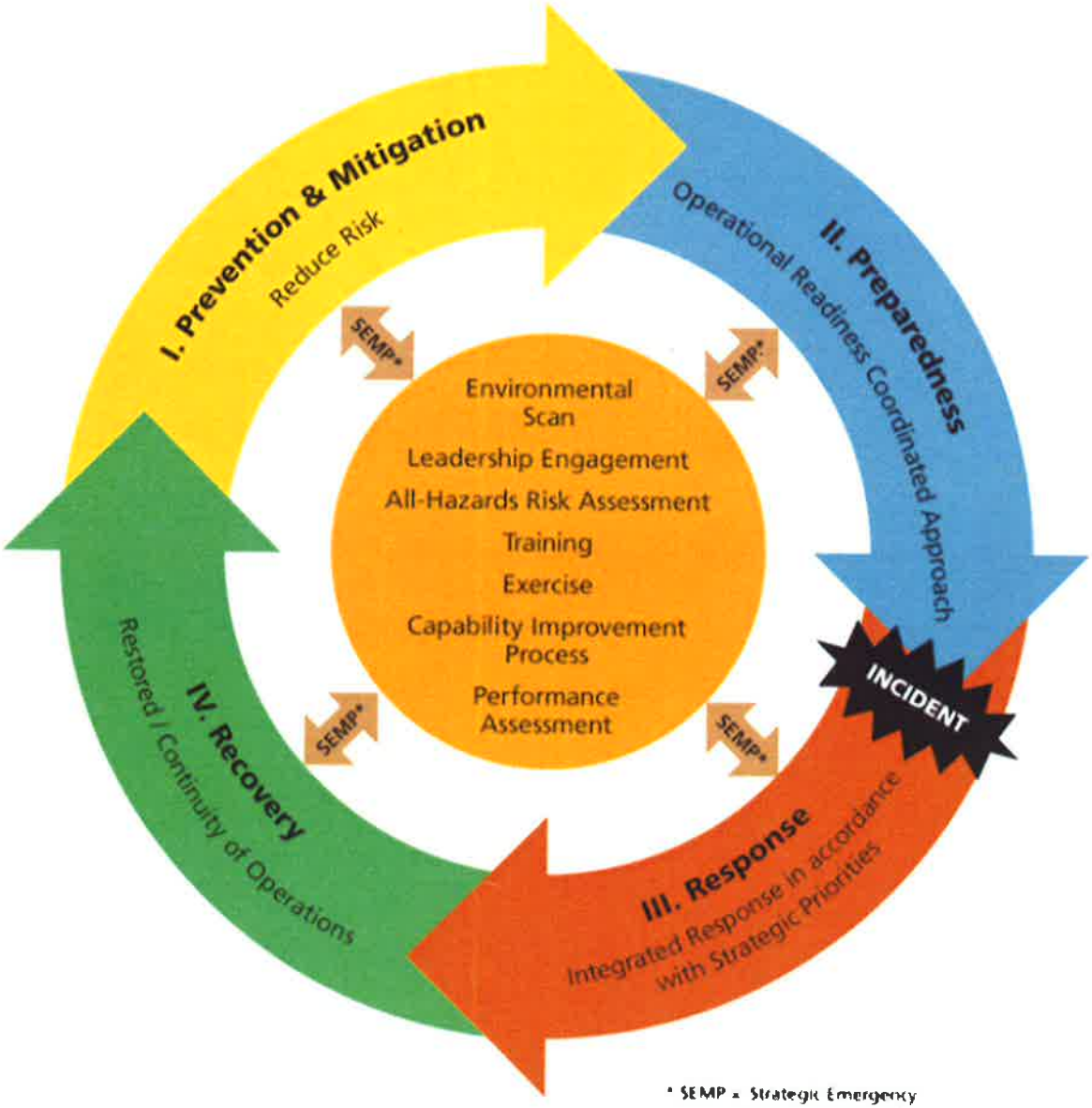
Kiwanis Club Public Outreach

CLALLAM COUNTY EM

EMERGENCY PREPAREDNESS & DISASTER MANAGEMENT

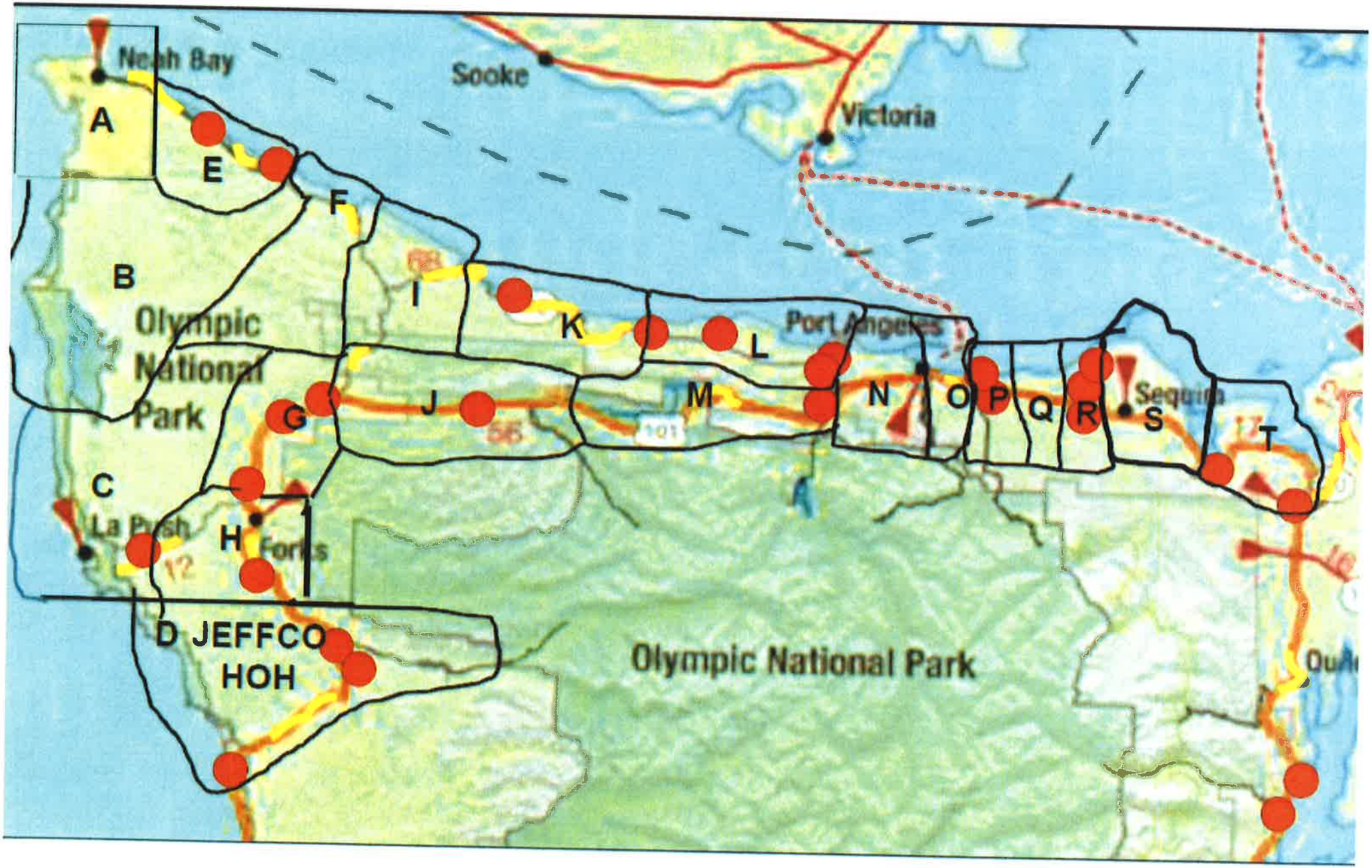
SAVES LIVES, PROTECTS PROPERTY & SUPPORTS THE ENVIRONMENT

Emergency Management Continuum

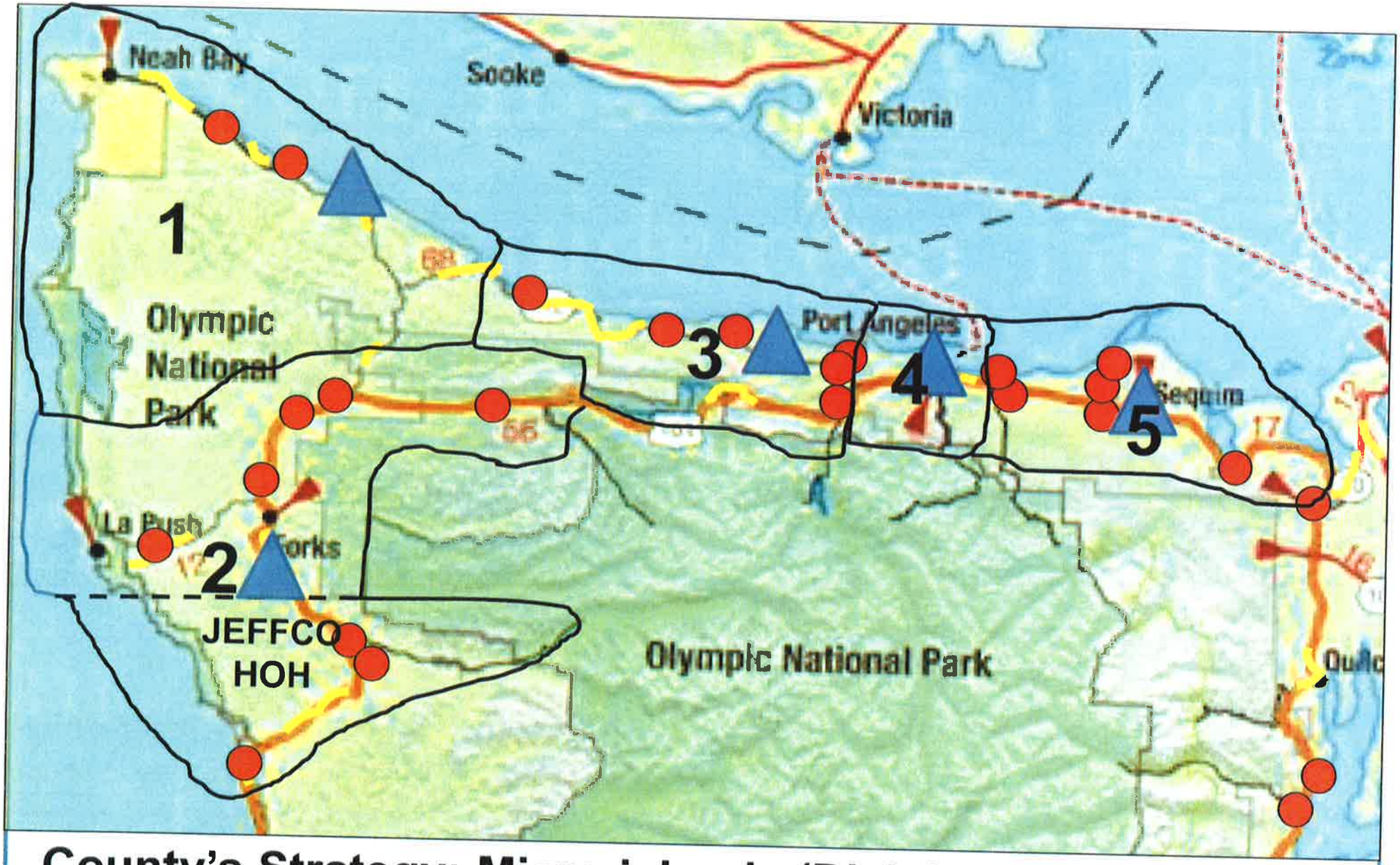


* SEMP = Strategic Emergency Management Plan

UNDERSTANDING OUR EM FRAMEWORK STORY



Damaged roads and bridges divide the county into at least 20 micro-islands.



County's Strategy: Micro-islands (Divisions) are grouped into Command Areas based on the following hubs: Forks, Clallam Bay/Neah Bay, Joyce, Port Angeles, & Sequim

UNDERSTANDING OUR VULNERABILITIES

Figure 12. Areas in the 75th percentile for weather-related disasters since 1980. These areas are also referred to herein as extreme weather hazard areas.

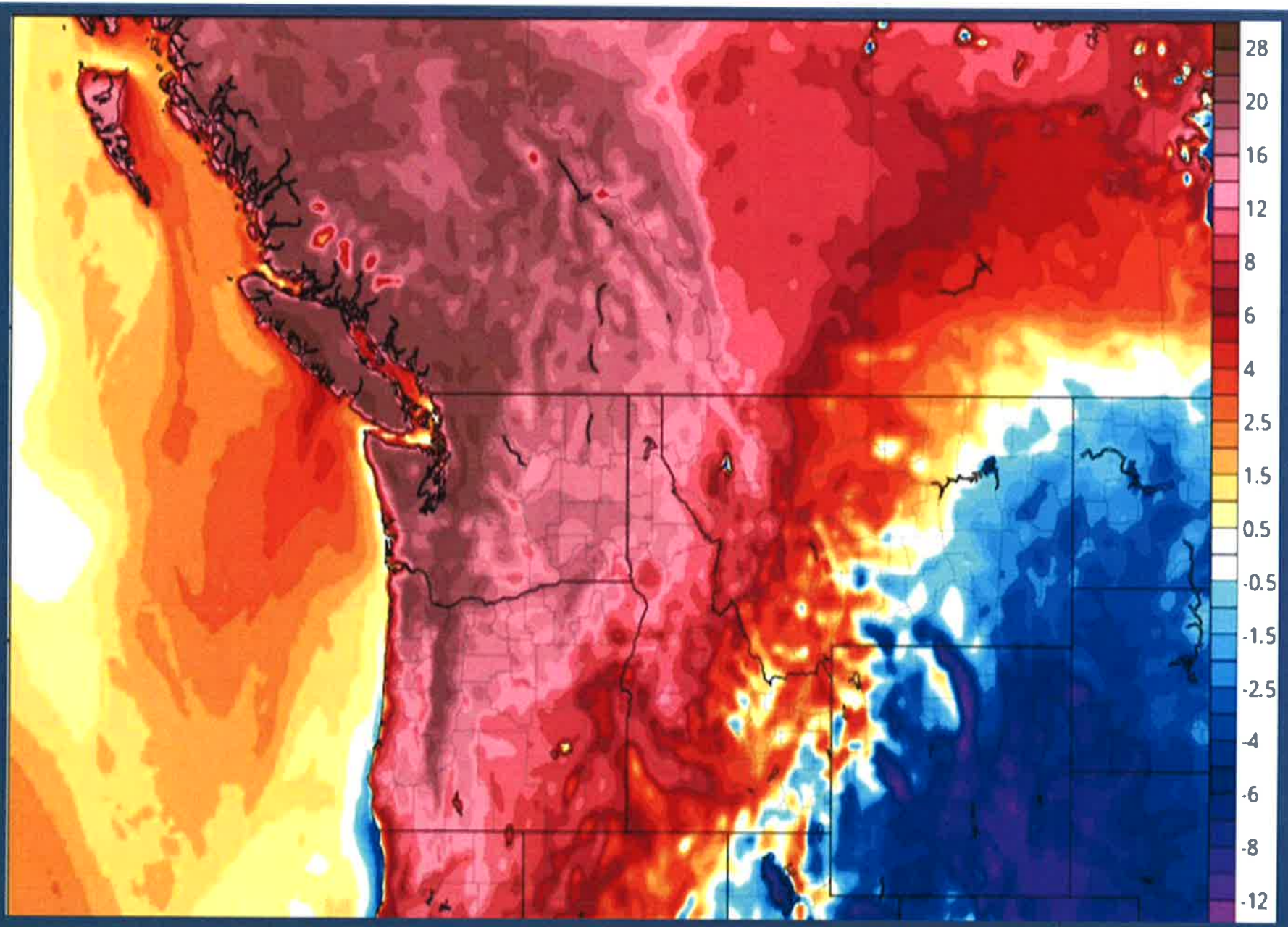


Figure 16. Temperature departures from average on June 28, 2021. This shows temperatures in Washington reaching 20°C (68°F) above normal in some places (Source: Freedman & Malcolm, 2021).

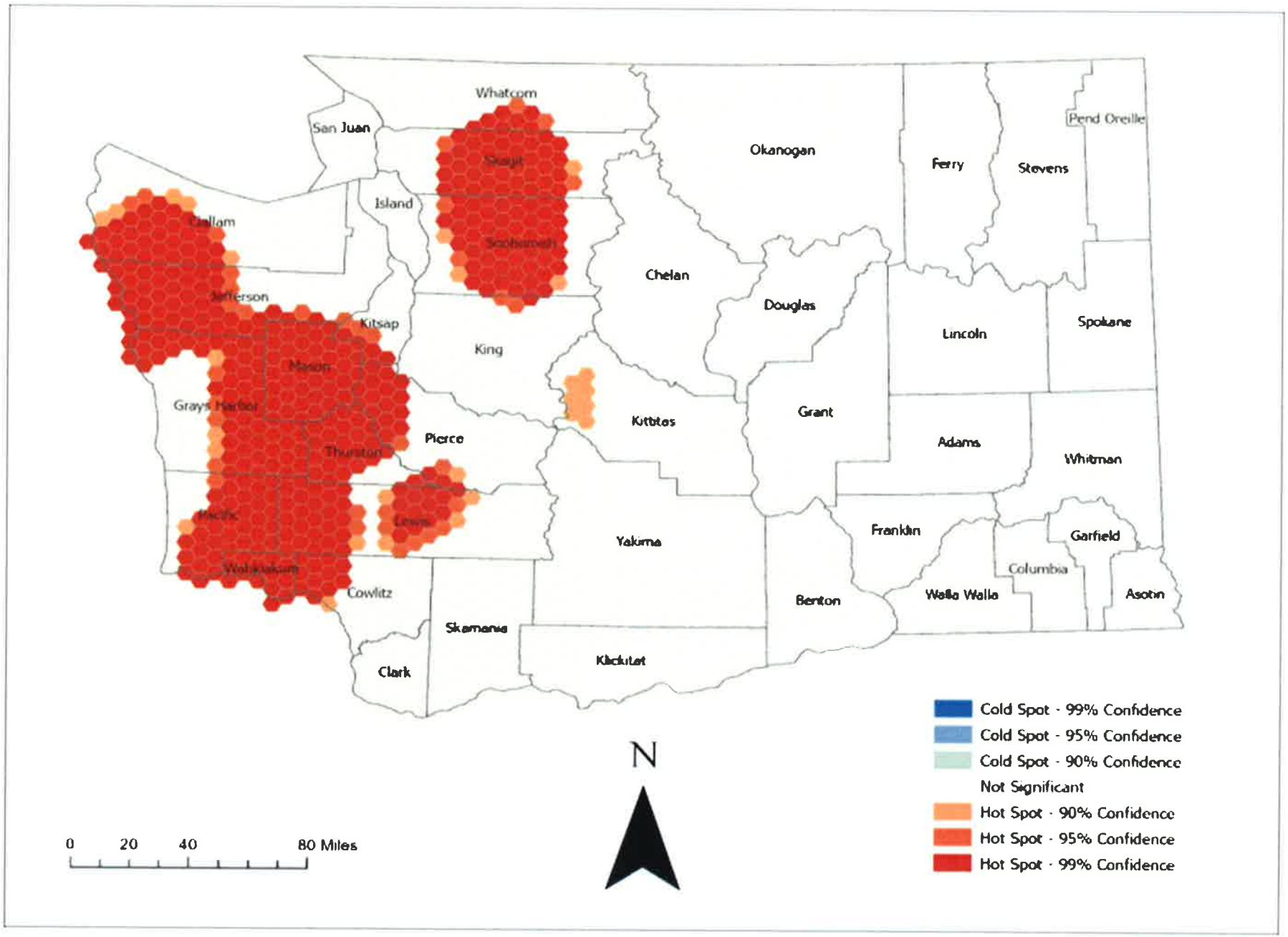


Figure 25.Landslide hot spot map based on the 2018 WGS landslide compilation data. Areas with counts we are 99% confident are higher than state average are shown in the darkest red shade and may be areas most prone to landslides in the future.

FEMA

HIGHWAY IMPACT

Landslides Caused by Earthquakes

CASCADIA

Some Areas at Risk:

- Morse Creek
- Highway 112
- Highway 113
- Lake Crescent
- Lake Sutherland
- 101 East of Gardiner
- Blyn
- Black Diamond
- Tumwater Truck
- Hill Street
- South Valley St
- Lee Creek
- Peabody Creek
- Ennis Creek
- Elwha River Valley
- Hoko-Ozette Road

FEMA

HIGHWAY IMPACT

Damage Caused by Earthquakes

CASCADIA RISING

Christchurch New Zealand
November 14, 2016 7.8 Magnitude Quake

24" Displacement Vertical with 4-6 foot separation of the roadway

12" Displacement Vertical with 1-2 foot separation of the roadway

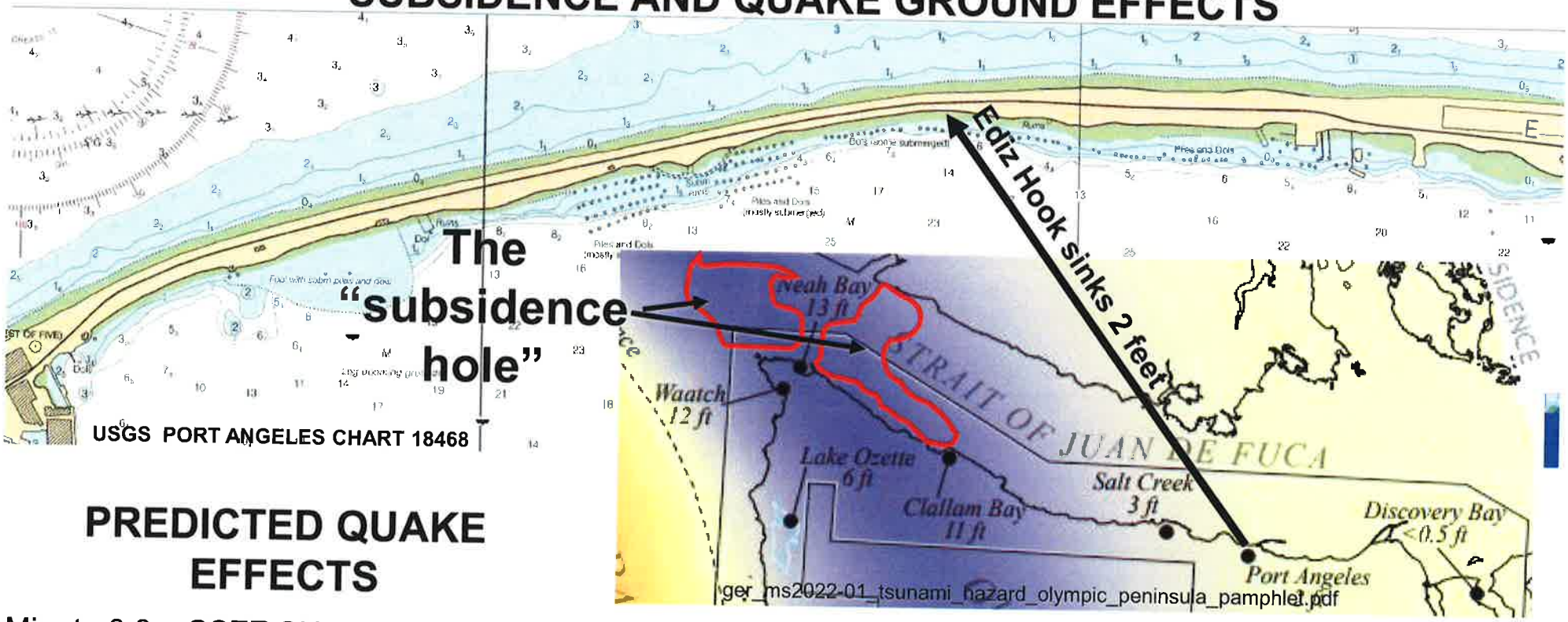
COMPARISON OF CASCADIA IMPACTS ON

COAST GUARD AIR STATION PORT ANGELES

AND

WILLIAM R. FAIRCHILD INTERNATIONAL AIRPORT

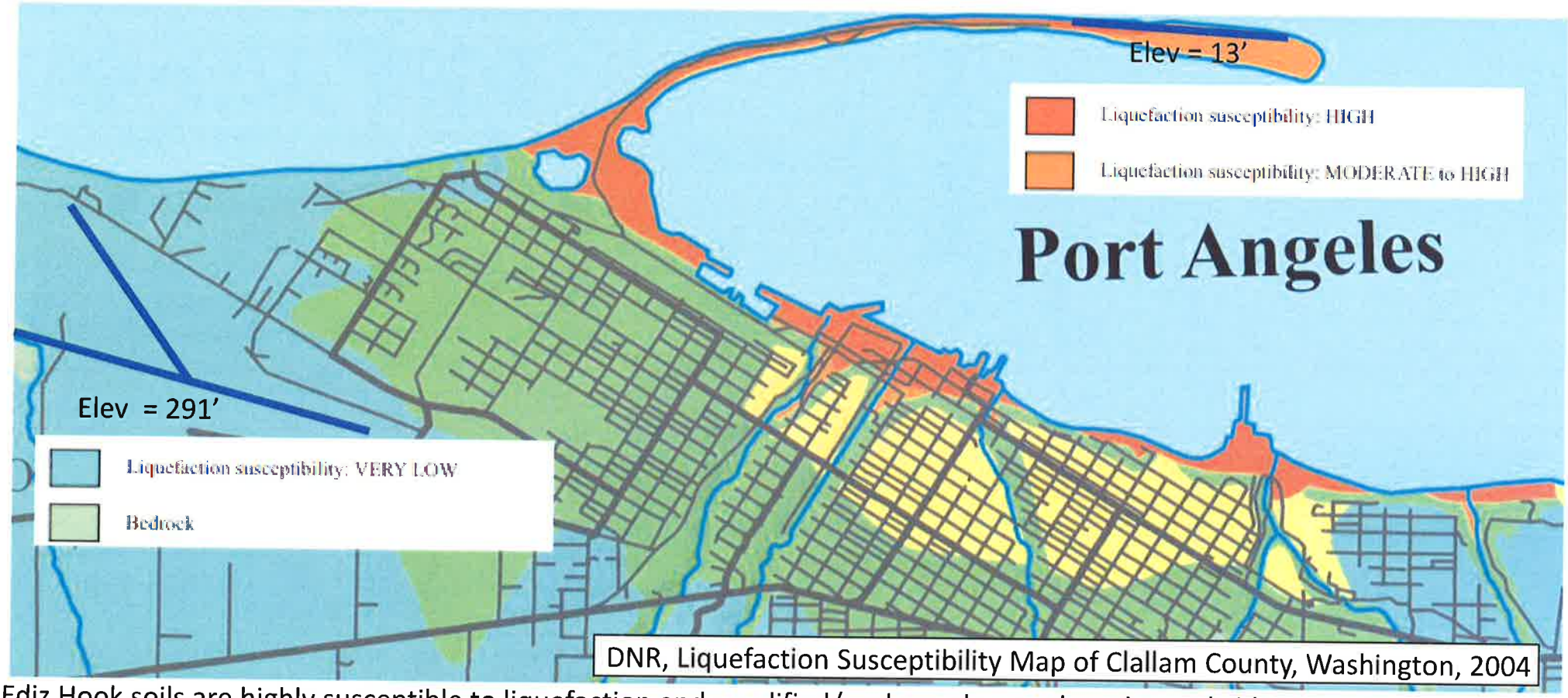
SUBSIDENCE AND QUAKE GROUND EFFECTS



PREDICTED QUAKE EFFECTS

Minute 0.0 – CSZE SHAKING STARTS – People will be unable to drive, stand or walk during the shaking.
Minute 0.0 to 1.0 – Land between the Elwha River and Sequim Bay subsides 2 feet **(New runway elevation = 11').**
Minute 0.0 to quake conclusion (~5 minutes) Liquefaction makes Ediz Hook unstable. Water and sand are ejected from the ground, Marine View Drive, Ediz Hook Road and runway are destroyed, foundations at the station fail and buildings sink or collapse.
Minute 2.0 to 50.0 – all of the water east of Clallam Bay will flow west to fill the "subsidence hole".

SOIL CONDITIONS AT COAST GUARD AIR STATION PORT ANGELES vs THE WILLIAM R. FAIRCHILD INTERNATIONAL AIRPORT

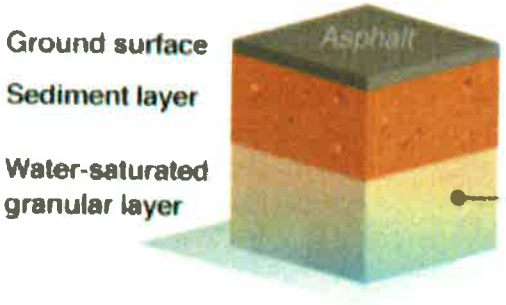


Ediz Hook soils are highly susceptible to liquefaction and amplified/prolonged ground motion, subsidence and tsunami.

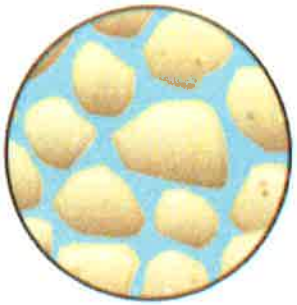
Fairchild soils have a very low susceptibility to liquefaction and amplified/prolonged ground motion, subsidence – no tsunami.

Soil liquefaction

Liquefaction is a phenomenon in which water-saturated sandy layers of earth act like liquids due to the pressure created by earthquakes



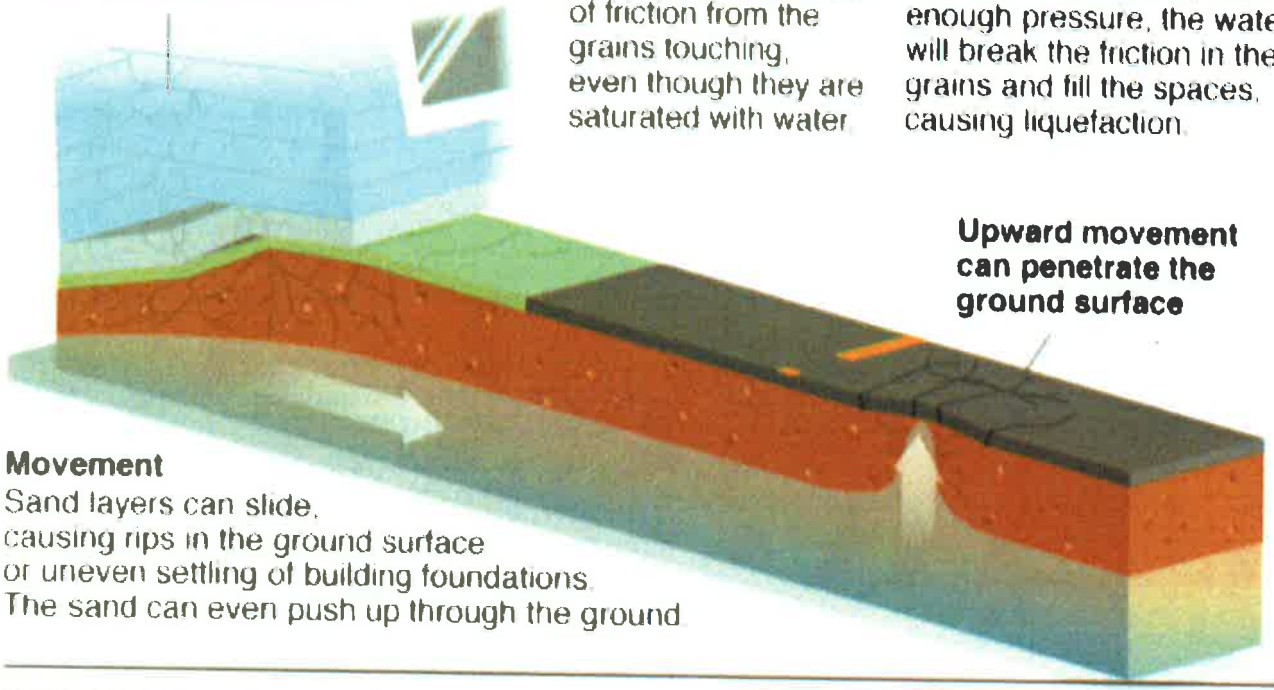
Normal pressure
Soft sands can maintain strength or hardness because of friction from the grains touching, even though they are saturated with water.



Intense pressure
Force from an earthquake causes the water to increase in pressure. With enough pressure, the water will break the friction in the grains and fill the spaces, causing liquefaction.

Lateral movement can create uneven ground, damaging structures

Upward movement can penetrate the ground surface

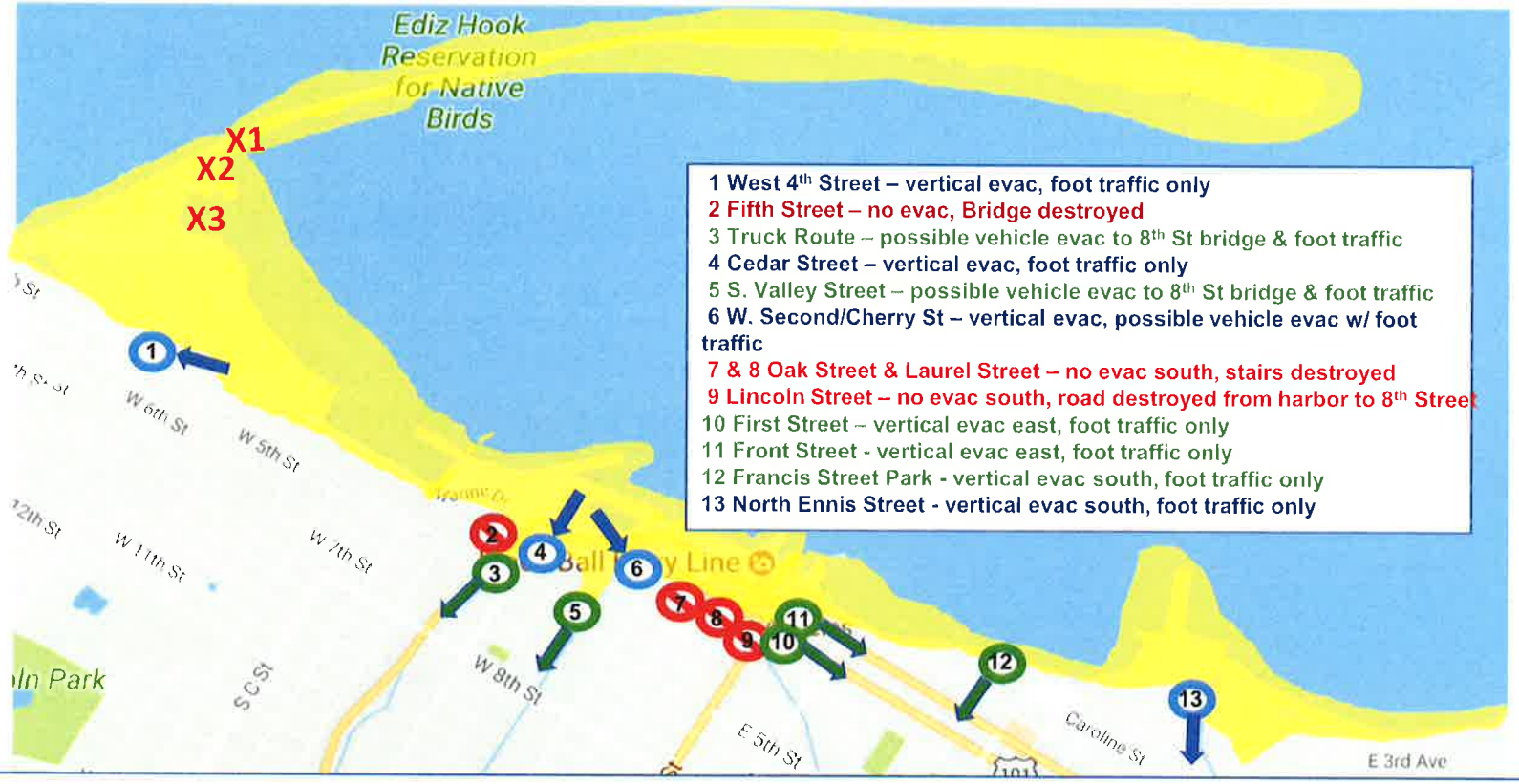


Movement
Sand layers can slide, causing rips in the ground surface or uneven settling of building foundations. The sand can even push up through the ground.

Source: California Watch research

BRIAN CRAGIN / CALIFORNIA WATCH

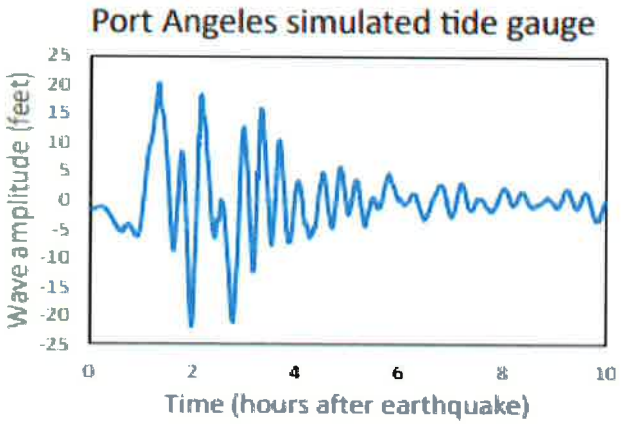
ACCESS TO THE STATION DURING AND AFTER THE QUAKE



Land access to, or evacuation from, the Coast Guard Station, if possible at all, will be hindered by possible fire in the Marathon fuel farm (X1), the collapsed paper mill (X2) , destroyed lagoon bridge (X3) and liquefacted roads on Ediz Hook. The map shows location of tsunami evacuation routes to high ground in Port Angeles. Access to the station will be unsafe for at least 36 hours.

CG staff living in Port Angeles will be able to mobilize at Fairchild.

TSUNAMI



ger_ms2022-01_tsunami_hazard_maps_olympic_peninsula_map_sheet_6_georeferenced_port_angeles_inundation.pdf

1. Minute 30 to 60 – Expect water level in harbor to drop 5-6 feet prior to arrival of the tsunami with outgoing current up to 19 knots.
2. Minute 60 to > 600 – Expect at least 6 each 15'-20' tsunamis to cover Ediz Hook with currents up to 19 knots in the 4 hours after the quake. Tsunami zone will be unsafe for up to 36 hours.
3. Note the minus 20' wave troughs in the harbor at minutes 120 and ~160. These will generate extreme currents.

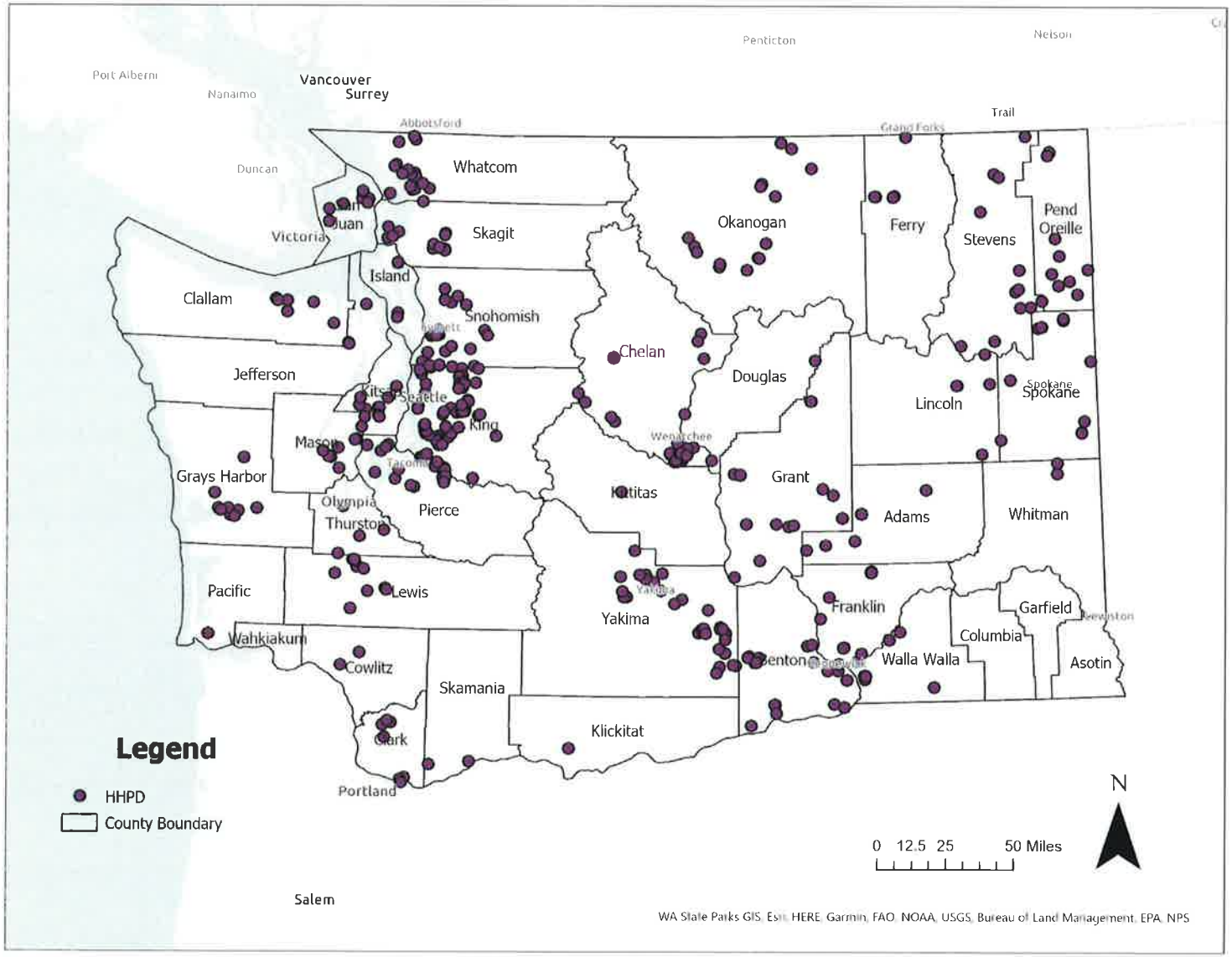


Figure 42. Location of high hazard potential dams statewide

Figure 3 – Dam Break Inundation Map

Ivy Crest Ave

HOW ARE WE MITIGATING OUR VULNERABILITES?

PLANNING, PLANNING, PLANNING

ENERGY RESILIENCE

SCOPING MITIGATION PROJECTS

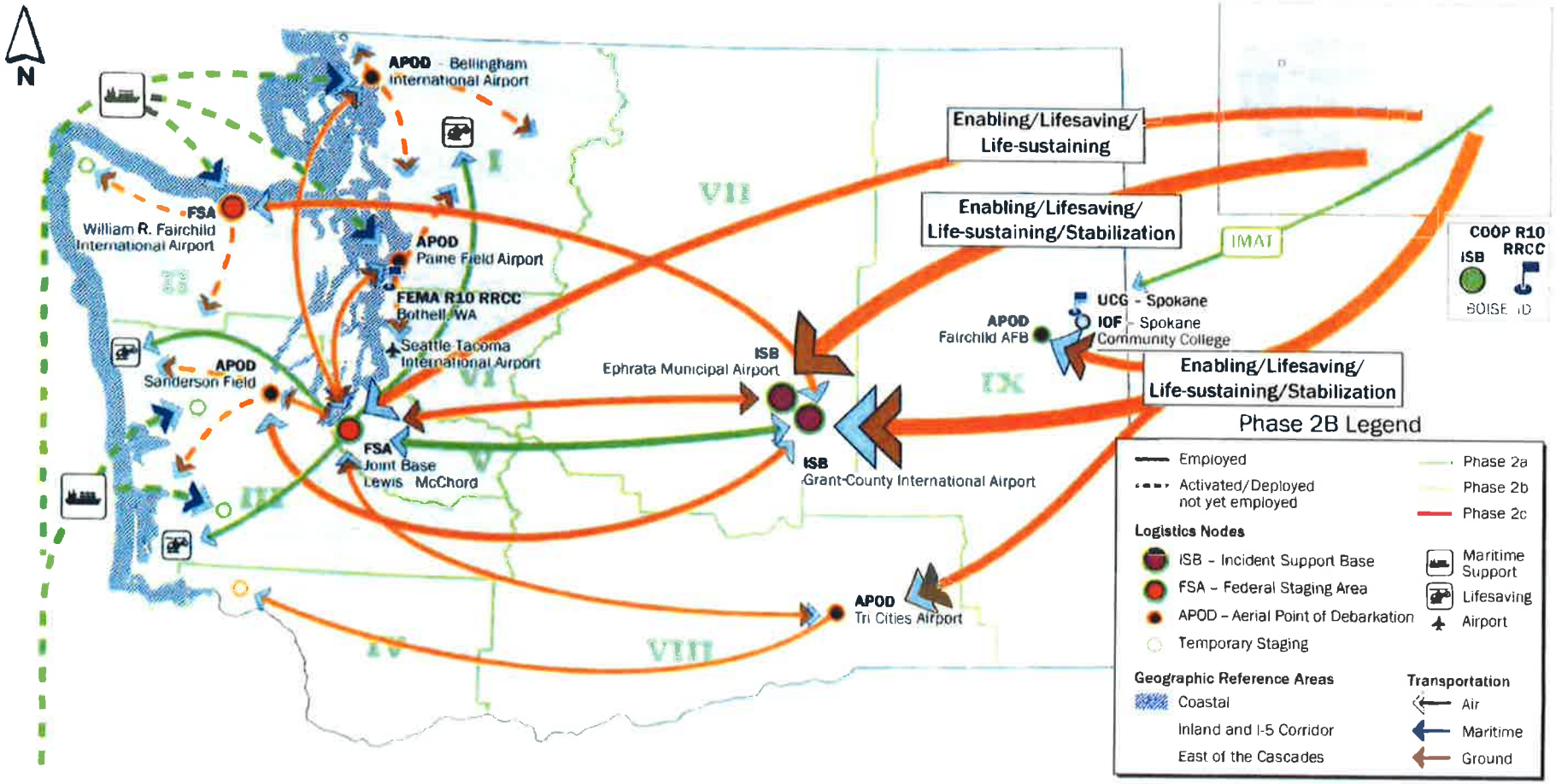
CRITICAL SERVICES

- Emergency Response
- Law Enforcement
- Health & Medical Care
- Mass Care (Food, Water, Shelter, Medical)
- Social Services
- Food Network
- Government Administration
- Education

CRITICAL INFRASTRUCTURE

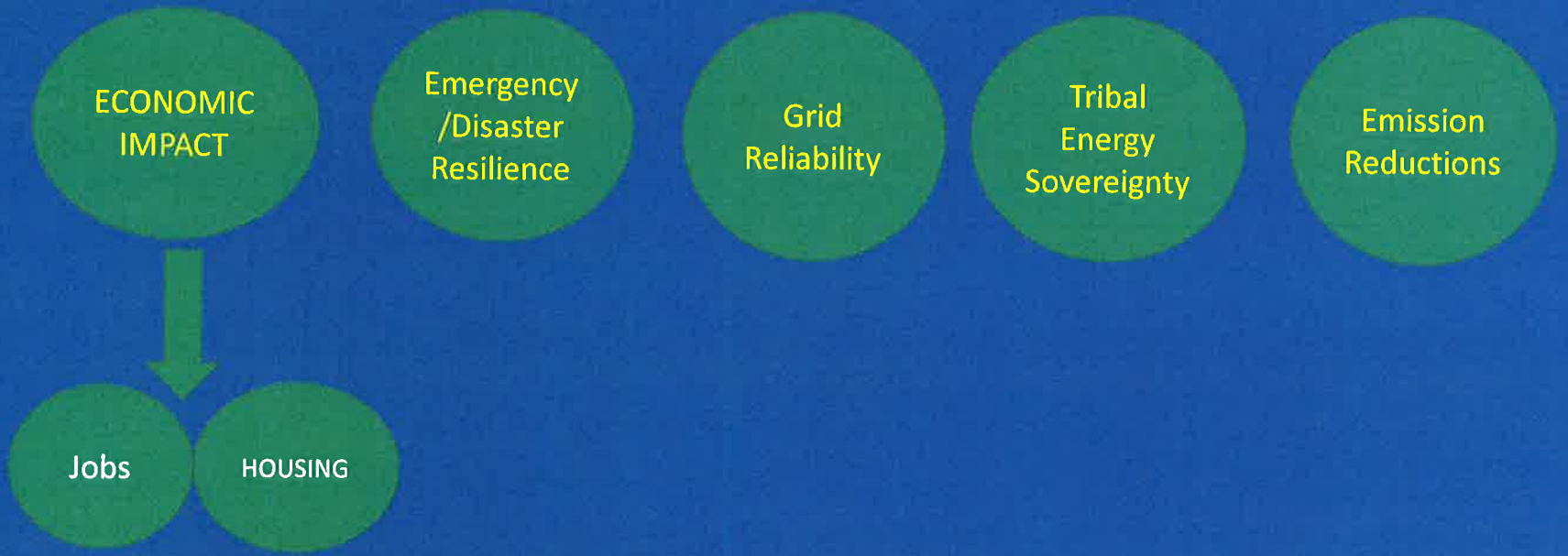
- **Roads** to deliver food, water, medical supplies, people
- **Utilities** to provide water, wastewater system, cooking, heat
- **Hospitals, Airports, Schools, other Buildings** for mass care, hospital overflow, and Point of Distribution locations (food, water, supplies)

Concept of Operations – Phase 2b (Community Stabilization)



ENERGY FUTURES CONFERENCE

INTERDEPENDENCIES OF ENERGY RESILIENCE IN OUR COMMUNITY:



HOW CAN WE INCREASE ENERGY RESILIENCE?

- MICROGRID AT KEY LIFELINE INFRASTRUCTURE
- BACKUP GENERATORS AT RESILENCE HUBS
- FUNDING FOR EMERGENCY GENERATOR CONNECTORS FOR FUELING STATIONS
- SOLSMART PROGRAM
- C-PACER PROGRAM
- FUNDING FOR SOLAR FEASIBILITY STUDY OF CRITICAL INFRASTRUCTURE

UNIVERSITY of WASHINGTON

ELECTRICAL AND COMPUTER ENGINEERING

POWER FOR A RESILIENT FAIRCHILD AIRPORT

CHENYANG TIAN
EVAN BOWMAN
JONATHAN GRADY
TANNER WEAVER
WESLEY KING
SOPHIA VOTAVA

MAY 2023

BE BOUNDLESS

KEY TAKEAWAYS

- EMERGENCY OPERATIONS SOLAR/BATTERY MICROGRID AT FAIRCHILD AIRPORT IS ECONOMICALLY AND TECHNICALLY FEASIBLE
- COMMERCIAL/LARGE SOLAR PROJECTS LIMITED BY BPA CONTRACT PROVISIONS AND COST OF MICROGRID
- FEDERAL AND STATE GRANTS MAKE CERTAIN MICROGRID PROJECTS VIABLE
- NEED FOR ENERGY FUTURES STEERING COMMITTEE TO COMMUNICATE GRANT OPPORTUNITIES AND FOR PLANNING LARGE PROJECTS WITH STAKEHOLDERS

CASCADIA

RENEWABLES

Clallum County Fairgrounds
Solar Plus Storage Feasibility Study

1608 W. 16th Street, Port Angeles, WA 98363

#063000110700

Prepared by Cascadia Renwables

(info@cascadiarenewables.com)

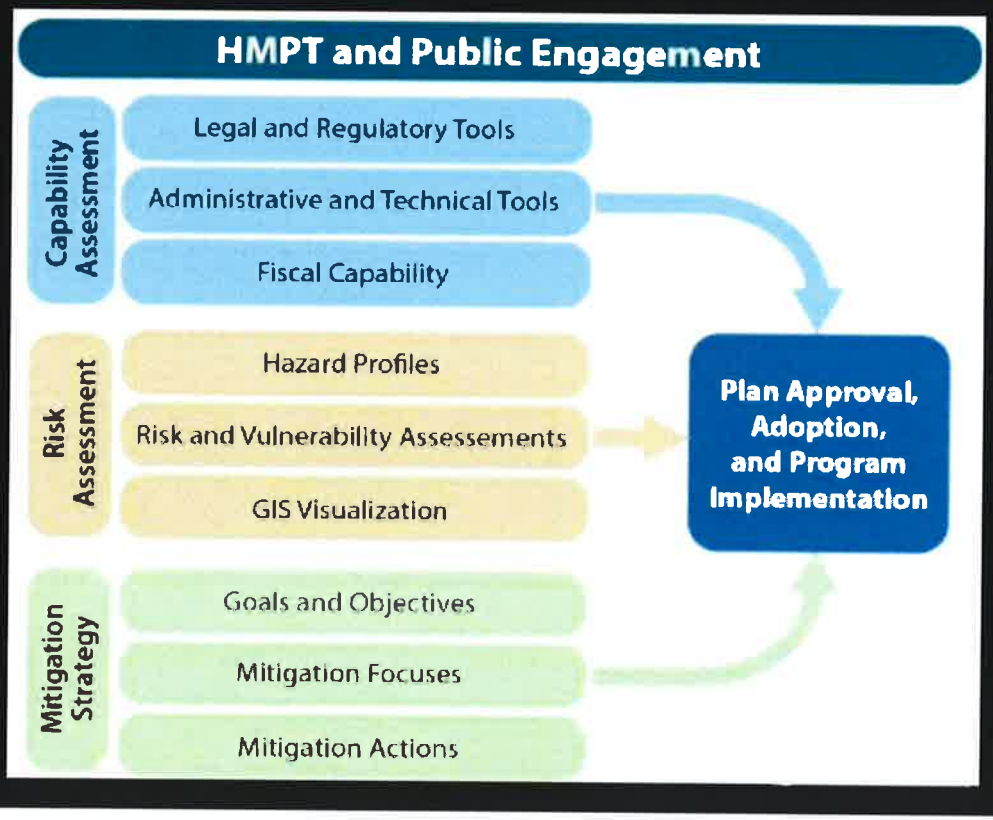
What is Hazard Mitigation Planning?

- A commitment to reduce risks posed by hazards
- A comprehensive and inclusive planning process
- Development of a mitigation strategy with clear and concrete actions

ecology and environment, inc.
Global Environmental Specialists

What's in the plan?

- Updated every five years
- Review and approved by FEMA
- Opens up funding opportunities
- Identifies risks
- Outlines capabilities to deal with hazards
- Prescribes actions to reduce risks
- Provides implementation plan



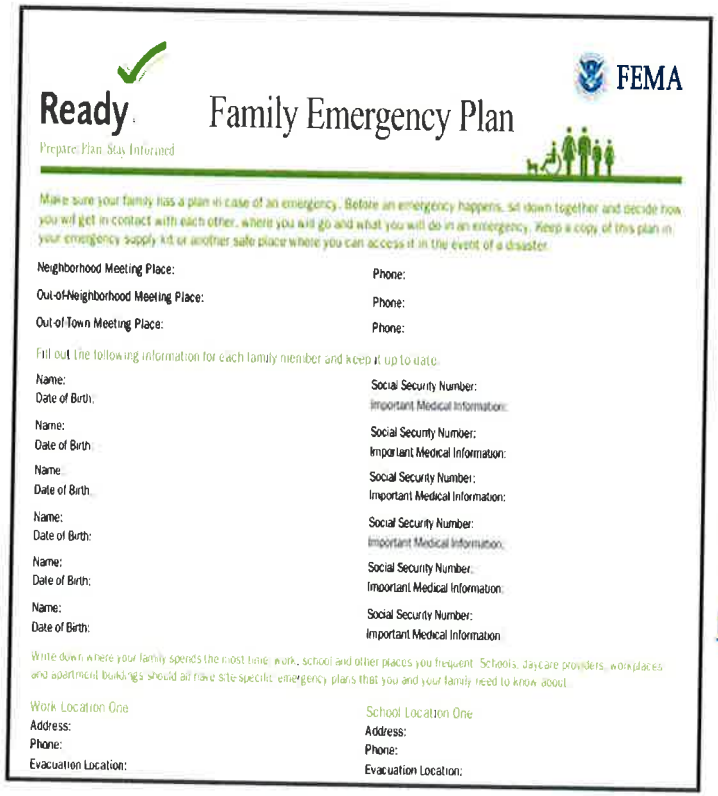
Wildfire

- **Build awareness of increasing wildfire risk and preparedness** of Chelan County Communities
- **Coordinate and improve emergency preparedness systems**, particularly early detection
- **Develop fire safe places in fire prone areas** with wildland urban interface policies and codes
- **Create fire adapted communities**
- **Coordinate ecological recovery programs**
- Build partnerships...**monitor and respond to climate changes and vulnerabilities in forested and shrub-steppe lands**
- **Proactively address fire resiliency** through activities such as: pre-fire monitoring, maintenance/forest treatment, thinning, prescribed fire, and managed natural fire
- **Air quality:** education, training, and responses to protect people and communities during and after wildfire

Climate Resiliency Round Table
Large Group Polling Activity

- **What are your top 2 priorities?**

Individual & Family Preparedness



Ready

Family Emergency Plan

FEMA

Prepare. Plan. Stay Informed.

Make sure your family has a plan in case of an emergency. Before an emergency happens, sit down together and decide how you will get in contact with each other, where you will go and what you will do in an emergency. Keep a copy of this plan in your emergency supply kit or another safe place where you can access it in the event of a disaster.

Neighborhood Meeting Place: Phone:

Out-of-Neighborhood Meeting Place: Phone:

Out-of-Town Meeting Place: Phone:

Fill out the following information for each family member and keep it up to date.

Name: Social Security Number:
Date of Birth: Important Medical Information:

Name: Social Security Number:
Date of Birth: Important Medical Information:

Name: Social Security Number:
Date of Birth: Important Medical Information:

Name: Social Security Number:
Date of Birth: Important Medical Information:

Name: Social Security Number:
Date of Birth: Important Medical Information:

Name: Social Security Number:
Date of Birth: Important Medical Information:

Write down where your family spends the most time: work, school and other places you frequent. Schools, daycare providers, workplaces and apartment buildings should all have site-specific emergency plans that you and your family need to know about.

Work Location One
Address:
Phone:
Evacuation Location:

School Location One
Address:
Phone:
Evacuation Location:

Preparedness starts at the Individual & Family level

DHS&CCEM encourages preparing a disaster kit that can see a family for 30 days without assistance. Kits can include:

- Water
- Food
- Clothing
- First Aid Supplies
- Medication(s)

CCEM has resources to help you plan ahead. Visit our website or come in and talk to us.

http://www.clallam.net/emergencymanagement/

Disaster Recovery Plan Cartoon

Funny
Disaster Recovery Plan

Save Like Comment View image More

Kiwanis Club (Port Angeles)
4/4/24

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☒ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☒ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☒ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Morse Cr	Center Median DANger Need The Jussey Barriers
TARE SNAKES	UN Beliveably DANgerous FOR MOTORCYCLES

Kiwanis Club (Port Angeles)
4/4/24

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
-Bridges- failure	in a flood or equake
lack of food + water	- Bridges are down and many people will not have 30 days of water or food
Safety	- The "Have nots" will be putting the "Haves" in danger.

Kiwanis Club (Port Angeles)
4/4/24

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☒ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☒ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☒ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Isolation	Not being able to navigate off the peninsula - or get supplies in.

Kiwanis Club (Port Angeles)
4/4/24

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident
☒ Landslide ☒ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought
☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Fire	Port Angeles
Power	All Port Angeles

Kiwanis Club (Port Angeles)

Top Hazards in Clallam County

4/4/24

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): Jen S	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☒ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	Locations and Descriptions

Kiwanis Club (Port Angeles) 4/4/24

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☒ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Kiwanis Club (Port Angeles) 4/4/24

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
JOHN BREWER	☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake (1) ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm (3) ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☒ Tsunami (2) ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Collapse of Courthouse	... and end to the Emergency Staff!

Kiwanis Club (Port Angeles)
4/4/24

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
LEN BORCHERS	☒ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☒ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident ☐ Landslide ☒ Windstorm ☐ Winter Storm ☒ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☒ Other (please specify below)

Pandemic – Virus or communicable disease

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	Locations and Descriptions
Power outage	- usually accompanies windstorm. - We are on well water so no power / NO well water. - Have a generator
Wildfire	- property abuts state forest. Lovingly called "Tree burn" (Mt Pleasant area)
Windstorm	- Dangr of falling trees.
Pandemic	Rising anti-vax attitudes are dangerous to all of us.
Violence	Guns are out of control – a major public health issue

Kiwanis Club (Port Angeles) 4/4/24

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

APPENDIX C.5

Joyce Daze Public Outreach

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): BARB McFall	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): Rae Leiper	**Jurisdiction:** ☑ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☑ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought
☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
BRETT	☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
LINES DOWN	JOYCE AREA HOW TO REPORT, WHAT TO DO BEFORE P.U.D. ARRIVES
	People Running Generators Should know not To Back-Feed LINES

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
CATHY	☒ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☒ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☒ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
112	NEEDS TO BE RE-ROUTED SOUTH BY A MILE
CLALLAM BAY SEKIU	SCHOOL AND MEDICAL AND EMERGENCY SERVICES NEED TO BE RELOCATED TO HIGH GROUND

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): Jim MRAZ	**Jurisdiction:** ☒ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	Locations and Descriptions

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
SARAH	☐ Unincorporated County ☑ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☒ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Acts of Violence	We have a Growing Homeless Population.

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): Jennifer F.	**Jurisdiction:** ☐ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☑ Earthquake ☐ Disease ☐ Power Outages ☑ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you. Patti Monson

Name (Optional):	**Jurisdiction:** ☑ Unincorporated County ☑ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☒ Winter Storm ☒ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

APPENDIX C.6

HMCR Community Workshop

SAVE THE DATE!

Wednesday, August 7th | 1:30 - 3:30 PM
Jamestown S'Klallam Tribal Center Red Cedar Hall
1033 Old Blyn Hwy, Sequim, WA 98382

HAZARD MITIGATION & CLIMATE RESILIENCE PLANNING WORKSHOP

Join representatives from the Jamestown S'Klallam Tribal Government, Clallam County Emergency Management, Fire District #3, City of Sequim and other local partners on **Wednesday, August 7th at 1:30 pm** to learn more about and provide input on hazard mitigation planning happening in our region.

The Jamestown S'Klallam Tribal community is encouraged to participate in the plan's update as Jamestown has a subsection included in the plan. **Your input will help strengthen the plan and may lead to projects and resilience actions taken in Clallam County!**

Food and refreshments will be provided.

Hazard Mitigation & Climate Resilience Planning Workshop

WEDNESDAY, AUGUST 7TH | 1:30 – 3:30 PM
JAMESTOWN S'KLALLAM TRIBAL CENTER RED CEDAR HALL | 1033 OLD BLYN HWY, SEQUIM, WA, 98382

Participant Agenda

Total time = 2 hours

Time	Item
1:35 – 1:40	Welcome
1:40 – 1:45	Hazard Mitigation & Climate Resilience Project Overview
1:45 – 1:55	What are the climate impacts and hazards in Clallam County?

1:55 – 2:30	Facilitated Discussion on Impacts, Risks, & Vulnerabilities
	• *Two breakout groups based on Vulnerability Assessment Focus areas*
	• *Discussion questions:*
	  ○ *Who in your community, and broader Clallam County, is most vulnerable/at risk?*
	  ○ *What physical assets (specific areas, critical facilities, infrastructure) are most vulnerable/at risk?*

2:30 – 2:40	Break
2:40 – 2:50	What policies, programs, projects, and activities would help your community address impacts from climate change and hazards?

2:50 – 3:25	Facilitated Discussion on Responses
	• Hazards (5-year planning timeframe)
	  ○ Discussion question: *What are capital improvement projects, programs, policies to address short-term hazard mitigation?*
	• Climate Element (10 year planning timeframe)
	  ○ Discussion question: *What are priority actions (policies, projects, etc.) to respond to the impacts and vulnerabilities we identified?*

3:25 – 3:30	Wrap up & Next Steps

Hazard Mitigation & Climate Resilience Planning Workshop Summary

WEDNESDAY, AUGUST 7TH, 2024 | 1:30 – 3:30 PM
JAMESTOWN S'KLALLAM TRIBAL CENTER RED CEDAR HALL

This workshop was the first planned in-person event for the Climate Element (CE) and Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). Project partners and Jamestown S'Klallam Tribal community members were invited to participate. The workshop included short overview presentations on the two plans, hazards, and expected climate impacts for the County.

The workshop featured two main discussions, one focused on vulnerability to hazards and climate impacts and the latter on solutions and responses. We gathered critical local context and input on who and what is most vulnerable, gathered priorities and brainstormed new ideas.

Workshop objectives:

- A meaningful input opportunity for tribal community members and partner agencies
- Provide opportunities to learn about both planning processes from the project team and provide feedback to further guide plan development

Attendees

Name	Affiliation
Wendy Clark-Getzin	Jamestown S'Klallam Tribe
Jackie Johnson	Jamestown S'Klallam Tribe
Diane Harvey	Clallam County Sherrif's Office
Bruce Emery	Clallam County DCD
Kim Kettel	Jamestown S'Klallam Tribe
Brandy Hooley	7 Cedars Resort
Jesse Waknitz	Port of PA
Tim Haven	Clallam County DCD
Meggan Necker	City of Sequim Public Works
Shailesh Shere	Clallam County POD
Blane Zechenelly	CCFD #3

K Koehler	CCFD #3
Paul Bucich	City of Sequim
Justice Chonly	Clallam County BM
Alex Seagliotti	Jamestown S'Klallam Tribe
Will Habel	Port Angeles
Derrell Sharp	PAFD
Holden Fleming	Clallam County DCD
Jim Buck	CCEM & FD #4
Jenna Ziogas	Jamestown S'Klallam Tribe
Ginnie Chitwood	Jamestown S'Klallam Tribe
Loni Greninger	Jamestown S'Klallam Tribe
Luke Strong-Cvetich	Jamestown S'Klallam Tribe
Ricky Johnson	Jamestown S'Klallam Tribe

Facilitated Discussion on Impacts, Risks, & Vulnerabilities

Following a short presentation of hazards covered in the MJHMP and top climate impacts for Clallam County, we split into two discussion groups for 15 minutes. Group 1 discussed vulnerability assessment focus areas of economic development and land use, and public health and community wellbeing. Group 2 discussed the remaining VA focus areas of built infrastructure and natural environment, and water resources.

We focused the discussion on who and what are the most vulnerable.

WHAT WE HEARD

WHO IN YOUR COMMUNITY, AND BROADER CLALLAM COUNTY, IS MOST VULNERABLE/AT RISK?

Built Infrastructure

- People with basements susceptible to mold
- Older residents, especially hard for them to pass the levees

Economic Development and Land Use

- Is population growth considered in the VA?

Natural Environment and Water Resources

- Those with shallow wells for saltwater intrusion, Rainy Reach area
- Those who live in neighborhoods on or with many slopes, especially concerned about landslides and flooding

Public Health and Community Wellbeing

- Older adults, especially for Tribal elders
- Isolated communities that may be cut off from services during an extreme event
- Those who live in trailers/mobile home communities, which are more affordable housing where elderly, tribal members, other low-income folks live ("the valley").

WHAT PHYSICAL ASSETS (SPECIFIC AREAS, CRITICAL FACILITIES, INFRASTRUCTURE) ARE MOST VULNERABLE/AT RISK?

Built Infrastructure

- Undersized culverts bridge abandonments, sink holes, all over
- Aging infrastructure, no funding in place to rebuild
- Natural aging out of built infrastructure and increased capacity/demand on existing. Previously, ~40k people living in the County, now ~80k all with increased demand on water, sewer, and roads.
- Earthquake assessment, bolted down piping, replacement
- One internet pipeline
- All power lines running from Bonneville power, includes software lines, very vulnerable during an extreme storm.
- Propane tanks need bolted down; Joyce has 13 unbolted propane tanks.
- Very dependent on I-5 for any type of secondary health care, and only have a Level 3 Hospital
- Very reliant on Hood Canal bridge and connection to Kitsap County
- How to build road systems that work for all, round-abouts
- No AC for extreme heat or cooling shelters
- Do not have an extreme cold warning system
- Will need regular fuel delivery to keep everything running
- Neighborhood King Tides
- Slope sluffing on bluffs
- Water contamination, water is life
- Saltwater intrusion on wells, specifically Jamestown Beach Well
- Manual overrides for systems in the event the technology is down
- Marinas a serious problem, fishing industries not capable of receiving supplies

Economic Development and Land Use

- Jamestown S'Klallam moved some commercial fishing operations to Kona, HI due to increasing PH levels for geoduck and oysters
- Bigger threat for shellfish and crabs from increased ocean acidity

- Land use sector stressors on resources
- Port assets: fuel, airports
- Forestry and fishing industries
- Recreation and tourism impacts, specifically Hurricane Ridge
- Also increased recreation demand from increase in population growth (in and outside of Clallam County)

Natural Environment and Water Resources

- Water systems are vulnerable, during 2020 storms there was a solid shut-off during the storm
- Water systems shut off during an earthquake
- Fisheries, timber, agriculture, and tourism industries depend on natural environment
- Need fuel deliveries to keep thing running
- Erosion and water contamination
- Relocating Jamestown S'Klallam Tribe beach wall, saltwater intrusion
- Valleys and neighborhoods/communities face large landslide risks
- River adjacent homes/trailers face flooding risks
- Snowpack influences hydropower, and overall power sources

Public Health and Community Wellbeing

- Limited medical capabilities if unable to access other large cities
- How many doctors, nurses, etc. are available in Clallam County if unable to access other areas?
- Mobility issues, one road in and out, Hood Canal bridge
- Clallam Fire: previously averaging 5K calls a year, now closer to 9k a year
- Casino is an "informal" cooling center, there are 2 generators available
- Government offices also have generators
- A need for communication across jurisdictions on disaster response to community members
- Jamestown S'Klallam Tribe has some contacts in specific agencies, and also have radio and satellite communications
- Sequim has no backup generator, relies on ECC
- Roads: there is only one road wall the way to west end, where tribal communities are. If the road closes or fails, there is no way in or out
- Flooding impacts for trailers/mobile home communities in the valley, but generally, any land and buildings in valleys are at risk.
- Lack of communications is a concern. What about an attack on communications- there'd be no way to call 911? No back-up. (I think they mentioned one provider only)

Facilitated Discussion on Responses

Following a break, we reviewed our previous discussions and shared key themes noted from both discussions. Next, we switched to two full-group conversations focusing on the responses that Clallam County can take to build adaptive capacity to hazards and climate change.

WHAT WE HEARD

DISCUSSION 1: HAZARD MITIGATION ACTIONS (5 YEAR PLANNING HORIZON)

Hazard Assessment and Preparedness

- Talk a lot about CSZ hazard versus everything else
- Education for all on what are the hazards
- Neighborhood preparedness groups, how to survive for 30 days
- Encourage community members to develop a neighborhood emergency plans
- Need zoning regulations that reflect climate risk and get people out of hazard zones

Infrastructure and Transportation

- Transportation: one road in, one road out
- Need redundant routing on the 101 and weakest links
- Identified weakest part of 101, some have resources on USFS roads
- Jimmy Comelately creek/bridge is a weak point
- WSDOT currently doing study on 101, 3-year study timeline, could pursue a smaller locally controlled project on 112 road
- City of Sequim: CLP on W Sequim Bay Road, second evacuation route**
- Pip ship bridge during storm surge

Communication and Coordination

- Communication lines, could be weeks without normal communication channels
- Clallam County has CERC certification, and need to support across jurisdictions the EOC
- As a regional group, include mitigation action items for every annex to show importance to FEMA
- State needs to be an advocate on a bigger level
- More grants opportunities if its multi-jurisdictional and projects applying together

Resources and Supplies

- Barging in supplies an option for all hazards except CSZ/tsunami. Port of PA bought 3 barges

- Need local location where materials can be staged for 4 weeks, opportunity to use barges
- Seeking funding for low-income communities/individuals for buying supplies food, water, etc.
- Diane working with FEMA for FEMA staged supplies
- Don't have FEMA warehouse in WA State

Medical and Emergency Services

- Medical evacuation, would likely need a helicopter to transport out
- Fire district 2 and Jamestown S'Klallam Tribe support/provide medical for all
- Jamestown S'Klallam Tribal elders and people for evacuation

Private and Independent Systems

- Private water system, need independent power system

DISCUSSION 2: POLICIES, PROJECTS, OTHER RESPONSES FOR CLIMATE IMPACTS (10 YEAR+ PLANNING HORIZON)

Economic Development and Land Use

- Reexamine land use zones and redefining what flood plain means
- Getting people out of harm's way, specifically for wildfire risk
- Property buy-back program

Public Health and Community Wellbeing

- Expectation setting: when power is off and maybe for a while, what's the back up?
- Over communicate to community about impacts, hazards, preparedness
- Tribal liaison for coordination on climate responses more locally
- Need for education on wildfire
- Education programs for people to be more water wise on their property
- Partner on lobbying together to go to the state, Olympia strategy

Built Infrastructure

- PUD mentioned need to know some of the mitigation plans in advance, to be able to plan ahead. Examples:
    - If street is going to be added/moved, would be good to know well in advance to plan for line maintenance at same time
    - If tribes are talking relocating at all, or plans for new housing developments, need to talk where substation goes well in advance. Those are hard to locate once people are living somewhere
- Round abouts, remove traffic signals, build solar lights, wider culverts

- Solar projects and solar generators, long term balancing act
- Can double down on generators
- Electric grid expansion for increased AC demand
- Solarization and generator needs
- Weatherization of homes (Jamestown S'Klallam Tribe owns 50+)
- Microgrid resiliency

Natural Environment and Water Resources

- Dungeness Watershed Technical Workgroup already have some recommendations in progress
- Sequim has a water reclamation facility
- Need to be smarter about water reclamation to use in infrastructure
- Diversification of water resources
- Elwha can get really low
- Better characterization of ground water systems
- Need to do prescribed burning in Clallam, working on getting USDA grant
- Dungeness River main irrigation source
- Last year, it was a choice between irrigation or salmon
- Consider conserving early in the season
- Implementing conservation tactics earlier, all water, do policy earlier
- Housing and UWE balancing act
- WSU Clallam and Clallam Conservation District leading drought relief education outreach program all county

8.7 Workshop Sign-in Sheet

Name	Affiliation	Email
Wendy Clark-Gudgen	Jamestown S'Klallam Tribe	WCLARK@JAMESTOWNTRIBE.OR
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JESSE WAKNITZ	PORT OF PA	jessew@portofpa.com
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Meggan Uecker	City of Sequim Public Works	muecker@sequimwa.gov
Bhailesh Shere	Clallam County PUD	sshere@clallampud.net

8.7 Workshop Sign-in Sheet

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Name	Affiliation	Email
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Holden Fleming	Clallam county DCD	Holden.Fleming@Clallam Coun
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RICKY JOHNSON	JST	rajohnson@jamestowntribe.o

Hazard Mitigation & Climate Resilience Planning Workshop

Wednesday, August 7th, 2024 | 1:30-3:30 PM

CLALLAM COUNTY
Washington

JAMESTOWN S'KLALLAM TRIBE
THE STRONG PEOPLE

Welcome!

Let’s all go around the room and introduce ourselves!

Workshop Objectives

- Share out early learnings and updates for the Climate Element and Multi-Jurisdictional Hazard Mitigation Plan
- Meaningful opportunity to provide feedback to further guide plan development

Workshop Agenda

Time	Agenda Item
5 mins	Welcome
5 mins	Hazard Mitigation & Climate Resilience Project Overview
10 mins	What are the climate impacts and hazards in Clallam County?
35 mins	Facilitated Discussion on Impacts, Risks, & Vulnerabilities
10 mins	Break
10 mins	What policies, programs, projects, and activities would help your community address impacts from climate change and hazards?
30 mins	Facilitated Discussion on Responses
10 mins	Wrap up & Next Steps

Hazard Mitigation & Climate Resilience Project Overview

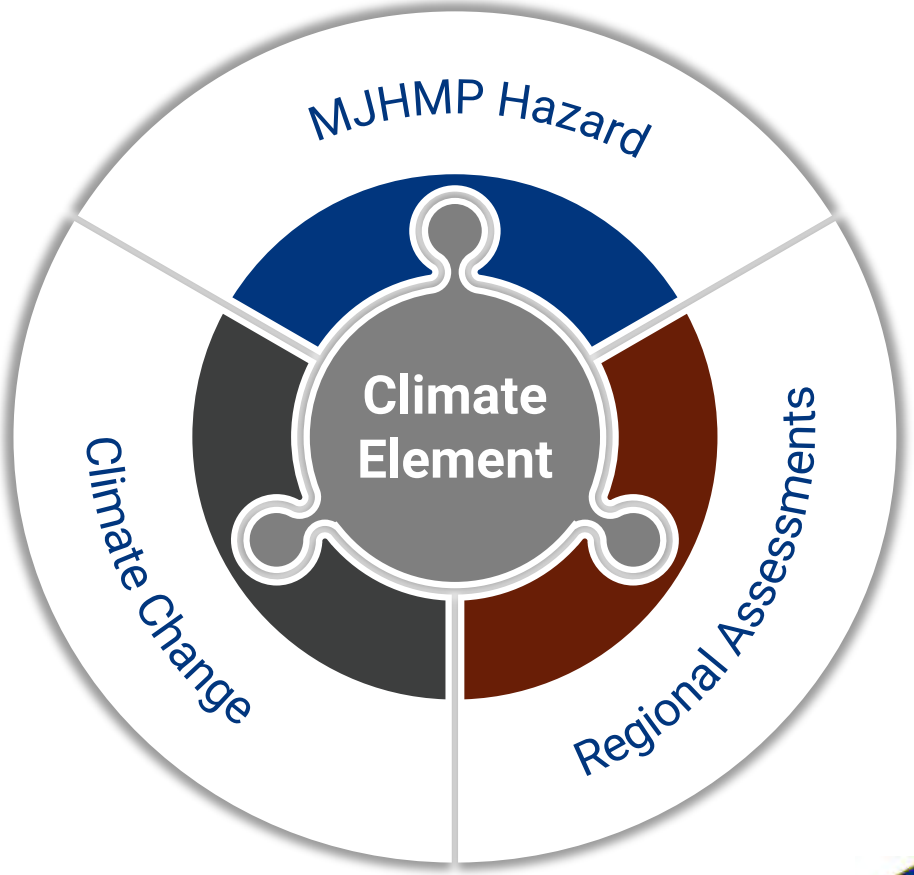
Project Background and Goal

- County is updating the **MJHMP** in collaboration with the same 2019 participating jurisdictions, agencies, and Tribes.
- Concurrently developing a Comprehensive Plan **Climate Element.**

Goal: Elevate key **climate and hazard issues** facing the community and ensure that there is **alignment between the plans** while addressing **state and federal requirements**.

Progress to Date

- Climate Element
  - ✓Draft goal and policy development
  - ✓Climate survey
- MJHMP
  - ✓Hazard mapping
  - ✓Hazard profiles
- Both
  - ✓Hazard survey analysis
  - ✓Vulnerability assessment



Community Engagement

What are the Climate Impacts and Hazards in Clallam County?

Hazards in Clallam County

- Dam/Reservoir Failure
- Disease (Infectious/Vector) and Pandemic
- Drought
- Flood
- Human-Caused Hazards
  - Hazardous Materials Spill
  - Maritime Disasters
  - Active Shooter
  - Terrorism
  - Utility Failure/Power Outage [secondary hazard]
  - Supply Chain Interruption [secondary hazard]
- Landslide

Hazards in Clallam County

Sea Level Rise

- Coastal Erosion

Seismic Hazards

- Cascadia Subduction Earthquake
- Earthquake, ~7.0 Design Level

Severe Weather

- Windstorm
- Winter Storm (rain, freezing rain, ice, snow, cold temperature)
- Extreme Heat

Tsunami

Wildfire

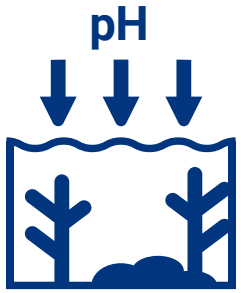
- Wildfire Smoke [secondary hazard]

Climate Impacts

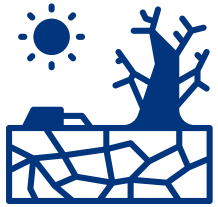
Coastal flooding from higher sea levels

Reduced snowpack

Increased riverine flooding



Ocean acidification (pH decreases)



Drought

Higher temperatures

Coastal Flooding

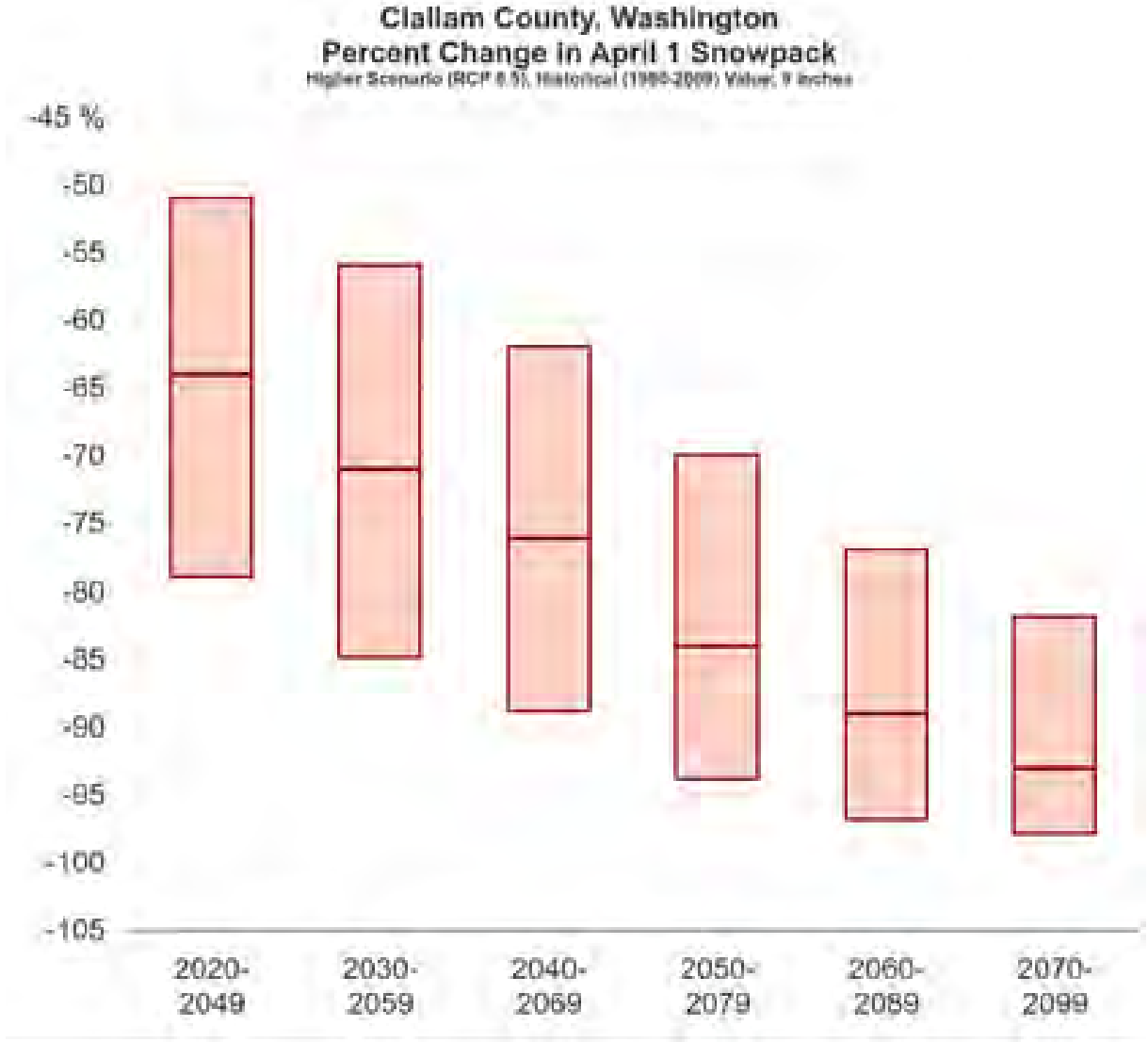
SEA LEVEL RISE *The amount of sea level rise expected with a 50% and 1% likelihood relative to the 1991 - 2009 average sea level.**	**Neah Bay** *Clallam County*	**Clallam Bay/Sekiu** *Clallam County*	**Port Angeles** *Clallam County*
	50% chance of 0.1 feet (2050) and 1.0 feet (2100)	50% chance of 0.4 feet (2050) and 1.1 feet (2100)	50% chance of 0.6 feet (2050) and 1.2 feet (2100)
	1% chance of 0.8 feet (2050) and 3.8 feet (2100)	1% chance of 1.4 feet (2050) and 4.2 feet (2100)	1% chance of 1.8 feet (2050) and 4.6 feet (2100)

** The projections in this table come from (Miller, I.M., et al. , 2019) - to be updated soon!*

Coastal Flooding

Source: [Coastal Flooding | Washington Coastal Hazards Resilience Network (wacoastalnetwork.com)]

Reduced Snowpack



Increased Riverine Flooding

	2050-2079	2070-2099
Precipitation Magnitude (Salathé, E.P. et al., 2010) *Accessed via Climate Mapping for a Resilient Washington.**	Clallam County	Clallam County
Heavy Precipitation Magnitude	12% (1% to 21%)	14% (5% to 17%)
Extreme Precipitation Magnitude	13 % (0% to 27%)	18 % (8 to 24%)

Increased Riverine Flooding

Source: All sizes | The Pysht River over SR 112 | Flickr - Photo Sharing!

Ocean acidification

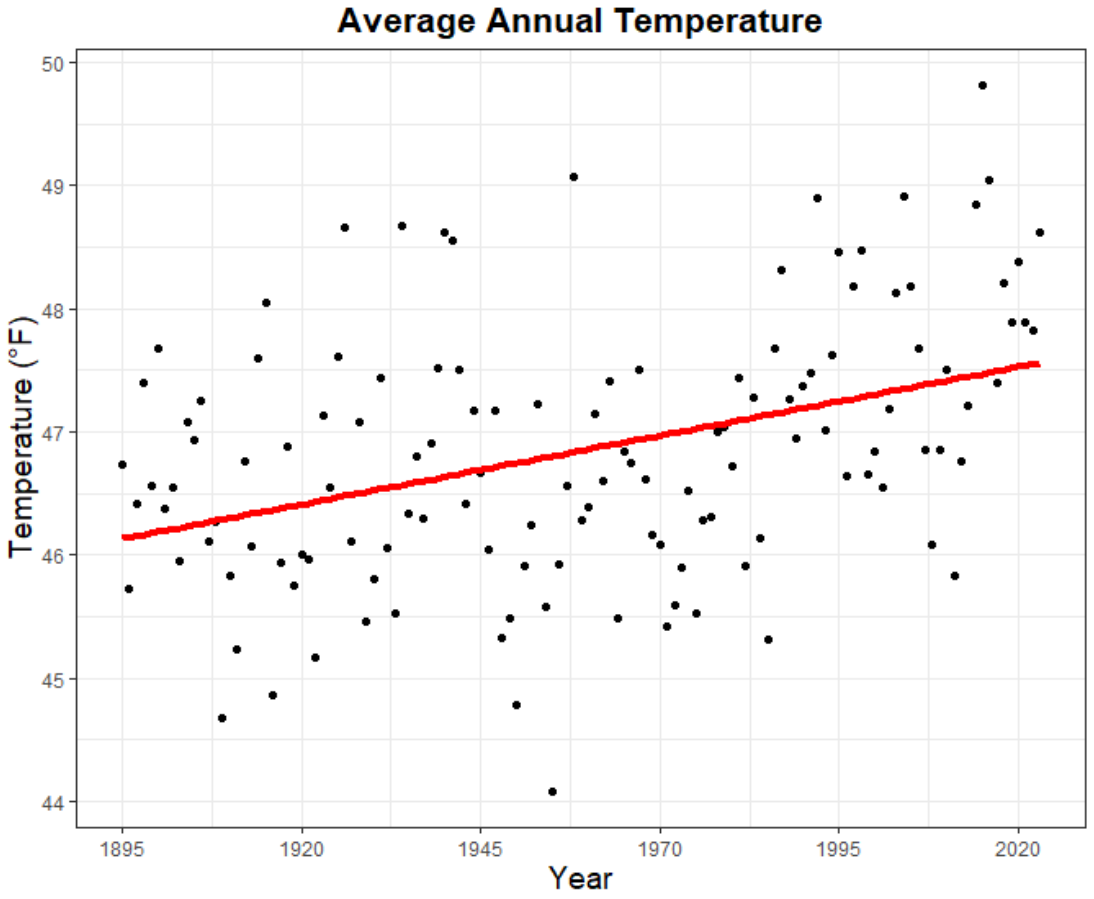
Figure 5. The pteropod, or "sea butterfly," is a tiny sea snail about the size of a small pea eaten by a variety of species, including seabirds, fish, and whales. The photos above show what happens to a pteropod's shell when placed in seawater with pH and carbonate levels projected for the year 2100. The shell slowly dissolved over 45 days. *Used with permission from National Geographic.*

Drought

	2050-2074	2075-2099
Monthly Rainfall (North Olympic Peninsula Resource Conservation & Development Council, 2022)	Clallam County	Clallam County
Average Monthly Rainfall in August	-0.62 inches	-0.62 inches
Average Monthly Rainfall in November	+1.5 inches	+1.5 inches

	2010-2039	2040-2069
Wildfire Danger (T. Sheehan, et al., 2015) *Accessed via Climate Mapping for a Resilient Washington.**	Clallam County	Clallam County
Change in annual high fire danger days	5 days (-1 to 10 days)	10 days (1 to 16 days)

Higher temperatures



(NOAA National Centers for Environmental information, 2024)

Defining Climate Vulnerability

Climate risks are the range of potential impacts a system would be affected by climate change and are dependent on exposure and sensitivity. To characterize risks, we will look at:

Exposure + **Sensitivity** − **Adaptive Capacity** = **Vulnerability**

The degree to which a system is stressed by the impacts of climate change

The degree to which that system is likely to be affected by climate impacts

The ability to cope and respond to the impacts of climate change. To characterize adaptive capacity, we will look at current and potential adaptation actions that could minimize the impacts of climate risks.

Exposure and sensitivity increase vulnerability, while adaptive capacity decreases vulnerability.

Vulnerability Assessment Sectors

	Focus Area	Subsectors
	Public Health and Community Wellbeing	Public Health
		Community Resources
		Emergency Management
	Natural Environment and Water Resources	Ecosystems and Critical Areas
		Parks, Trails, and Open Space
		Water Systems
	Economic Development and Land Use	Local Industries and Businesses
		Land Use and Resource Lands
	Built Infrastructure	Housing
		Water Systems
		Energy
		Transportation

Discussion on Impacts, Risks, and Vulnerabilities

- 15 minute facilitated discussion
- Splitting into 2 groups, each covering 2 Vulnerability Assessment sectors

Group 1: Mike	Group 2: Meg
• Economic Development and Land Use • Public Health and Community Wellbeing	• Built Infrastructure • Natural Environment and Water Resources

Discussion on Impacts, Risks, and Vulnerabilities

Who in your community, and broader Clallam County, is most vulnerable/at risk?

What physical assets (specific areas, critical facilities, infrastructure) are most vulnerable/at risk?

Break and Sticky Notes

10 minutes

What policies, programs, projects, and activities would help your community address impacts from climate change and hazards?

Two-part discussion on Responses

1. Hazard Mitigation topics and hazards projects in the shorter term (5 years),
2. Policies, projects, other for Climate impacts (longer-term [10 year] planning horizon)

Focus for both discussions:

What are ways Clallam County can build adaptive capacity to hazards and climate change?

Multi-Jurisdictional Hazard Mitigation Plan

Mitigation Actions:

- Reduce the Potential for Damage
- Create a Decision Tool for Management
- Promote Coordination and Compliance with State and Federal Program Requirements

Mitigation Action Types:

- Local Planning And Regulations
- Structure and Infrastructure Projects
- Natural Systems Protection
- Education and Awareness Programs

Discussion on Hazard Responses

What are capital improvement projects, programs, policies to address short-term hazard mitigation?

Discussion on Climate Responses

What are priority actions (policies, projects, etc.) to respond to the impacts and vulnerabilities we identified?

Thank you for joining us today!

Take the Climate Risk & Resiliency Survey!

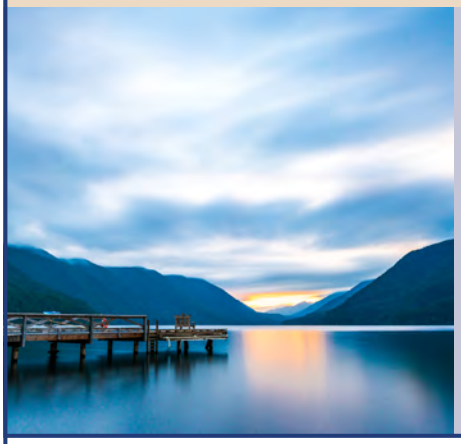
https://www.clallamcountywa.gov/ClimateSurvey2024

HAZARD MITIGATION & CLIMATE RESILIENCE PLANNING IN CLALLAM COUNTY

Clallam County (County) is updating its 2019 **Multi-Jurisdictional Hazard Mitigation Plan** and creating a **Climate Element** as a part of the 2025 Comprehensive Plan update. These plans will help the County prepare for environmental hazards and climate change.

Multi-Jurisdictional Hazard Mitigation Plan

The Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) provides a plan for Clallam County to reduce vulnerability to natural and human-caused hazard events such as earthquakes, drought, power outages, and wildfires and requires an update every 5 years.



Climate Element

The Climate Element (CE) meets new Washington House Bill 1181 requirements for cities and counties to include climate mitigation and/or resilience policies into their periodic comprehensive plan updates. Clallam County is required to satisfy a climate resilience sub-element for its 2025 Comprehensive Plan.

We want to hear from you!

We want to hear from you to better understand and address the specific threats that hazards, extreme weather and climate change pose to Clallam County.

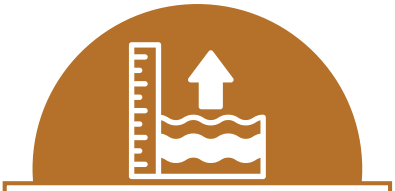
Stay connected

There are many opportunities to provide feedback on the new plan, stay up to date with events, opportunities to provide feedback, and any updates through our website.

PROJECTED CLIMATE CHANGE IMPACTS FOR THE PENINSULA

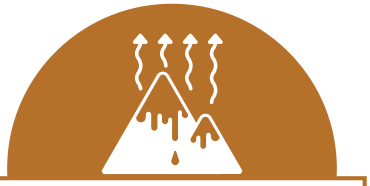
Examining historical trends and future climate projections, we are able to get a foundational understanding of how future changes in the climate and associated hazards will impact Clallam County now and in the future.

Without ambitious greenhouse gas (GHG) reduction measures across the region and globe, Clallam County is expected to experience:



COASTAL FLOODING FROM HIGHER SEA LEVELS

Varying impacts across the county are expected, with projections of between 0.46-0.85 ft of sea level rise by 2050 and more by 2100.

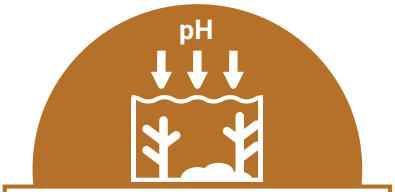


REDUCED SNOWPACK

Resulting in less water availability for streams during the late summer months, affecting salmon habitat, water quality, and streamflow.

INCREASED RIVERINE FLOODING

Increased winter precipitation, along with more precipitation falling as rain rather than snow, can lead to flooding.



OCEAN ACIDIFICATION (pH DECREASES)

Adversely impacts marine life and ecosystems, including culturally and economically significant invertebrates.

INCREASED DROUGHT

Leading to increased wildfire risk and related smoke, and stress to agricultural and forest lands.

HIGHER ANNUAL AVERAGE TEMPERATURES

With higher temperature increases during the summer months, and more days with average temperatures above 86°F.

IMPACTS, RISKS, & VULNERABILITIES DISCUSSION

Who in your community, and broader Clallam County, is most vulnerable/at risk?

What physical assets (specific areas, critical facilities, infrastructure) are most vulnerable/at risk?

ECONOMIC DEVELOPMENT AND LAND USE

PUBLIC HEALTH AND COMMUNITY WELLBEING

IMPACTS, RISKS, & VULNERABILITIES DISCUSSION

Who in your community, and broader Clallam County, is most vulnerable/at risk?

What physical assets (specific areas, critical facilities, infrastructure) are most vulnerable/at risk?

BUILT INFRASTRUCTURE

NATURAL ENVIRONMENT AND WATER RESOURCES

VULNERABILITY ASSESSMENT FOCUS AREAS

PUBLIC HEALTH AND COMMUNITY WELLBEING

Public Health	Physical health risks (medical care; climate-related illness, injury, and death); environmental and socioeconomic health disparities; mental health
Community Resources	Social services; cultural resources; food access; shelter
Emergency Management	Critical facilities; emergency services; communication systems; community safety and security

NATURAL ENVIRONMENT AND WATER RESOURCES

Ecosystems and Critical Areas	Inland and coastal habitats, forests, wetlands, impervious surfaces
Parks, Trails, and Open Space	Multiuse trails, greenways, public lands, and parks, tree canopy
Water Supply	Water Supply (Surface and groundwater supply; Water storage and transmission systems

ECONOMIC DEVELOPMENT AND LAND USE

Local Industries and Businesses	Recreation and tourism; labor; local businesses
Land Use and Resource Lands	Agriculture, forest, and resource lands, Urban Growth Areas, downtowns

BUILT INFRASTRUCTURE

Housing	Single and multi-family residential buildings
Water Systems	Stormwater (Stormwater infrastructure); Wastewater (wastewater management)
Energy	Energy supply and demand (energy grid, utilities, and fuel); energy infrastructure (powerlines, substations, and energy transmission and distribution systems)
Transportation	Highway/roadway/motor vehicles; pedestrian and bicycle systems (including Olympic Discovery Trail; mass transit; railway; maritime (ports)

RESPONSES AND SOLUTIONS DISCUSSION

What are priority actions (policies, projects, etc.) to respond to the impacts and vulnerabilities we identified?

ECONOMIC DEVELOPMENT AND LAND USE

PUBLIC HEALTH AND COMMUNITY WELLBEING

BUILT INFRASTRUCTURE

NATURAL ENVIRONMENT AND WATER RESOURCES

CLALLAM COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

MITIGATION ACTIONS:

- **Reduce the Potential for Damage:** Reduce damage to critical assets from natural and human-caused hazards.
- **Create a Decision Tool for Management:** To provide information for jurisdictions within the County may act to address vulnerabilities.
- **Promote Coordination and Compliance with State and Federal Program Requirements:** To ensure jurisdictions within the County are coordinated and take full advantage of state and federal grant programs.

REVIEW AND SELECTION CRITERIA

SOCIAL

- Is the proposed action socially acceptable to the jurisdiction and surrounding community?
- Are there equity issues involved that would mean that one segment of the jurisdiction and/or community is treated unfairly?
- Will the action cause social disruption?

ADMINISTRATIVE

- Can the jurisdiction implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

POLITICAL

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

ECONOMIC

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, nonprofit, and private)?
- How will this action affect the fiscal capability of the jurisdiction?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?
- Does the action contribute to other jurisdiction goals?
- What benefits will the action provide?

LEGAL

- Is the jurisdiction authorized to implement the proposed action?
- Are there legal side effects? Could the activity be construed as a taking?
- Will the jurisdiction be liable for action or lack of action?
- Will the activity be challenged?

TECHNICAL

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other jurisdiction goals?

ENVIRONMENTAL

- How will the action affect the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

MITIGATION PRIORITIZATION

High	Top organizational priority and is generally a well-detailed project idea. Protects population, resource or property at high risk, Uses feasible methods, techniques or technology.
Medium	A good idea that needs more information or is an action that addresses a moderate hazard.
Low	An idea that needs a lot more information or will take a lot of preliminary action to build support.

MITIGATION TIMEFRAME

Short-term	1-2 years
Mid-term	3-4 years
Long-term	5+ years
Ongoing	1-2 years and ongoing thereafter

RESPONSES AND SOLUTIONS DISCUSSION

What are capital improvement projects, programs, policies to address short-term hazard mitigation?

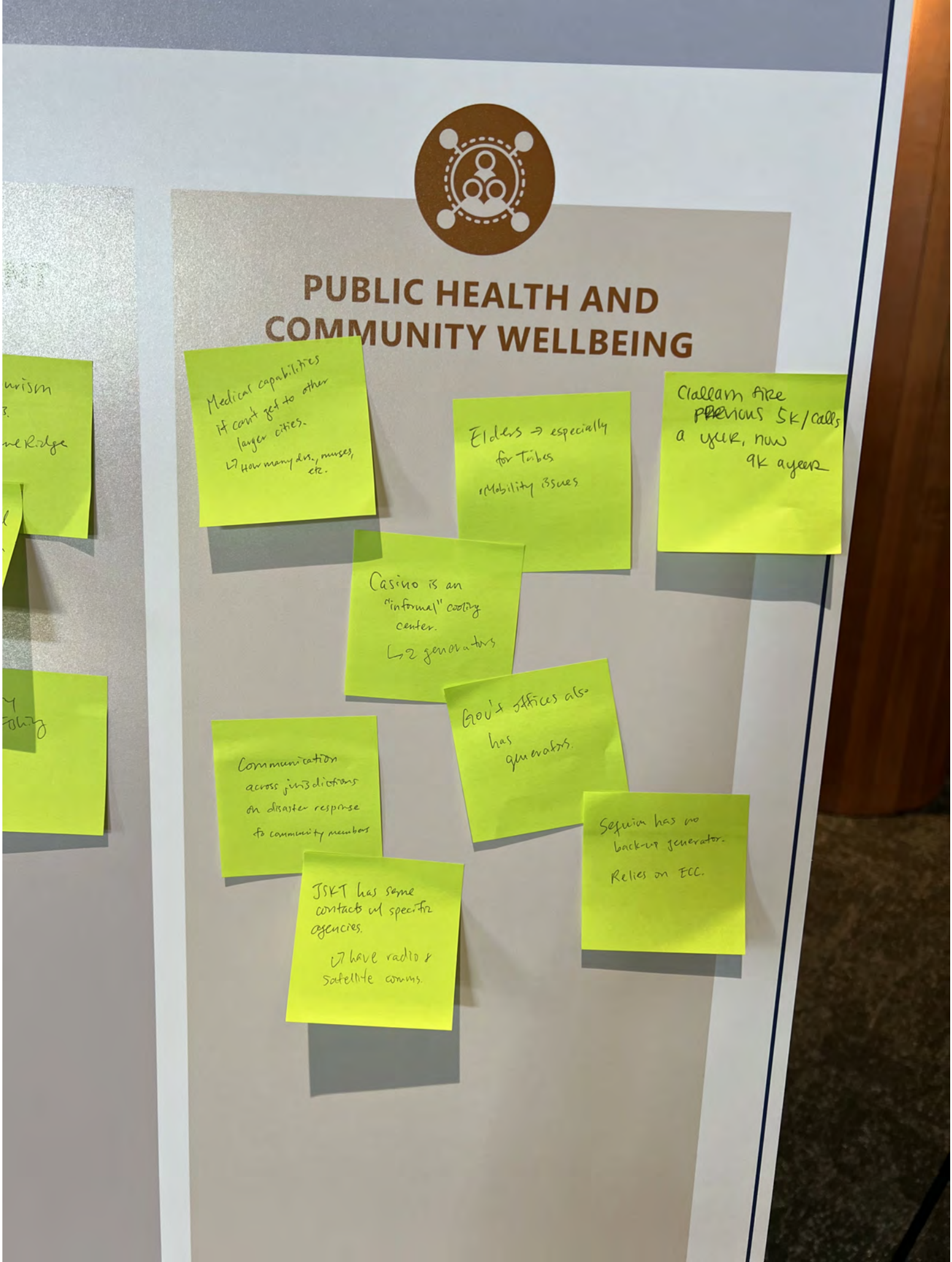
ECONOMIC DEVELOPMENT AND LAND USE

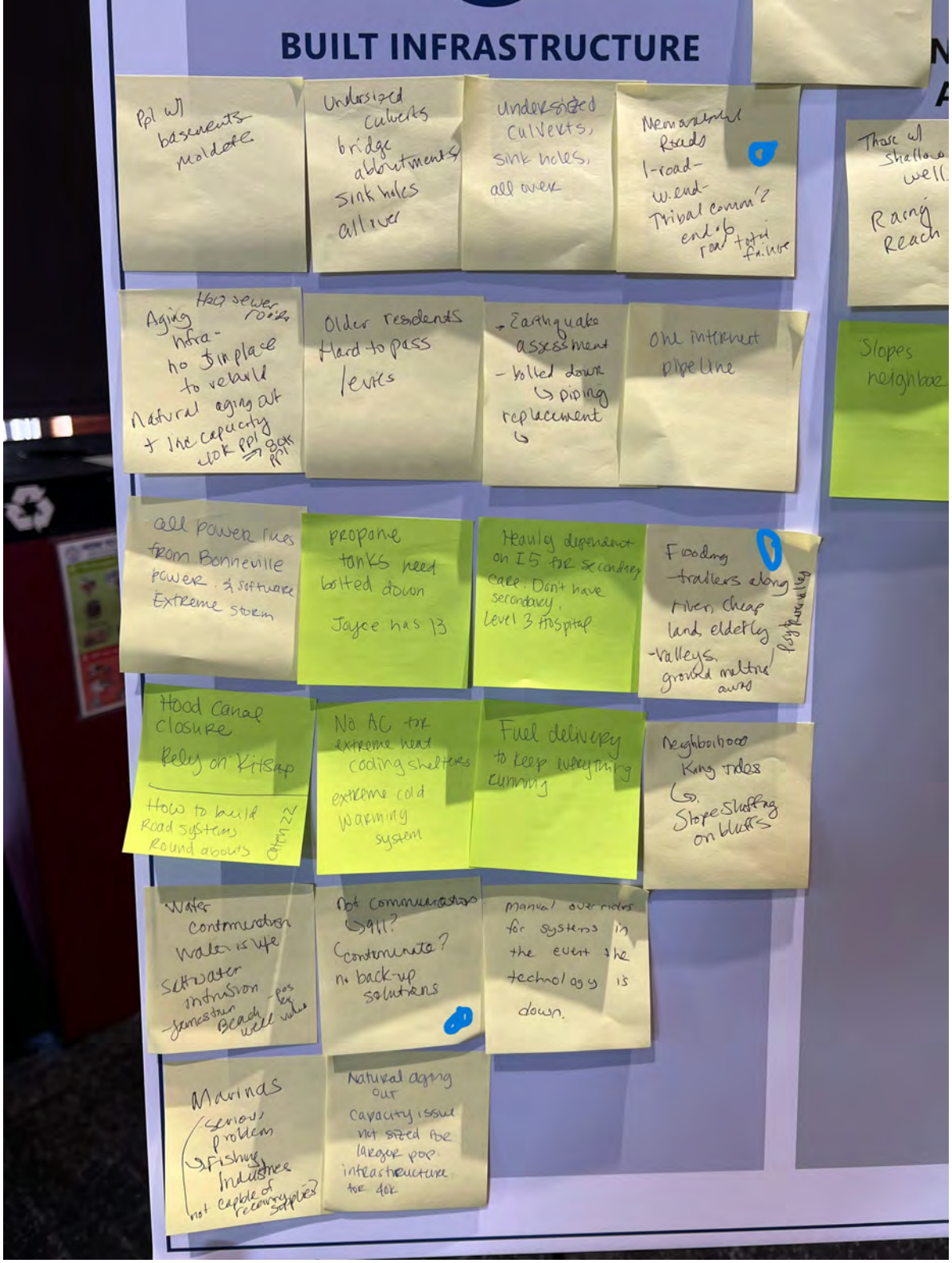
PUBLIC HEALTH AND COMMUNITY WELLBEING

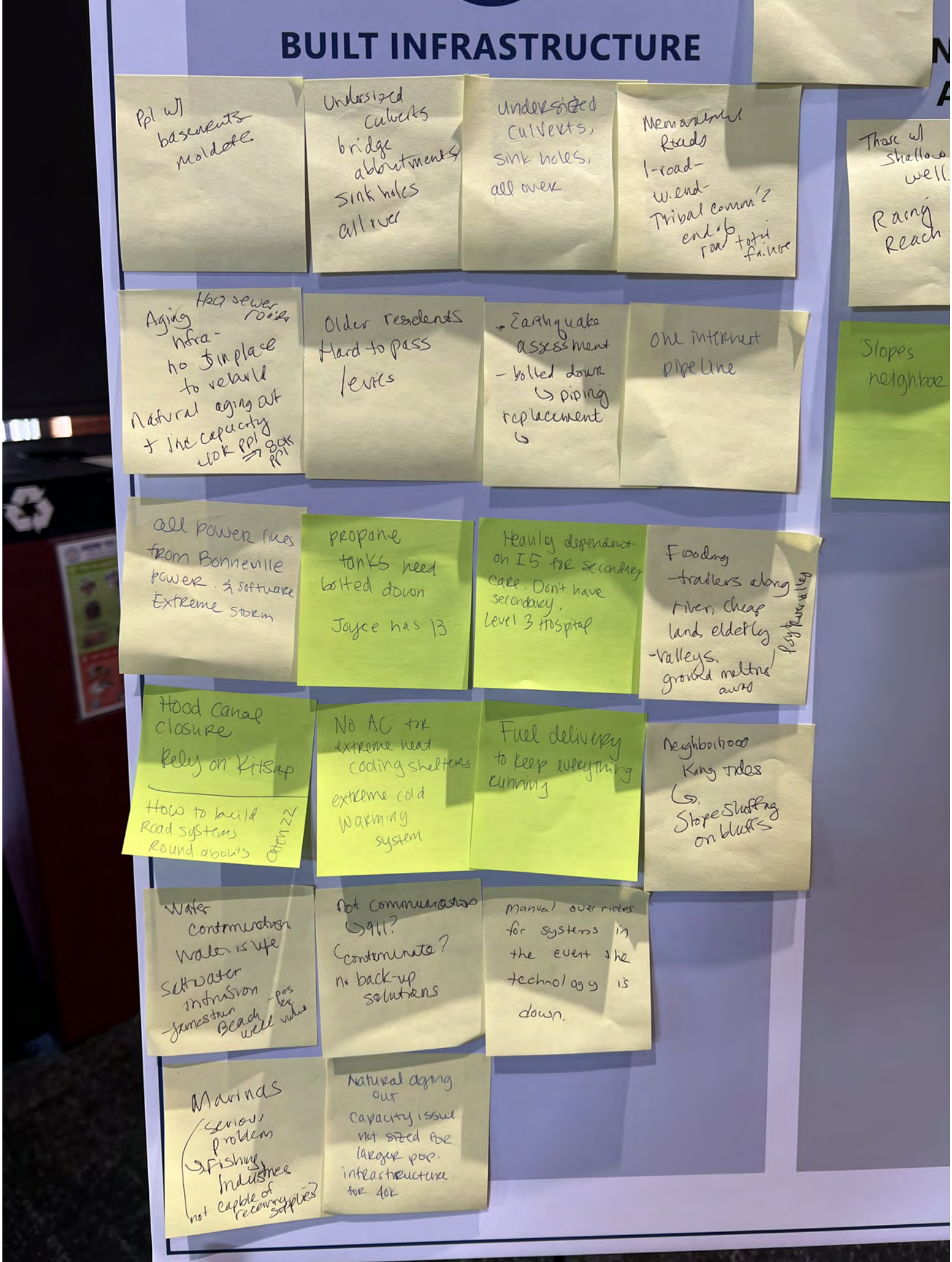
BUILT INFRASTRUCTURE

NATURAL ENVIRONMENT AND WATER RESOURCES

What physical assets (specific a
infrastructure) are most vu
ECONOMIC DEVELOPMENT
AND LAND USE
JSKT
Commercial
fishing moved
to Kona, HI
bigger threat
more acidic
shellfish, crabs
Rec & tourism
impacts
↳ Hurricane Ridge
Population
growth considered
in the VA?
Land Use
sector
stressors on resources
Also rec. demand
from ↑ in population
growth
Port assets.
↳ fuel
↳ airports
Forestry
Fishing
Medical capabili
it can't get to
larger cities.
↳ How many
Communication
across jurisdictio
on disaster respo
to community
JSKT
conta
agenc


PUBLIC HEALTH AND COMMUNITY WELLBEING
Medical capabilities it can't get to other larger cities.
↳ How many drs., nurses, etc.
Elders → especially for Tribes
↳ Mobility issues
Clallam like previous 5k/calls a year, now 9k a year
Casino is an "informal" cooling center.
↳ 2 generators
Gov't offices also has generators.
Communication across jurisdictions on disaster response to community members
Sequim has no back-up generator.
Relies on ECC.
JSKT has some contacts w/ specific agencies.
↳ have radio & satellite comms.


BUILT INFRASTRUCTURE
Ppl w/ basements → moldete.
Undersized culverts bridge abbutments Sink holes all over
Undersized culverts, sink holes, all over
Non-motorized Roads I-road- W.end- Tribal comm'z end-b rail total failure
Those w/ shallow well
Aging infra- no $ in place to rebuild Natural aging out + Inc capacity 40K ppl → 60K ppl
Older residents Hard to pass levees
- Earthquake assessment - boiled down ↳ piping replacement ↳
One internet pipeline
Slopes neighbor
all power lines from Bonneville power. ↑ software Extreme storm
propane tanks need bolted down Jayce has 13
Heavily dependent on I5 for secondary care. Don't have secondary. Level 3 hospital
Flooding trailers along river, cheap land, elderly -valleys, ground melting away
Hood Canal closure Relay on Kitsap
How to build Road systems Round abouts often 22
No AC for extreme heat cooling shelters extreme cold Warming system
Fuel delivery to keep everything running
Neighborhood King tides ↳ Slope Sluffing on bluffs
Water contamination Water is life Saltwater intrusion -Jamestown Beach well wells
Not communicating ↳911? Communicate? no back-up solutions
manual over riders for systems in the event the technology is down.
Marinas serious problem ↳Fishing Industries not capable of receiving supplies
Natural aging out Capacity issue not sized for larger pop. infrastructure for 40K


BUILT INFRASTRUCTURE
Ppl w/ basements Moldate.
Undersized Culverts bridge abbutments Sink holes all over
Undersized Culverts, sink holes, all over
Mem-arterial Roads I-road- W. end- Tribal comm'? end of road failure
Those w/ shallow well
Rainy Reach
Aging Haz sewer roofs infra- no $ in place to rebuild Natural aging out + Inc capacity 40K ppl => 80K ppl
Older residents Hard to pass /evics
- Earthquake assessment - bolted down ↳ piping replacement ↳
Old internet pipeline
Slopes neighbor
all power runs from Bonneville power. & software Extreme storm
propane tanks need bolted down Joyce has 13
Heavily dependent on I5 for secondary care. Don't have secondary. Level 3 Hospital
Flooding -trailers along river, Cheap land, elderly -valleys, ground melting away
Psychrometrics
Hood Canal closure Rely on Kitsap
How to build Road systems Round abouts
Catch 22
No AC for extreme heat cooling shelters extreme cold warming system
Fuel delivery to keep everything running
Neighborhood King tides ↳ Slope Sluffing on bluffs
Water Contamination Water is life Saltwater intrusion Jamestown Beach - pos for well water
Not communicating ↳911? Contaminate? no back-up solutions
manual over rides for systems in the event the technology is down.
Marinas Serious problem Fishing Industries not capable of receiving supplies?
Natural aging out Capacity issue not sized for larger pop. infrastructure for 40K

ssets (specific areas, critical facilities,
ure) are most vulnerable/at risk?

Elders!
& older folks

Fixed income
& tax base

ICTURE

NATURAL ENVIRONMENT AND WATER RESOURCES

Non-paved Roads
1-road-
w.end-
Tribal comm's
end of road to fish hatch

There w/ shallow wells
Rainy Reach

Water systems vulnerable
2020 storms
solid shut off during storm
Earthquake shut off

Fisheries
Timber,
Agriculture,
Tourism
↳ Fuel delivery
keep things running

ONE internet pipeline

Slopes
neighborhoods

erosion &
Water ~~contamination~~
Contamination

Relocating JSKT beach well
salt water intrusion!

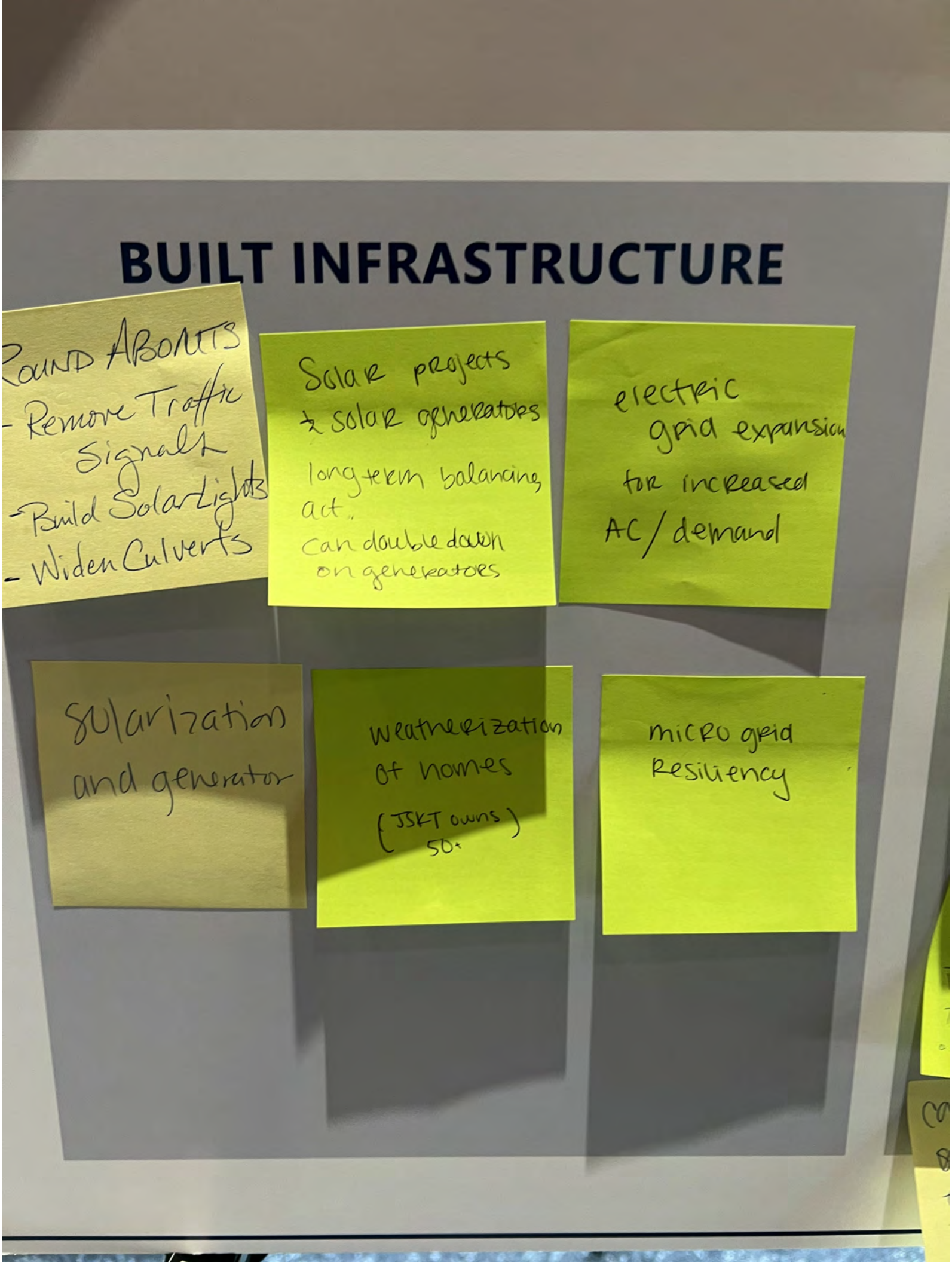
Flooding
trailers along river, cheap lands elderly
-Valleys, ground melting/ avers
Psychological

Valleys
neighborhoods/ communities
⇓
Travel Slides

River adjacent homes/trailers

Neighborhood King Tides
↳ Slope Shifting on bluffs

Snowpack hydropower
⇓
power sources


BUILT INFRASTRUCTURE
ROUND ABOUTS
- Remove Traffic Signals
- Build Solar Lights
- Widen Culverts
Solar projects & solar generators
long-term balancing act.
can double down on generators
electric grid expansion for increased AC/demand
solarization and generator
weatherization of homes
(JSKT owns) 50+
micro grid resiliency

respond to the impacts and v

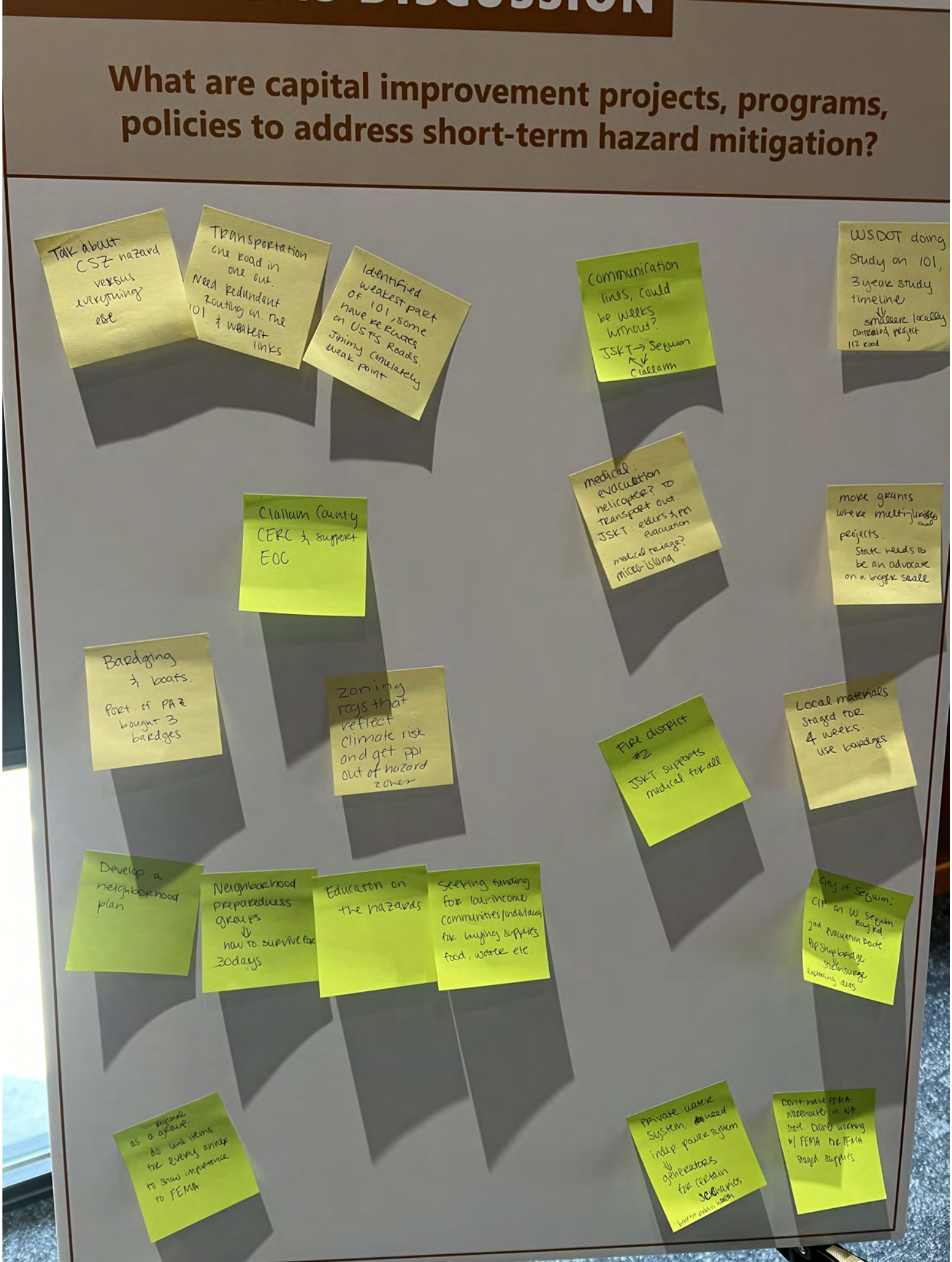
ECONOMIC DEVELOPMENT AND LAND USE

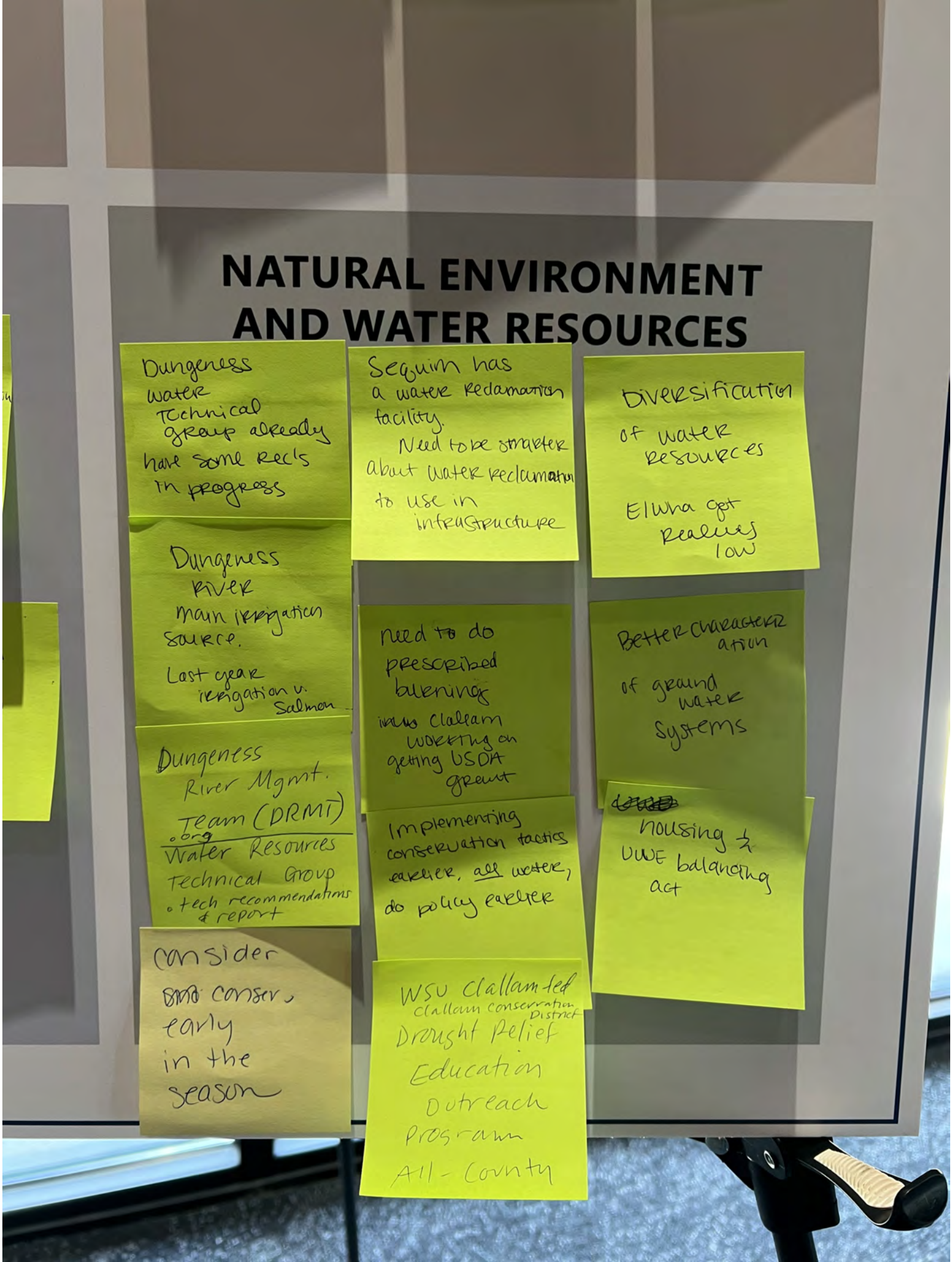
Reexamine Land use zones & redefining what flood-prone means. getting ppl out of harms way of wildfire risk

Property by back Program

BUILT INFRASTRUCTURE

What are capital improvement projects, programs, policies to address short-term hazard mitigation?




NATURAL ENVIRONMENT AND WATER RESOURCES
Dungeness water Technical group already have some Rec's in progress
Sequim has a water Reclamation facility. Need to be smarter about water reclamation to use in infrastructure
Diversification of water resources
Elwha get Realies low
Dungeness River main irrigation source.
Last year irrigation v. Salmon
need to do prescribed burning
Clallam working on getting USDA grant
Better characterization of ground water systems
Dungeness River Mgmt. Team (DRMT)
Water Resources Technical Group
• org
• tech recommendations & report
Implementing conservation tactics earlier, all water, do policy earlier
housing & UWE balancing act
consider conserv. early in the season
WSU Clallam led
Clallam conservation District
Drought Relief
Education
Outreach
Program
All-County

PUBLIC HEALTH AND COMMUNITY WELLBEING

Expectation Setting:
When power is off, what's the back up?

over communicate to community about impacts, hazards, preparedness

Tribal Liason for coordination on climate responses, more locally

partner on lobbying together to go to the state, Olympia strategy!

education programs for ppl to be more water-wise on their property
practices
↓
natural plants
WSU Clallam County

Education on wild fire!

NATURAL ENVIRONMENT

Jamestown S'Klallam Tribal Annex Mitigation Action Handout

WHAT IS MITIGATION?

It is the **ongoing effort to lessen the impact** that disasters can have on people and property. Without mitigation, the same people, property, and community lifelines are affected repeatedly. This directly impacts the community's lifelines, including:

- Safety and Security
- Food, Hydration, Shelter
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials
- Water Systems

ABOUT MITIGATION ACTIONS

- Actions to Reduce or Eliminate Long-Term Risk and Vulnerability
- Lessen or Eliminate the Need for Preparedness or Response Resources
- Emphasis on the Impact of Vulnerabilities

HOW TO USE THIS HANDOUT

Clallam County is preparing an update to the 2019 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), per Federal Emergency Management Agency requirements.

As part of this update, previous mitigation actions are comprehensively reviewed for status (complete/ongoing/underway) and relevancy (to include in the 2024 MJHMP update or eliminate as no longer applicable). ***Actions from the 2019 MJHMP are included on the following pages for reference and context to generate ideas for new mitigation actions as part of the 2024 MJHMP update.*** A status summary of 2019 MJHMP actions is included below.

2019 MJHMP Mitigation Summary

20 *Total Mitigation Actions*

14 *Ongoing Mitigation Actions*

3 *Underway Mitigation Actions*

2 *Completed Mitigation Actions*

1 *No Longer Applicable Mitigation Actions*

JAMESTOWN S'KLALLAM TRIBAL ANNEX
2019 MITIGATION ACTIONS WORKSHEET
COMMUNITY OUTREACH HANDOUT

Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
JSK02	Improve communications in Blyn Basin, including building cellular tower and installing fiber internet.	Completed	No	Tribe	Constructed in 2019-20	All hazards	Tribe	Located in Blyn, Verizon, T-mobile, County EM repeater
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.	Completed Potential New Action: need to decommission old well close to shoreline	No	Tribe	1 year	Flooding, Tsunami	CDBG-GP Grand, EPA Grants, USDA Rural Development Loans or Grants	New well has been developed and water storage constructed. Well will soon serve community system
JKS03	Lower Dungeness River Floodplain Restoration, including 3 Crabs Rd.	More completed, and more to come	Yes	Tribe, Clallam County, Washington Department of Fish and Wildlife	5 years	Flooding	WA Floodplains by Design, Construction funding from ACOE	River's edge project completed in 2022
JSK04	Structure elevation and/or relocation of Tribal facilities and infrastructure	Underway	Yes	Tribe	Variable	Flooding, Tsunami	HMGP/BIA Climate Resiliency	Awarded funding to relocated Natural Resource Lab
JSK05	Coordinate with County on the implementation of the NFIP Program	Underway, but not finalized	Yes	FEMA, Tribe, County	Ongoing	Flooding	FEMA, Tribe	

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JAMESTOWN S'KLALLAM TRIBAL ANNEX
2019 MITIGATION ACTIONS WORKSHEET
COMMUNITY OUTREACH HANDOUT

Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
JSK01	Seismic assessment of Tribal facilities	Ongoing	Yes	Tribe	1-3 years	Tsunami, Earthquakes	FEMA	
JSK06	Encourage native vegetation on shorelines and formation of dunes	Ongoing	Yes	Tribe	Ongoing	Flooding	Building Resilient Infrastructure and Communities Grant Program (FEMA) , U.S. Department of Agriculture	
JSK07	Public education around flood mitigation, floodplain functions, emergency service procedures, and potential hazards.	Ongoing	Yes	Tribe	Ongoing	Flooding	PDM	
JSK08	Limit removal of vegetation in areas prone to ground failure. Plan ground cover where appropriate.	Ongoing	Yes	Tribe, County	Variable	Landslide	Tribe	
JSK09	Encourage residents and landowners to leave natural erosion barriers, such as driftwood logs on the shore, in place to reduce shoreline erosion.	Ongoing	Yes	Tribe	Variable	Landslide	Tribe	
JSK11	Conduct severe weather awareness activities.	Ongoing	Yes	Clallam County, Tribe	Ongoing	Windstorm, Winter Storm	Tribe	
JSK12	Develop alternate water supplies to provide reserve	Ongoing	Yes	Tribe	1-3 years	Windstorm, Winter	HUD Indian Community	Mitsubishi Well is being

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Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
	water sources to be used in event of drought or water shortage.					Storm, Drought	Development Grand Program	developed to the East of Blyn, with potential to produce 1000GPM
JSK13	Create and expand water efficiency/conservation programs.	Ongoing	Yes	Tribe	5 years	Drought	Tribe, Grants	Invested in Cedars at Dungeness irrigation system. Installed water efficient fixture and auto faucets in Tribal facilities
JSK14	Continue to participate in TsunamiReady with Clallam County	Ongoing	Yes	Clallam County, Tribe	Ongoing	Tsunami	Minimal	
JSK15	Develop advanced warning systems	Completed – Ongoing	Yes	Clallam County, Tribe	Ongoing	Tsunami	Minimal	AHAB sirens installed in Blyn and Jamestown beach in 2021
JSK17	Explore feasibility of incorporating elevated tsunami shelters or vertical evacuation structures in future construction plans in	Ongoing	Yes	Tribe	5 years	Flooding, Tsunami	FEMA	

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Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
	vulnerable zones in Blyn (7 Cedars Resort Casino & Tribal Government).							
JSK18	Fuel reduction projects and defensible space around structures	Ongoing	Yes	Tribe and County	1-5 years	Wildfire	U.S. Forest Service Grants	
JSK19	Promote FireWise building design for construction in the Vision Master Plan and Housing Programs	Ongoing	Yes	Tribe and County	Ongoing	Wildfire	ICDBG, US Forest Service, BLM	
Adopt the Hazard Mitigation Plan	Adopt the Hazard Mitigation Plan	Completed	YES – change date to 2024 Update	Planning Department	N/A	All hazards	N/A	

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Lower Elwha Tribal Annex Mitigation Action Handout

WHAT IS MITIGATION?

It is the **ongoing effort to lessen the impact** that disasters can have on people and property. Without mitigation, the same people, property, and community lifelines are affected repeatedly. This directly impacts the community's lifelines, including:

- Safety and Security
- Food, Hydration, Shelter
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials
- Water Systems

ABOUT MITIGATION ACTIONS

- Actions to Reduce or Eliminate Long-Term Risk and Vulnerability
- Lessen or Eliminate the Need for Preparedness or Response Resources
- Emphasis on the Impact of Vulnerabilities

HOW TO USE THIS HANDOUT

Clallam County is preparing an update to the 2019 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), per Federal Emergency Management Agency requirements.

As part of this update, previous mitigation actions are comprehensively reviewed for status (complete/ongoing/underway) and relevancy (to include in the 2024 MJHMP update or eliminate as no longer applicable). ***Actions from the 2019 MJHMP are included on the following pages for reference and context to generate ideas for new mitigation actions as part of the 2024 MJHMP update.*** A status summary of 2019 MJHMP actions is included below.

2019 MJHMP Mitigation Summary

12 *Total Mitigation Actions*

8 *Ongoing Mitigation Actions*

4 *Completed Mitigation Actions*

LOWER ELWHA TRIBAL ANNEX
2019 MITIGATION ACTIONS WORKSHEET
COMMUNITY OUTREACH HANDOUT

Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources
LEK01	Move the tribal center from the tsunami inundation zone where it is currently located.	Not Completed	Yes	Lower Elwha Police Department, Emergency Management Division	3-5 years	Tsunami	Federal Emergency Management Agency (FEMA)
LEK02	Widen and strengthen Lower Elwha Road from Stratton Road to Kacee Way.	Not Completed	Yes	Lower Elwha Police Department, Emergency Management Division	3-5 years	Earthquake, Flood, Landslide, Winter Storm, Tsunami, Wildfire	FEMA
LWK03	Evaluate options to make new hotel in Port Angeles tsunami resistant.	Not Completed	Yes	Lower Elwha Police Department, Emergency Management Division	1-3 years	Earthquake, Flood, Tsunami	FEMA
LEK04	Identify Elders and other vulnerable populations to prioritize for mitigation and disaster assistance	Completed	No	Lower Elwha Klallam Emergency Management, Tribal Police, Enrollment, Tribal Clinic	N/A	All hazards	Operating Budgets
LEK05	Create new, and expand existing Evacuation Routes, including better signage	Not Completed	Yes	Lower Elwha Klallam Emergency Management	1 year	Tsunami, Earthquake	Operating Budget

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LOWER ELWHA TRIBAL ANNEX
2019 MITIGATION ACTIONS WORKSHEET
COMMUNITY OUTREACH HANDOUT

Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources
LEK06	Acquire properties in low hazard areas in order to locate new development or relocate existing vulnerable structures and critical facilities	Completed	No	Lower Elwha Klallam Emergency Management	N/A	Flooding	Pre-Disaster Mitigation grant, Housing and Urban Development grants, U.S. Department of Agriculture (USDA) development grants
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	Completed	No	Lower Elwha Klallam Emergency Management	N/A	All hazards	Emergency Management Performance grants, regional homeland security grants, Citizens Corps funding and other sources
LEK08	Develop and/or improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Continuity of Operations Plan etc.	Not Completed	Yes	Tribal Council, Lower Elwha Klallam Emergency Management	1-5 years	All hazards	Emergency Mgt Performance Grants, Dept of Health Grants, Regional Homeland Security funds and other sources
LEK09	Partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions	Ongoing	Yes	Lower Elwha Klallam Emergency Management	Ongoing	All hazards	FEMA, Tribal Operating Budget
LEK10	Develop a system to protect and maintain historical and archival Tribal records	Not Completed	Yes	Tribal Council	1-3 years	All hazards	Tribal Operating Budget
LEK14	Implement Vegetation and other natural resource management	Completed	No				

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Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources
	practices to reduce landslides and coastal erosion						
Adopt the Hazard Mitigation Plan	Adopt the Hazard Mitigation Plan	Completed	YES – change date to 2024 Update	Planning Department	N/A	All hazards	N/A

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City of Sequim
Mitigation Action Handout

WHAT IS MITIGATION?

It is the **ongoing effort to lessen the impact** that disasters can have on people and property. Without mitigation, the same people, property, and community lifelines are affected repeatedly. This directly impacts the community's lifelines, including:

- Safety and Security
- Food, Hydration, Shelter
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials
- Water Systems

ABOUT MITIGATION ACTIONS

- Actions to Reduce or Eliminate Long-Term Risk and Vulnerability
- Lessen or Eliminate the Need for Preparedness or Response Resources
- Emphasis on the Impact of Vulnerabilities

HOW TO USE THIS HANDOUT

Clallam County is preparing an update to the 2019 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), per Federal Emergency Management Agency requirements.

As part of this update, previous mitigation actions are comprehensively reviewed for status (complete/ongoing/underway) and relevancy (to include in the 2024 MJHMP update or eliminate as no longer applicable). ***Actions from the 2019 MJHMP are included on the following pages for reference and context to generate ideas for new mitigation actions as part of the 2024 MJHMP update.*** A status summary of 2019 MJHMP actions is included below.

2019 MJHMP Mitigation Summary

19 *Total Mitigation Actions*

16 *Ongoing Mitigation Actions*

3 *Underway Mitigation Actions (Funding secured and/or partially constructed)*

CITY OF SEQUIM
2019 MITIGATION ACTIONS WORKSHEET
COMMUNITY OUTREACH HANDOUT

Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
SQ01	Build fuel station at City Public Works Yard to supply fuel to City departments and all emergency responders.	Not Completed	Yes	City Public Works, Police Department	1-3 years	Earthquake, Flood, Utility Failure, Winter Storm, Tsunami, Windstorm	Federal Emergency Management Agency (FEMA)	
SQ02	Replace 3-mile 12" water main from Ranney Will (infiltration gallery) beginning near the Dungeness River and ending at the Reservoir Road Reservoirs.	Not Completed	Yes	Public Works Department	5-7 years	Floods, Utility Failure, Winter Storm,	FEMA, Drinking Water State Revolving Fund (DWSRF)	
SQ03	Purchase a portable water purification system and small tanks. Prepare multiple sites and equipment to operate water purification	Not Completed	Yes	Public Works Department	3-5 years	Earthquake, flooding, tsunami	Drinking Water State Revolving Fund (DWSRF), FEMA	
SQ04	Locate site for new potable water reservoir, purchase property, design and construct.	Not Completed	Yes	Public Works Department	5-7 years	Winter storms, flooding	City of Sequim general fund, property owners, developers, Public Utility District (PUD	
SR05	Reroute/reconfigure electrical supply to the City of Sequim Water Reclamation Facility at 247 Schmuck Road by bringing new power source	Not Completed	Yes	Public Works Department , PUD	3-5 years	Utility Failure	Drinking Water State Revolving Fund (DWSRF), FEMA	

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Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
	into the facility and using existing supply as backup.							
SR06	Construct deep water well (>600 feet) to increase resiliency and reliability within water system.	One underway; one additional planned	Yes	Public Works Department	5-7 years	Utility Failure, Drought, Water Shortage	Drinking Water State Revolving Fund (DWSRF), FEMA	
SR07	Connect and extend City water mains to improve looping, during water main replacements and developer projects.	Ongoing	Yes	Public Works Department	3-5 years	Earthquakes, Excessive Heat, Utility Failure, Water Shortages, Wildfires	Drinking Water State Revolving Fund (DWSRF), Developers	
SQ08	Purchase Additional Heavy Equipment for Use during Severe Storms	Not Completed	Yes	Public Works Department	0-5 years	Winter storms, flooding	City of Sequim general fund	
SQ09	Develop Reliable Backup Program for Critical City Data Entry Post-Disaster	Ongoing	Yes	Finance Department (Information Technology)	2 years	All hazards	City of Sequim general fund	
SQ10	Capture stormwater in the County southwest of Sequim city limits and re-infiltrate using green stormwater infrastructure to benefit the watershed.	Underway	Yes	City of Sequim Public Works, Clallam County	1-2 years	Flooding, Drought, Wildfire	Application submitted to FEMA Hazard Mitigation Program	Funding obtained through FEMA grant

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CITY OF SEQUIM
2019 MITIGATION ACTIONS WORKSHEET
COMMUNITY OUTREACH HANDOUT

Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
				Public Works				
SQ11	Install an energy storage microgrid for storing solar energy for use in the EOC and Civic Center during power outage emergencies.	Not Completed	Yes	Public Works Department	1-3 years	All hazards	Washington State Department of Commerce	
SQ12	Replace mid-1900s AC pipe running through the City with earthquake-resistant pipe.	Ongoing	Yes	Public Works Department	3-5 years	Earthquake, Utility Failure	City Budget, Grant	
SQ13	Protect/reinforce Johnson Creek Trestle for the Olympic Discovery Trail west of Whitefeather Way	Underway	Yes	Public Works Department	3-5 years	Earthquake, Flooding, Landslide, Winter Storm	City Budget, Grant	Design funding obtained through FHWA RAISE grant
SQ14	Train City staff to perform seismic assessments of City properties	Ongoing	Yes	Public Works Department	1-3 years	Earthquakes	Staff time	Water Reservoirs in progress
SQ15	Conduct wildfire risk assessment for City of Sequim and Fire District 3	Not Completed by Public Works	Yes	Public Works Department and Clallam Co. Fire District 3	1-3 years	Wildfire	Grant	
SQ16	Implement asset management using GIS for all capital facilities	Ongoing	Yes	Public Works Department	1-3 years	All Hazards	Existing Budget	

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CITY OF SEQUIM
2019 MITIGATION ACTIONS WORKSHEET
COMMUNITY OUTREACH HANDOUT

Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
SQ17	Coordinate Emergency Management/Incident Response trainings for North Olympic Peninsula jurisdictions	Ongoing	Yes	Sequim Police Department	<1 year	All Hazards	Existing Budget	
SQ18	Public education of potential hazards, local agency response, and preparedness	Not Completed	Yes	Sequim Police Department	<1 year	All Hazards	Existing Budget	
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	Not Completed	Yes	Sequim Police Department	<1 year	All Hazards	Existing Budget, Grant	
Adopt the Hazard Mitigation Plan		Completed	YES – change date to 2024 Update	Planning Department	N/A	All hazards	N/A	

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Clallam County
Mitigation Action Handout

WHAT IS MITIGATION?

It is the **ongoing effort to lessen the impact** that disasters can have on people and property. Without mitigation, the same people, property, and community lifelines are affected repeatedly. This directly impacts the community's lifelines, including:

- Safety and Security
- Food, Hydration, Shelter
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials
- Water Systems

ABOUT MITIGATION ACTIONS

- Actions to Reduce or Eliminate Long-Term Risk and Vulnerability
- Lessen or Eliminate the Need for Preparedness or Response Resources
- Emphasis on the Impact of Vulnerabilities

HOW TO USE THIS HANDOUT

Clallam County is preparing an update to the 2019 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), per Federal Emergency Management Agency requirements.

As part of this update, previous mitigation actions are comprehensively reviewed for status (complete/ongoing/underway) and relevancy (to include in the 2024 MJHMP update or eliminate as no longer applicable). ***Actions from the 2019 MJHMP are included on the following pages for reference and context to generate ideas for new mitigation actions as part of the 2024 MJHMP update.*** A status summary of 2019 MJHMP actions is included below.

2019 MJHMP Mitigation Summary

18 *Total Mitigation Actions*

16 *Ongoing Mitigation Actions*

2 *Completed Mitigation Actions*

CLALLAM COUNTY
2019 MITIGATION ACTIONS WORKSHEET
COMMUNITY OUTREACH HANDOUT

Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources
CC01	Relocate Public Works/Roads from tsunami zone	Not Completed	YES	EMD, Public Works/Roads	3-5 years	All hazards	FEMA, Capital Funds
CC02	Move EOC from seismically unstable area to new location	Not Completed	YES	EMD, PA Fire Department, City Parks, Port of PA	2-3 years	All hazards	FEMA, Community Fund-matching
CC03	Identify and organize County hazard GIS data so that it is readily available in the event of a hazard.	Not Completed	YES	County Information Technology, EMD	<1 year	All hazards	Existing budget
CC04	Establish a system of real-time hazard mapping to communicate conditions on the ground to staff and public.	Not Completed	YES	County Information Technology, EMD	1 year	All hazards	Existing budget
CC05	Reinforce/retrofit Fire District 2 facilities for seismic stability.	Not Completed	YES	Clallam Fire District 2, Rescue	3-5 years	Earthquake	FEMA
CC06	Hire a consultant to conduct a wildfire risk assessment profile of Fire District 2 facilities.	Not Completed	YES	Clallam Fire District 2 Rescue	1-2 years	Wildfire	FEMA, Bond/Levy
CC07	Build new Fire District 4 station that is seismically sound.	Not Completed	YES	Clallam Fire District 4	1-3 years	Earthquake	FEMA, 25% match from FD
CC08	Establish back-up link for OPSCAN in Forks.	Completed	NO	County Sheriff's Office	N/A	All hazards	OPSCAN Operations
CC09	Inventory dikes, levees, and flood protection structures on Clallam County Rivers	Not Completed	YES	DCD, Public Works, USACE,	2-4 years	Flooding	FEMA

DRAFT

CLALLAM COUNTY
2019 MITIGATION ACTIONS WORKSHEET
COMMUNITY OUTREACH HANDOUT

Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources
				WDFW, WSDOT			
CC10	Inventory public utilities including water supplies, sewer systems, and solid-waste handling facilities.	Not Completed	YES	Sequim, Forks, Port Angeles, and Clallam County Public Works Departments, Environmental Health Division, WSDOH, WDOE.	1-3 years	All hazards	Grants, Operating budgets
CC11	Setback of USACE dike located in lower reach of Dungeness River.	Completed	NO	DCD, USACE, Clallam County Public Works	N/A	Flooding	Puget Sound Acquisition and Restoration Fund
CC12	Seismic study of newer portion of Clallam County Courthouse	Not Completed	YES	Clallam County Public Works Maintenance and Facilities	1-3 years	Earthquakes	County capital project funds, FEMA
CC13	Re-locate Fire Station 33, which is currently located in a liquefaction zone.	Not Completed	YES	Clallam County Fire District 3	1-3 years	Earthquakes	Grant, Bond/Levy
CC14	Re-locate Fire Station 31, which is currently located in a tsunami hazard zone.	Not Completed	YES	Clallam County Fire District 3	1-3 years	Earthquakes, Flooding, Tsunami	Grant, Bond/Levy

DRAFT

CLALLAM COUNTY
2019 MITIGATION ACTIONS WORKSHEET
COMMUNITY OUTREACH HANDOUT

Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources
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.	Not Completed	YES	Clallam County Department of Community Development	3-5 years	Drought, Water Shortages	County funds, FEMA
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.	Not Completed	YES	Clallam County Department of Community Development	3-5 years	Drought, Water Shortages	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 the coast to assess saltwater intrusion.
CC17	Investigate alternative water sources in areas where water quantity and quality have declined due to climate change.	Not Completed	YES	Clallam County Department of Community Development	3-5 years	Drought, Water Shortages	County, FEMA
Adopt the Hazard Mitigation Plan	Adopt the Hazard Mitigation Plan	Completed	YES – change date to 2024 Update	Planning Department, Sheriff's Office	N/A	All hazards	Loan, private or public fee increases

DRAFT

Multi-Jurisdictional Hazard Mitigation Plan

WHAT IS MITIGATION?

It is the **ongoing effort to lessen the impact** that disasters can have on people and property. Without mitigation, the same people, property, and community lifelines are affected repeatedly. This directly impacts the community's lifelines, including:

- Safety and Security
- Food, Hydration, Shelter
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials
- Water Systems

Goals, objectives, and actions for mitigation are documented in a **Hazard Mitigation Plan**.

WHAT IS A MITIGATION ACTION?

A measure, project, plan or activity proposed to **reduce** or **eliminate** current and future **vulnerabilities** to natural and/or human-caused hazards described in the plan.

TYPES OF MITIGATION ACTIONS:

Mitigation Type	Description	Examples
Local Plans and Regulations	These actions include government authorities, policies or codes that influence the way land and buildings are developed and built.	• Building codes • Open space preservation • Capital improvement plan
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure.	• Floodwalls • Utility undergrounding • Safe rooms
Natural Systems Protection and Nature-based Solutions	This type of action can include green infrastructure and low impact development, nature-based solutions, Engineering with Nature and bioengineering to incorporate natural features or processes into the built environment.	• Watershed restoration • Living shorelines • Forest management
Education and Awareness Programs	These types of actions keep residents informed about potential natural disasters. Many of these types of actions are eligible for funding through the FEMA HMA program.	• Real estate disclosures

How Can You Help?

How would you reduce risk to natural hazards in your community?

Share your ideas with the County and Consultant Team for consideration into the Hazard Mitigation Plan.

JAMESTOWN S'KLALLAM TRIBE

Hazard Mitigation
& Climate
Resilience Planning
Workshop
Wednesday, August 7th, 2024 | 1:30-3:30 PM
CLALLAM COUNTY

HAZARD MITIGATION & CLIMATE RESILIENCE PLANNING WORKSHOP
Workshop Objectives
• Share out early learnings and updates for the Climate Element and Multi-Jurisdictional Hazard Mitigation Plan
• Meaningful opportunity to provide feedback to further guide plan development

Hazards in Clallam County
Dam/Reservoir Failure
Disease (Infectious/Vector) and Pandemic
Drought
Flood
Human-Caused Hazards
Landslide

HAZARD MITIGATION & CLIMATE RESILIENCE PLANNING IN CLALLAM COUNTY

Clallam County (County) is updating its 2019 **Multi-Jurisdictional Hazard Mitigation Plan** and creating a **Climate Element** as a part of the 2025 Comprehensive Plan update. These plans will help the County prepare for environmental hazards and climate change.

Multi-Jurisdictional Hazard Mitigation Plan

The Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) provides a plan for Clallam County to reduce vulnerability to natural and human-caused hazard events such as earthquakes, drought, power outages, and wildfires and requires an update every 5 years.

Climate Element

The Climate Element (CE) meets new Washington House Bill 1181 requirements for cities and counties to include climate mitigation and/or resilience policies into their periodic comprehensive plan updates. Clallam County is required to satisfy a climate resilience sub-element for its 2025 Comprehensive Plan.

We want to hear from you!

We want to hear from you to better understand and address the specific threats that hazards, extreme weather and climate change pose to Clallam County.

Stay connected

There are many opportunities to provide feedback on the new plan, stay up to date with events, opportunities to provide feedback, and any updates through our website.

HAZARD MITIGATION & CLIMATE RESILIENCE PLANNING IN CLALLAM COUNTY
Clallam County (County) is updating its 2019 Multi-Jurisdictional Hazard Mitigation Plan and creating a Climate Element as a part of the 2025 Comprehensive Plan update. These plans will help the County prepare for environmental hazards and climate change.
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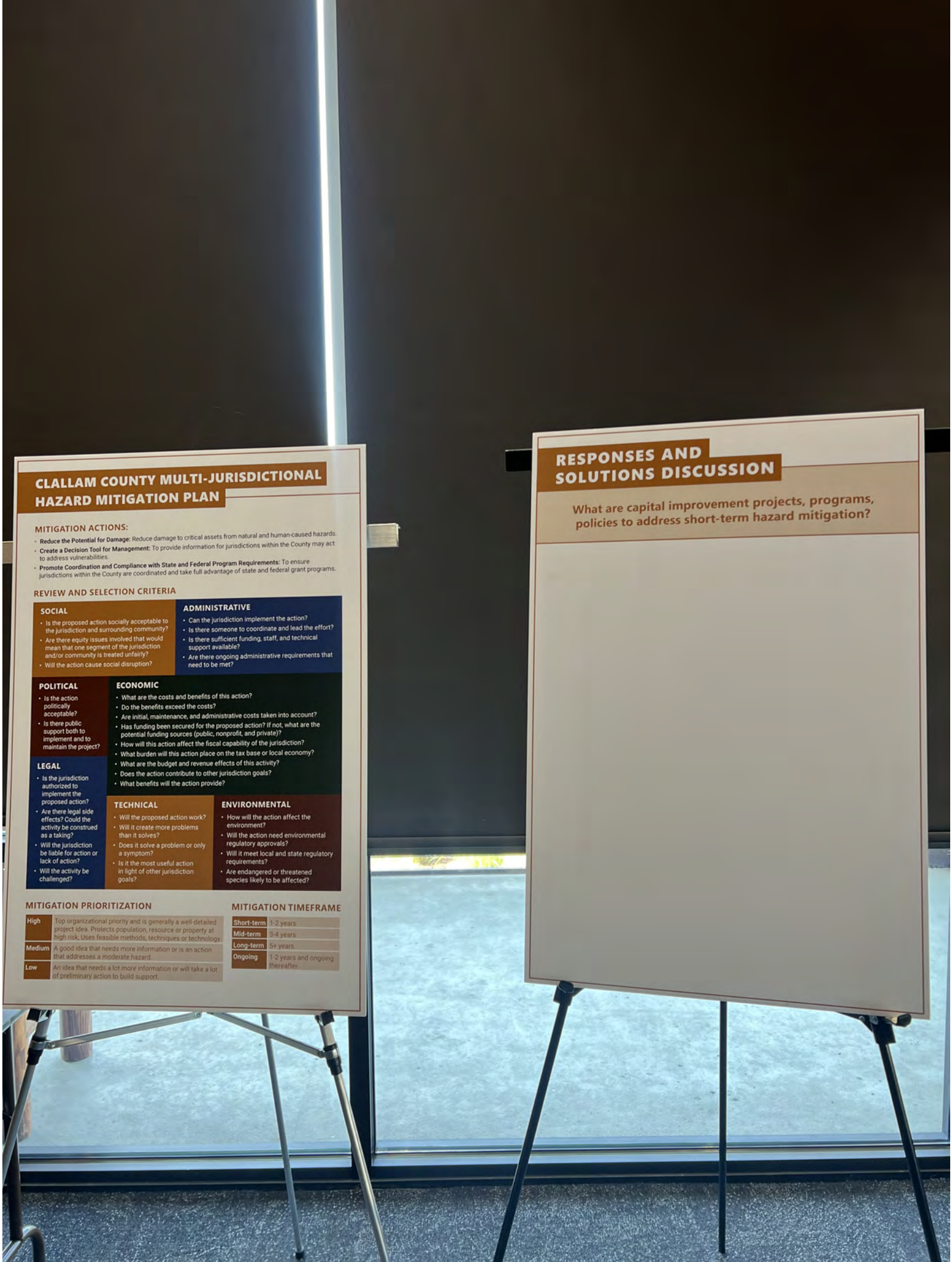
We want to hear from you to better understand and address the specific threats that hazards, extreme weather and climate change pose to Clallam County.
Stay connected
There are many opportunities to provide feedback on the new plan, stay up to date with events, opportunities to provide feedback, and any updates through our website.
PROJECTED CLIMATE CHANGE IMPACTS FOR THE PENINSULA
Examining historical trends and future climate projections, we are able to get a foundational understanding of how future changes in the climate and associated hazards will impact Clallam County now and in the future.
Without ambitious greenhouse gas (GHG) reduction measures across the region and globe, Clallam County is expected to experience:
COASTAL FLOODING FROM HIGHER SEA LEVELS
Varying impacts across the county are expected, with projections of between 0.46-0.85 ft of sea level rise by 2050 and more by 2100.
REDUCED SNOWPACK
Resulting in less water availability for streams during the late summer months, affecting salmon habitat, water quality, and streamflow.
INCREASED RIVERINE FLOODING
Increased winter precipitation, along with more precipitation falling as rain rather than snow, can lead to flooding.
OCEAN ACIDIFICATION (pH DECREASES)
Adversely impacts marine life and ecosystems, including culturally and economically significant invertebrates.
INCREASED DROUGHT
Leading to increased wildfire risk and related smoke, and stress to agricultural and forest lands.
HIGHER ANNUAL AVERAGE TEMPERATURES
With higher temperature increases during the summer months, and more days with average temperatures above 86°F
VULNERABILITY ASSESSMENT FOCUS AREAS
PUBLIC HEALTH AND COMMUNITY WELLBEING
Public Health
Physical health risks (medical care; climate-related illness, injury, and death); environmental and socioeconomic health disparities; mental health
Community Resources
Social services; cultural resources; food access; shelter
Emergency Management
Critical facilities; emergency services; communication systems; community safety and security
NATURAL ENVIRONMENT AND WATER RESOURCES
Ecosystems and Critical Areas
Inland and coastal habitats, forests, wetlands, impervious surfaces
Parks, Trails, and Open Space
Multiuse trails, greenways, public lands, and parks, tree canopy
Water Supply
Water Supply (Surface and groundwater supply); Water storage and transmission systems
ECONOMIC DEVELOPMENT AND LAND USE
Local Industries and Businesses
Recreation and tourism; labor; local businesses
Land Use and Resource Lands
Agriculture, forest, and resource lands; Urban Growth Areas; downtowns
BUILT INFRASTRUCTURE
Housing
Single and multi-family residential buildings
Water Systems
Stormwater (Stormwater infrastructure); Wastewater (wastewater management)
Energy
Energy supply and demand (energy grid, utilities, and fuel); energy infrastructure (powerlines, substations, and energy transmission and distribution systems)
Transportation
Highway/roadway/motor vehicles; pedestrian and bicycle systems (including Olympic Discovery Trail; mass transit; railway; maritime; ports)


CLALLAM COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN
MITIGATION ACTIONS:
Reduce the Potential for Damage: Reduce damage to critical assets from natural and human-caused hazards.
Create a Decision Tool for Management: To provide information for jurisdictions within the County may act to address vulnerabilities.
Promote Coordination and Compliance with State and Federal Program Requirements: To ensure jurisdictions within the County are coordinated and take full advantage of state and federal grant programs.
REVIEW AND SELECTION CRITERIA
SOCIAL
Is the proposed action socially acceptable to the jurisdiction and surrounding community?
Are there equity issues involved that would mean that one segment of the jurisdiction and/or community is treated unfairly?
Will the action cause social disruption?
ADMINISTRATIVE
Can the jurisdiction implement the action?
Is there someone to coordinate and lead the effort?
Is there sufficient funding, staff, and technical support available?
Are there ongoing administrative requirements that need to be met?
POLITICAL
Is the action politically acceptable?
Is there public support both to implement and to maintain the project?
ECONOMIC
What are the costs and benefits of this action?
Do the benefits exceed the costs?
Are initial, maintenance, and administrative costs taken into account?
Has funding been secured for the proposed action? If not, what are the potential funding sources (public, nonprofit, and private)?
How will this action affect the fiscal capability of the jurisdiction?
What burden will this action place on the tax base or local economy?
What are the budget and revenue effects of this activity?
Does the action contribute to other jurisdiction goals?
What benefits will the action provide?
LEGAL
Is the jurisdiction authorized to implement the proposed action?
Are there legal side effects? Could the activity be construed as a taking?
Will the jurisdiction be liable for action or lack of action?
Will the activity be challenged?
TECHNICAL
Will the proposed action work?
Will it create more problems than it solves?
Does it solve a problem or only a symptom?
Is it the most useful action in light of other jurisdiction goals?
ENVIRONMENTAL
How will the action affect the environment?
Will the action need environmental regulatory approvals?
Will it meet local and state regulatory requirements?
Are endangered or threatened species likely to be affected?
MITIGATION PRIORITIZATION
High
Top organizational priority and is generally a well-detailed project idea. Protects population, resource or property at high risk. Uses feasible methods, techniques or technology.
Medium
A good idea that needs more information or is an action that addresses a moderate hazard.
Low
An idea that needs a lot more information or will take a lot of preliminary action to build support.
MITIGATION TIMEFRAME
Short-term 1-2 years
Mid-term 3-4 years
Long-term 5+ years
Ongoing 1-2 years and ongoing thereafter
RESPONSES AND SOLUTIONS DISCUSSION
What are capital improvement projects, programs, policies to address short-term hazard mitigation?

Discussion on Climate Responses
What are priority actions (policies, projects, etc.) to respond to the impacts and vulnerabilities we identified?
JAMESTOWN S'KLALLAM TRIBE

APPENDIX C.7

Clallam County Fair Public Outreach

Wildfire can and does happen here!

Learn how to keep your home and family safe at a public presentation in Sekiu this Saturday, May 11th

Presentations by:

National Weather Service

- **Department of Natural Resources**
- **Clallam County Emergency Management**
- **Clallam County Public Health**
- **CCFD #5—Clallam Bay Fire and Rescue**
- **US Forest Service**
- **American Red Cross**

May 11th, 1:00 at the Sekiu Community Center

42 Rice Street, Sekiu, WA 98381

A Question and Answer session will follow the presentations

For more information, call 360.417.2305

Wildfire can and does happen here!

Learn how to keep your home and family safe at a public presentation near you

Presentations by:

National Weather Service

- **Department of Natural Resources**
- **Clallam County Emergency Management**
- **Clallam County Public Health**
- **Local Fire Districts**
- **US Forest Service**
- **American Red Cross**

May 4th, 1:00 at the Forks Congregational Church

May 11th, 1:00 at the Sekiu Community Center

May 18th , 1:00 at the Clallam Commissioners Room

May 25th, 1:00 at the Guy Cole Event Center

A Question and Answer session will follow the presentations

For more information, call 360.417.2305

Wildfire can and does happen here!

Learn how to prepare your home and family for Wildfires at a public presentation.

Forks Congregational Church
280 Spartan Ave
Forks, WA
Saturday, May 4th
1:00pm

Presentations by:

- **National Weather Service**
- **Department of Natural Resources**
- **Clallam County Emergency Management**
- **Clallam County Public Health**
- **Joyce Fire and Rescue (CCFD#4)**
- **US Forest Service**
- **American Red Cross**

A Question and Answer session will follow the presentations

Wildfire can and does happen here!

Learn how to keep your home and family safe at a public presentation.

Joyce Grange Hall

Saturday, April 27th

1:00pm

Presentations by:

- **Department of Natural Resources**
- **Clallam County Emergency Management**
- **Clallam County Public Health**
- **Joyce Fire and Rescue (CCFD#4)**
- **US Forest Service**
- **American Red Cross**

A Question and Answer session will follow the presentations

For more information, call 360.417.2305

Does Wildfire Happen Here?

What is the risk of Wildfire in Clallam County?

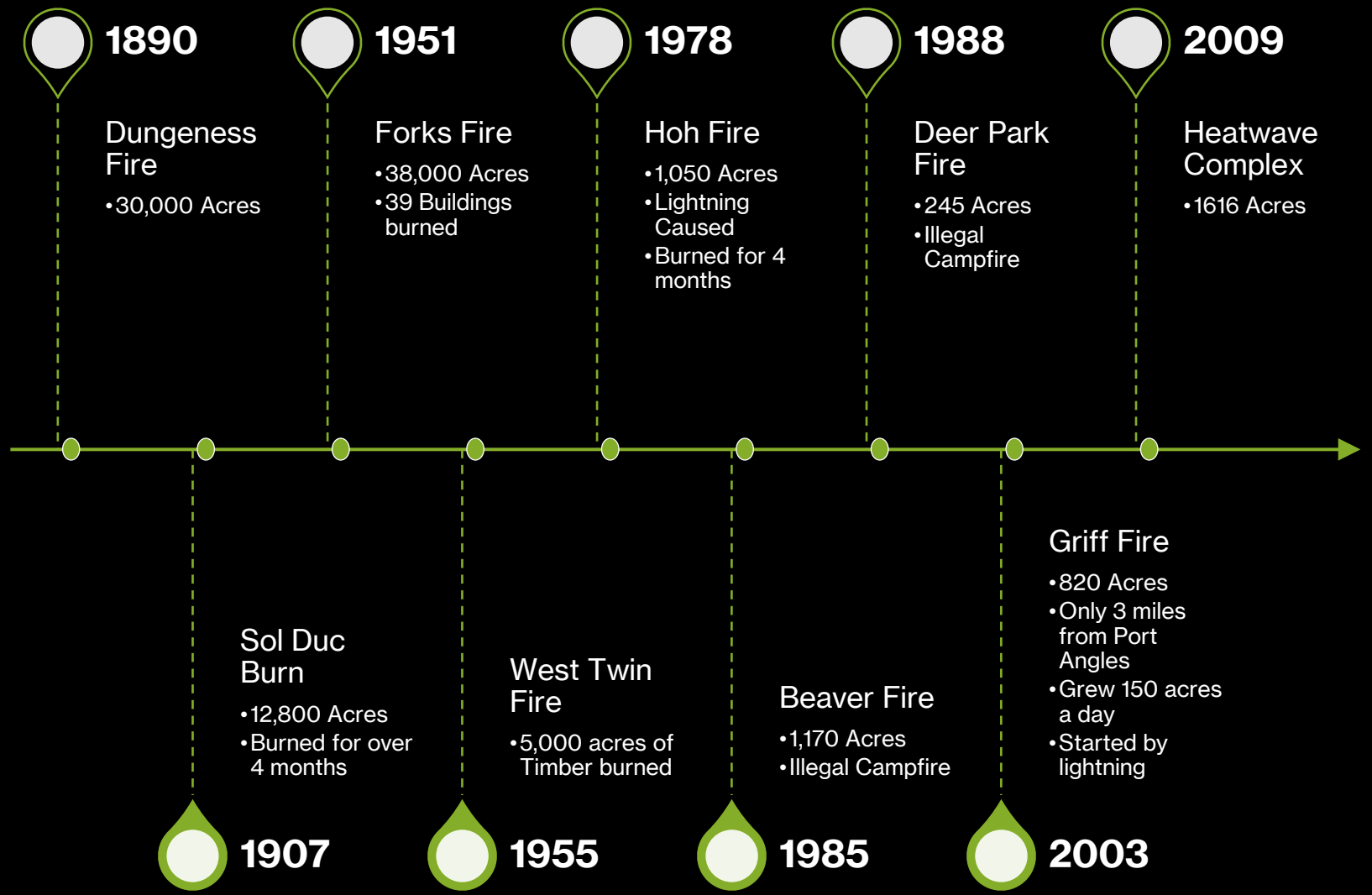
Wildfire risk

- According to the 2019 Clallam County Hazard Mitigation Plan, Wildfire ranks #5 on the list of total hazards threatening the county.

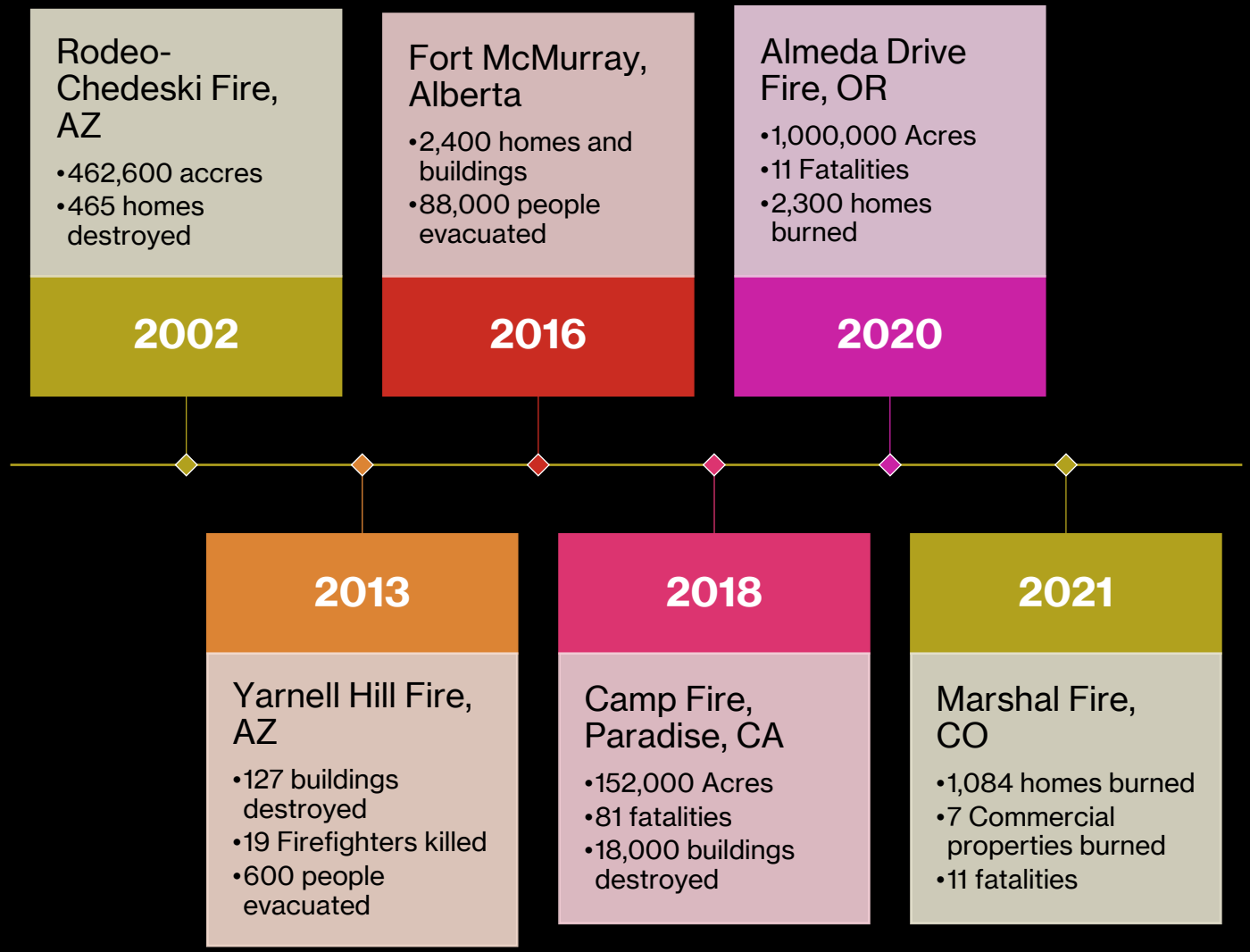
Historic Fires

- The Great Forks Fire of 1951
  - + A half a billion board feet of timber burned.
  - + 1000 Residents of Forks (pop.1114) evacuated
  - + 32 buildings destroyed
  - + 32,688 acres burned

PHOTO FROM FORKS FORUM FEB. 22, 1951


1890
Dungeness Fire
•30,000 Acres
1907
Sol Duc Burn
•12,800 Acres
•Burned for over 4 months
1951
Forks Fire
•38,000 Acres
•39 Buildings burned
1955
West Twin Fire
•5,000 acres of Timber burned
1978
Hoh Fire
•1,050 Acres
•Lightning Caused
•Burned for 4 months
1985
Beaver Fire
•1,170 Acres
•Illegal Campfire
1988
Deer Park Fire
•245 Acres
•Illegal Campfire
2003
Griff Fire
•820 Acres
•Only 3 miles from Port Angles
•Grew 150 acres a day
•Started by lightning
2009
Heatwave Complex
•1616 Acres

Devastation in small towns



What if it happens here?

- Who responds?
- How do I get information?
- Where do I go?
- How can I protect myself and my property?
- How do I improve my chances of survival?

Our Contributors

Anne Chastain – Clallam County Sheriff's Office Emergency Management Division

Steve Reedy – Incident Meteorologist National Weather Service

Justin Grider – Chief CCFD #3 – Sequim Fire

Eric Flanigan – Washington State Department of Natural Resources (DNR)

Heather Cheeks – American Red Cross

Jennifer Garcelon – Clallam County Environmental Health

2024 Fire Season Outlook

NOAA - National Weather Service Seattle, WA
Fire Weather Team: Steve Reedy, Maddie Kristell
& Anna Lindeman

What do we look at?

- **Pre-season**
  - Mountain snowpack (low correlation)
  - Long-term drought? (higher correlation)
- **June:** Important in gauging how soon fire season will begin
- **Most Important?** What happens *during* fire season (Jul-Sep)
  - Long-range Climate Outlooks

2023 Fire Season Review

- **Dry Lead-in, Increasing Drought:**
  - Moderate Drought conditions in the spring would only worsen as fire season started. These early dry conditions allowed for WFO Seattle to issue its earliest Red Flag Warning on record on June 6th.
- **Canadian Smoke & Air Quality:**
  - Canada's extreme fire season was actually a moderating influence on W WA, keeping fire behavior in check.
- **Early Finish:**
  - A series of wet systems passing through W WA in mid-September would effectively shut down fire season a couple of weeks early, much different from 2022!

The “New Normal”

- If we look at the past 11 years (2012-2023), 7 of them are in the top 10 for acres burned (WA + OR) out of the past 30 fire seasons:
  - **2021 – 1,503,027 (4th)**
  - **2020 – 1,983,971 (1st)**
  - **2018 – 1,336,096 (6th)**
  - **2017 – 1,142,442 (7th)**
  - **2015 – 1,823,473 (2nd)**
  - **2014 – 1,383,514 (5th)**
  - **2012 – 1,520,374 (3rd)**
- These years ran the entire range of the El Nino/La Nina cycle.
- It’s a good practice to head into the season thinking that it will be an active one unless there are strong indicators otherwise!

Winter 2023-2024 Review (Pacific Northwest)

- Coming out of winter
  - Washington: While enough moisture fell in the off-season to alieviate some drought conditions, dry conditions from mid-March onward have allowed drought to return to portions of WA.
  - Oregon: Atmospheric rivers that have been making headlines for CA have also been kind to OR, with the southern ⅔ of the state seeing near normal to normal snowpack. The northern ⅓ however echoes WA. Abnormally dry conditions linger over portions of the Cascades.

Percent of Normal Snow Depth as of May 1, 2024

Mt. Baker:
63%

Hurricane:
52%

Stevens :
63%

Snoqualmie:
33%

Mission:
49%

Paradise:
82%

Crystal:
75%

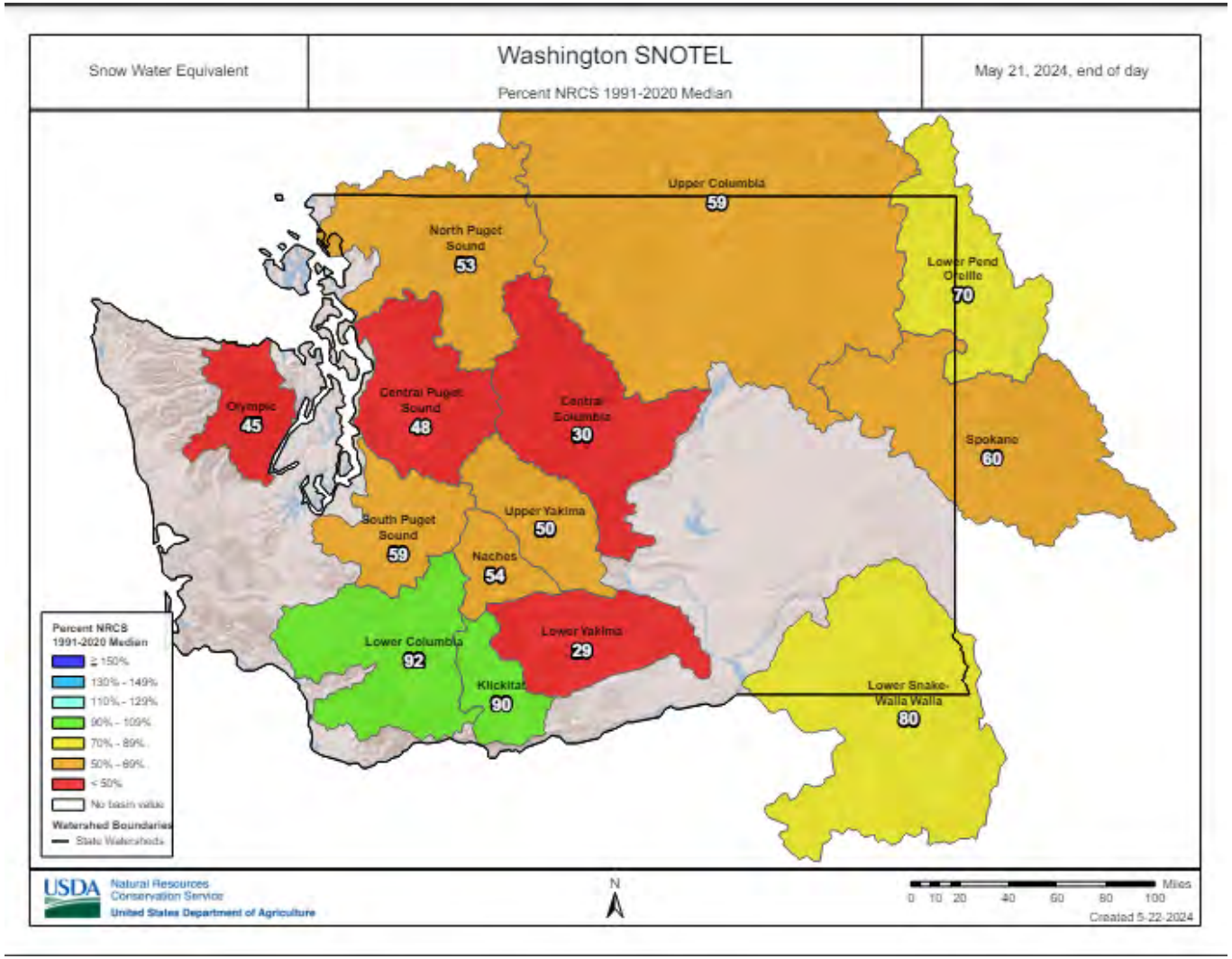
White Pass:
98%

Timberline:
95%

WA Current SWE % of Normal (current)

A cold, active start to March saw these numbers recover closer to normal, however the combination of the heat in mid-March, another round of above normal temperatures in mid-April and the lack of any significant precipitation-making systems have allowed conditions to worsen once again.

It is worth noting that this image does not take into account any recent precipitation that fell between 5/22 and 5/27.



Washington Current Drought Conditions

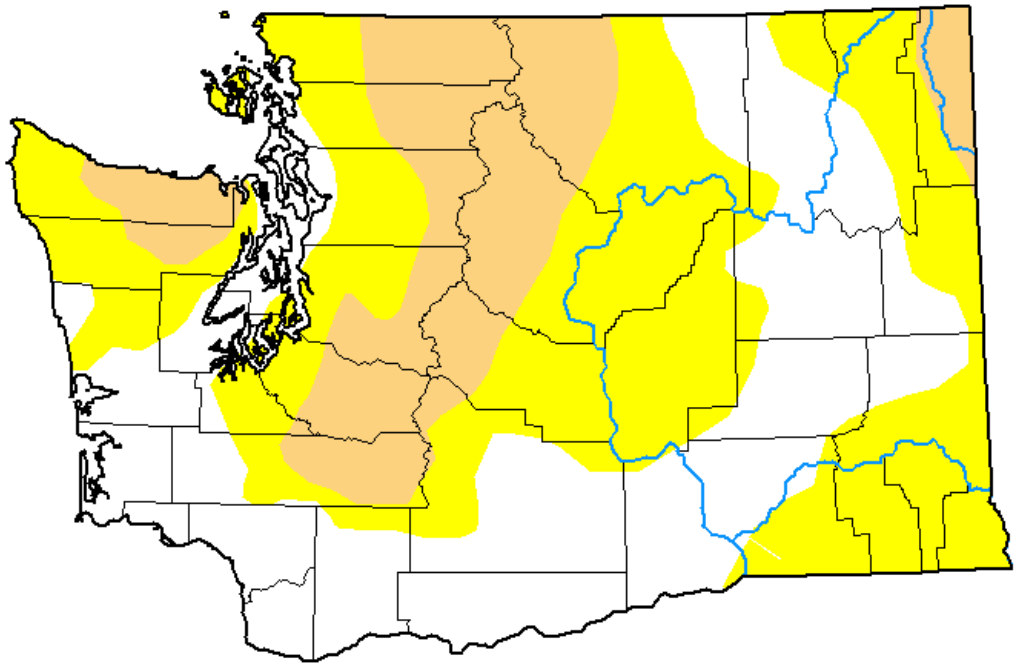
U.S. Drought Monitor

Washington

May 14, 2024

(Released Thursday, May. 16, 2024)

Valid 8 a.m. EDT



Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:

Lindsay Johnson
National Drought Mitigation Center

droughtmonitor.unl.edu

Clallam Co. Current Drought Conditions

Clallam County, WA

Map released: Thurs. May 23, 2024

Data valid: May 21, 2024 at 8 a.m. EDT

Intensity

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)
- No Data

Authors

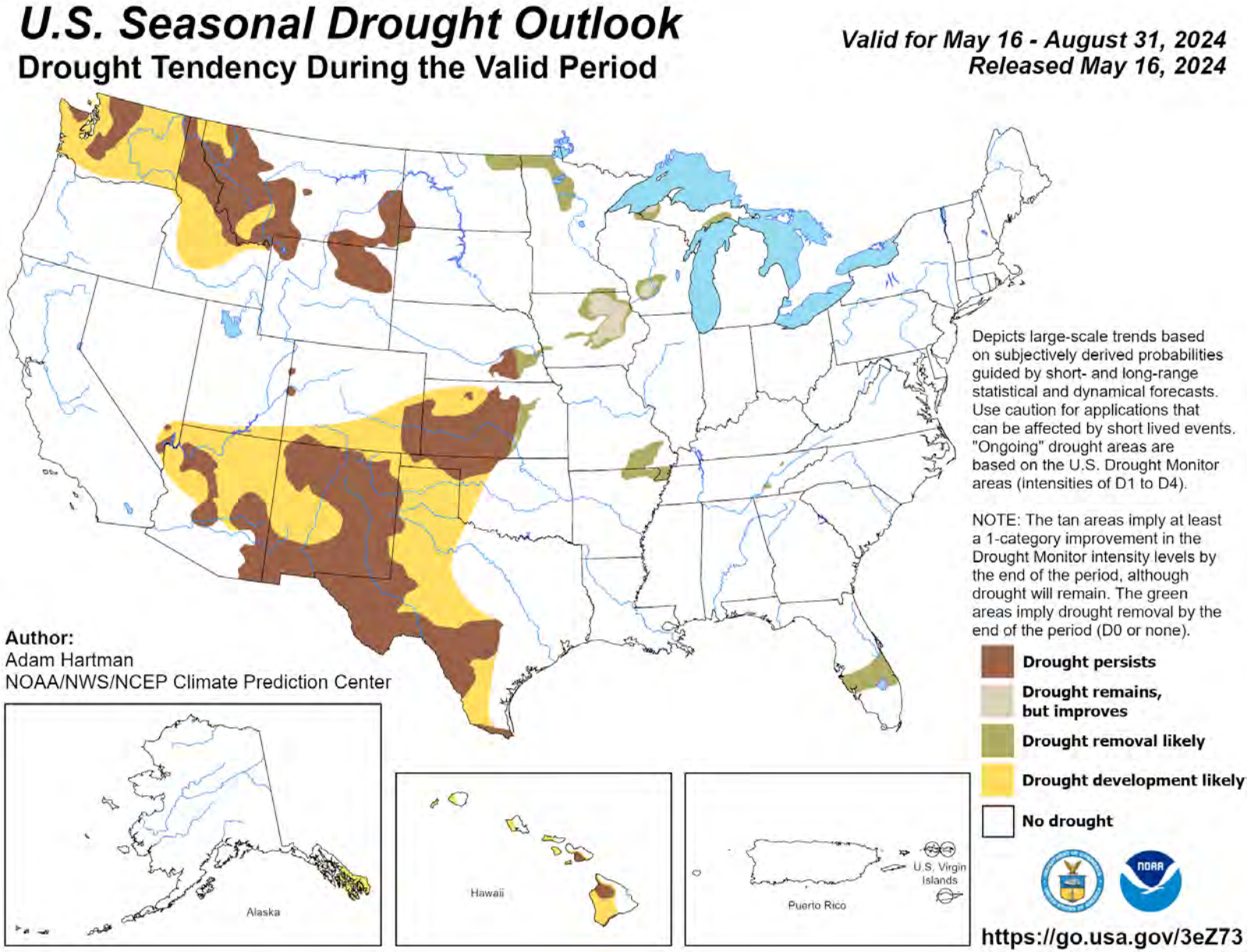
United States and Puerto Rico Author(s):

David Simeral, Western Regional Climate Center

Pacific Islands and Virgin Islands Author(s):

Richard Heim, NOAA/NCEI

Seasonal Drought Outlook



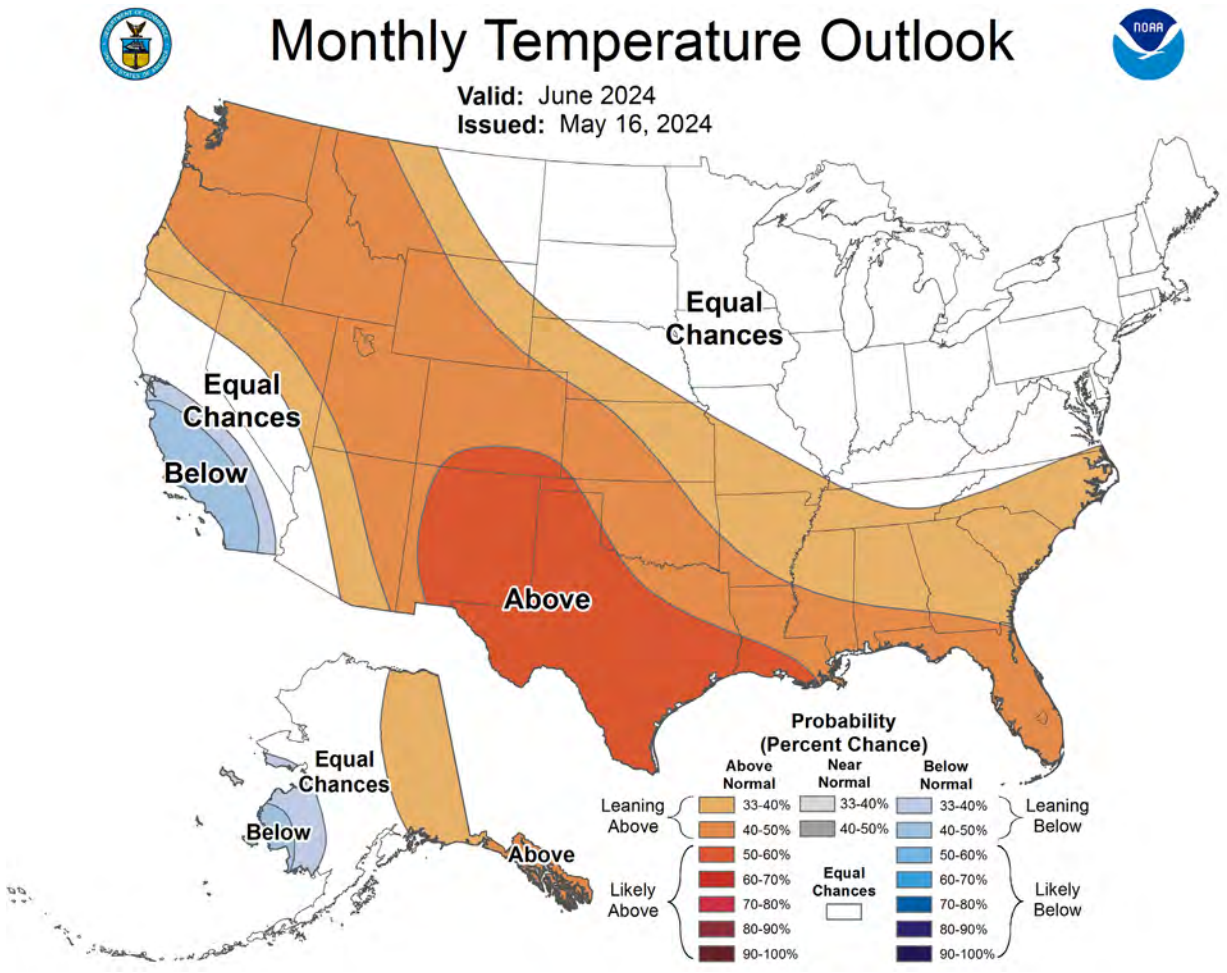
Seasonal Drought Outlook

Pre-Season Outlook: June

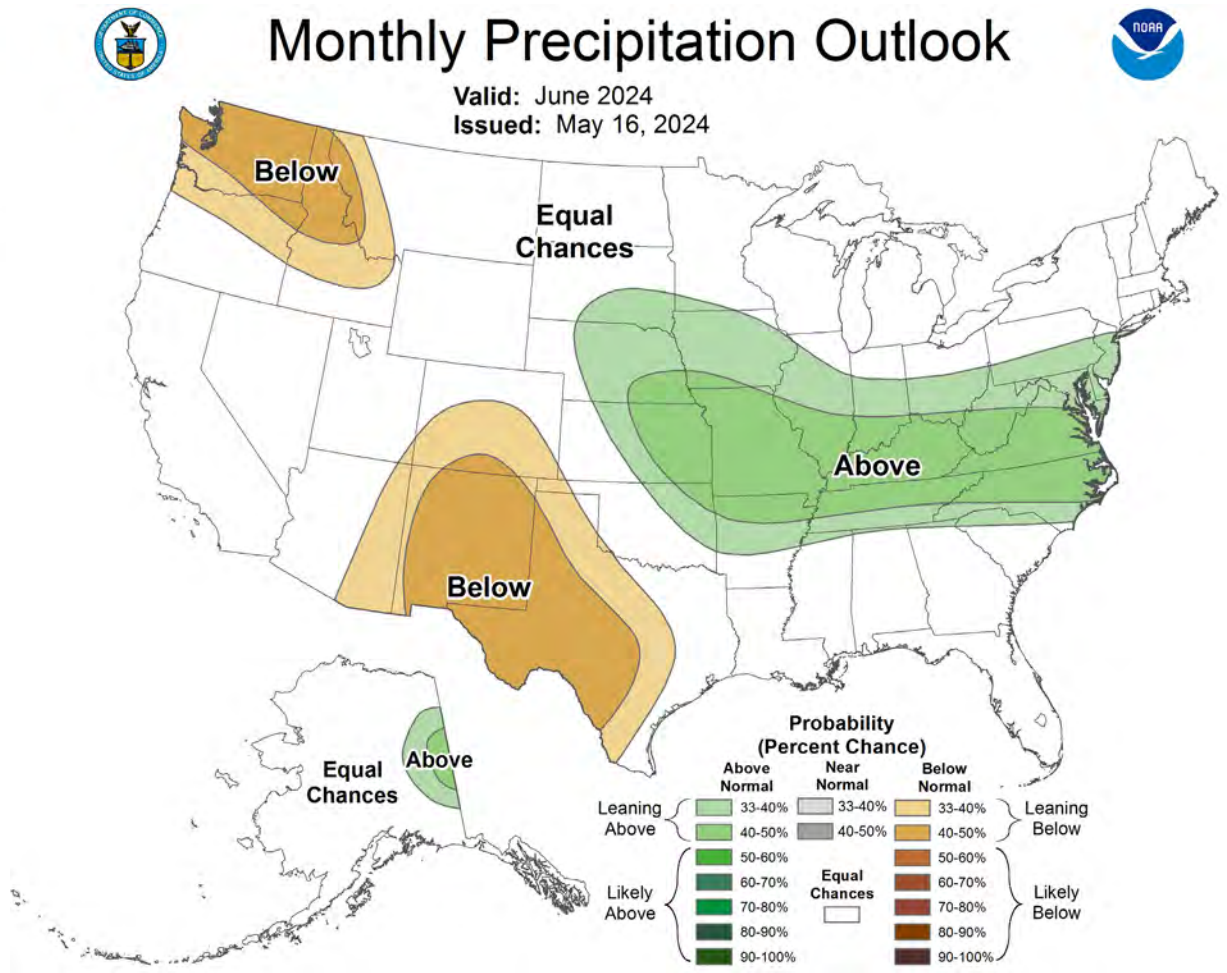
Weather Forecast Office
Seattle, WA

Outlook Favors

Above Normal Temperatures



Below Normal Precipitation

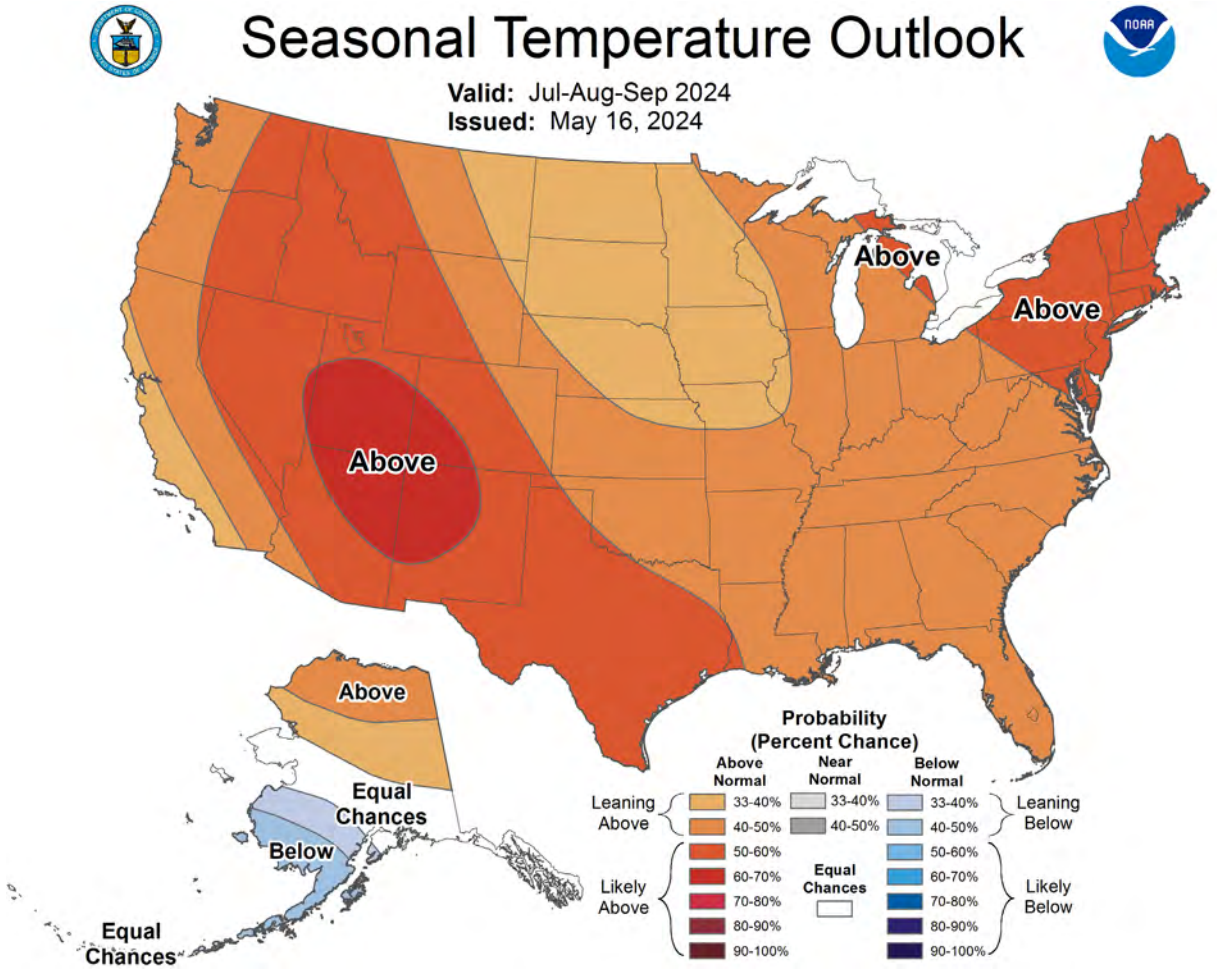


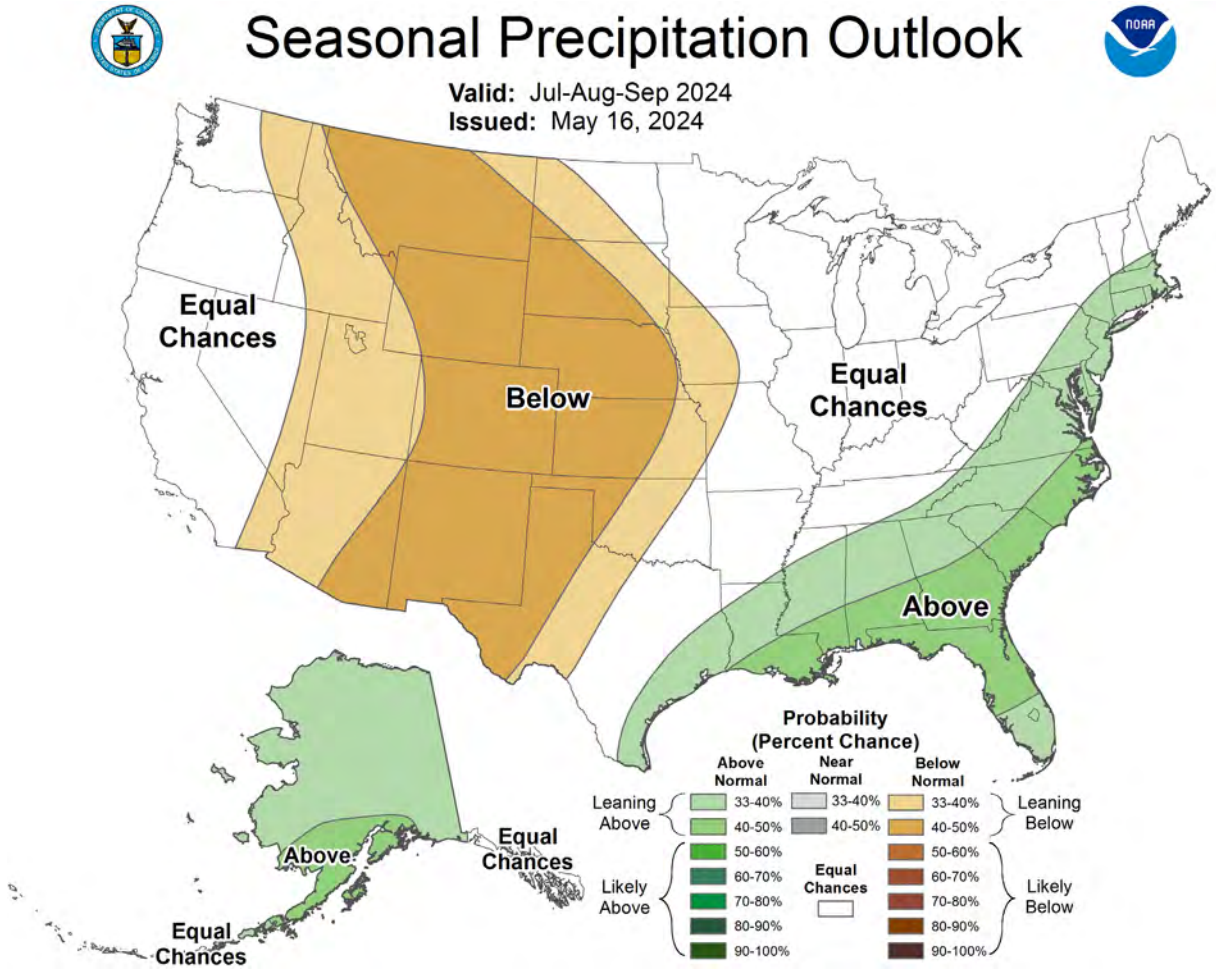
3-Month Outlook: July, August & September

Weather Forecast Office
Seattle, WA

Outlook Favors

Above Normal Temperatures





Significant Wildland Fire Potential Outlook

Weather Forecast Office
Seattle, WA

Outlook Favors

September	Above Normal across Western Washington
October	Near Normal across Western Washington

Effect of ENSO on 2024 NW Fire Season

- **El Nino will transition to ENSO neutral in the spring, then transition to La Nina during fire season.**
- **What does this mean for Pac NW Fire Season?**
  - Potentially an early and active start
    - Low snowpack and persistent abnormally dry spots coupled with continued warm and dry conditions in spring may allow drought to re-emerge.
  - But from there...?
    - La Nina tends to favor less activity
    - Persistent above normal temps and near normal (but still low) precipitation during fire season may offset that, keeping conditions active.

Bottom Line for Fire Season 2024

Weather Forecast Office
Seattle, WA

- Already present low snowpack and abnormally dry conditions may prove to give fuels a head start this spring.
- Persistent above normal temperatures and below normal precipitation expected during the spring may allow for an early and active start to the season.
- The transition to La Nina could lead to a downturn in fire activity, however the inertia from a warm, dry spring coupled with continued above normal temperatures and near normal precipitation during the season may offset that.
- Current expectation is for a late end to the season (early to mid Oct) barring any mitigating circumstances
  - La Nina kicking in more than expected
  - More Canadian wildfires blot out the sun

Questions???

Please feel free to email us!

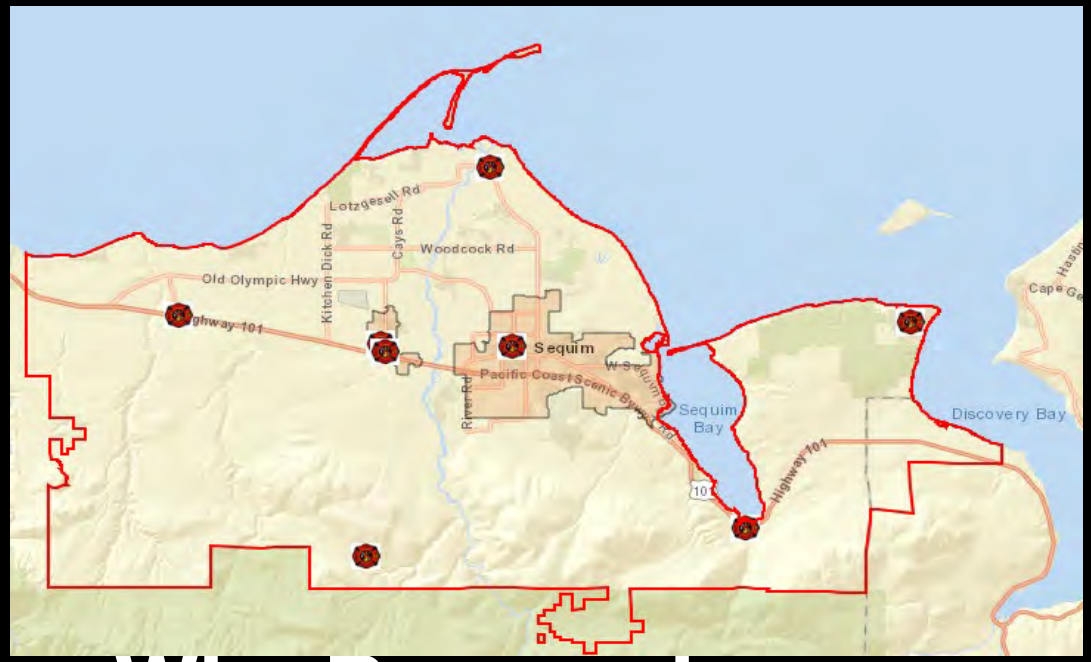
nws.seattle@noaa.gov

Clallam County fire district 3
justin grider
-fire chief

What if it happens Here?

Let us answer these questions one at a time.

- What should I do in seconds?
- How do I get information?
- Where do I go?
- How can I protect myself and my property?
- How do I improve my chances of survival?
- Who is going to help me?



Who Responds

When 911 is dialed the appropriate fire district will be dispatched as the call taker receives the information for the appropriate units.

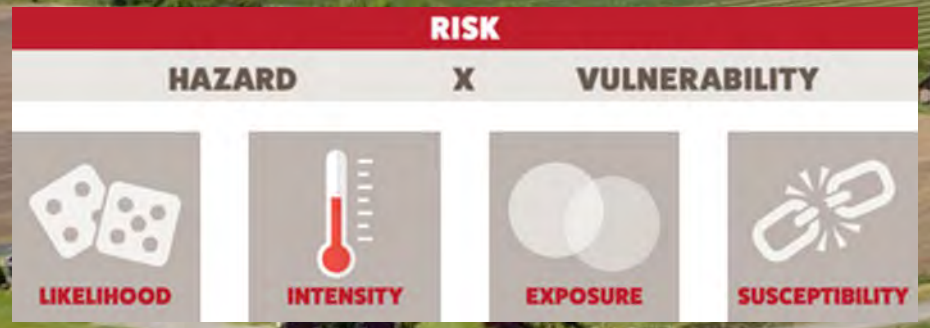
If you are attending this presentation, chances are yours will be Fire District 3.

We cover a diverse 142 square mile area from Bagley Creek Road and Deer Park in the West to Gardiner in the East and all points North and South to the USFS and National Park.

With 34,000 residents (and growing), we protect a lot of area...

Sequim Area Wildfire Risk

- Wildfire Likelihood
- Wildfire Intensity
- Wildfire Exposure
- Wildfire Susceptibility



WILDFIRE RISK TO COMMUNITIES

Search by community, tribal area, county, or state

Washington > Clallam County >

Sequim has a low risk of wildfire—lower than 74% of communities in the US.

Understand your risk

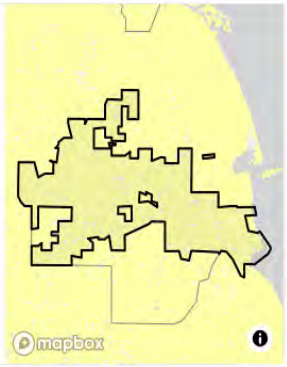
Wildfire risk is based on several factors. Understanding which factors affect your community can help you identify strategies to reduce your risk.

Low

Risk to Homes

The relative risk to a house for every location on the landscape, whether a house currently exists there or not.

Learn more >

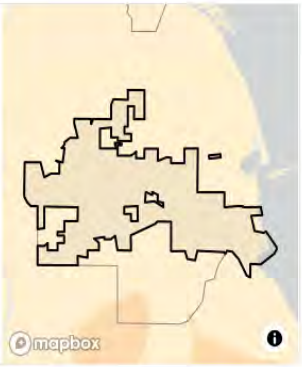


Low

Wildfire Likelihood

The probability of a wildfire burning in any given year.

Learn more >

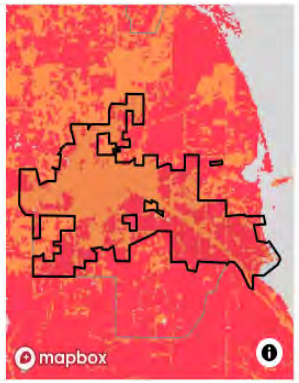


High

Exposure

Whether homes may be subjected to wildfire directly or indirectly (such as from embers).

Learn more >

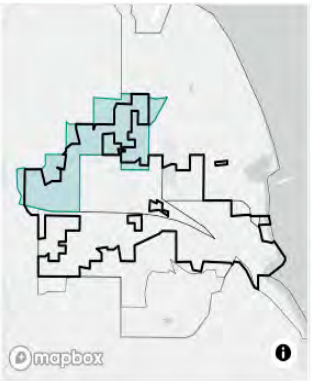


Med

Vulnerable Populations

People that may be disproportionately impacted by wildfire because of social and economic factors.

Learn more >



WILDFIRE RISK TO COMMUNITIES

Search by community, tribal area, county, or state

Washington >

Clallam County has a low risk of wildfire—lower than 82% of counties in the US.

Understand your risk

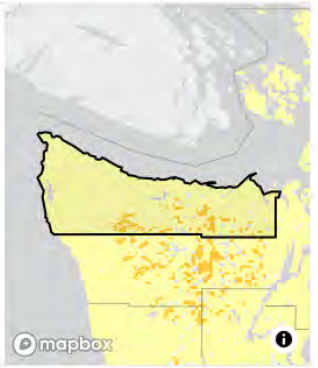
Wildfire risk is based on several factors. Understanding which factors affect your community can help you identify strategies to reduce your risk.

Low

Risk to Homes

The relative risk to a house for every location on the landscape, whether a house currently exists there or not.

Learn more >



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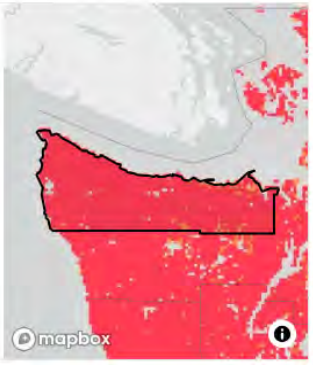

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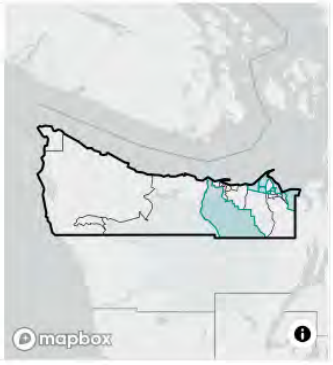
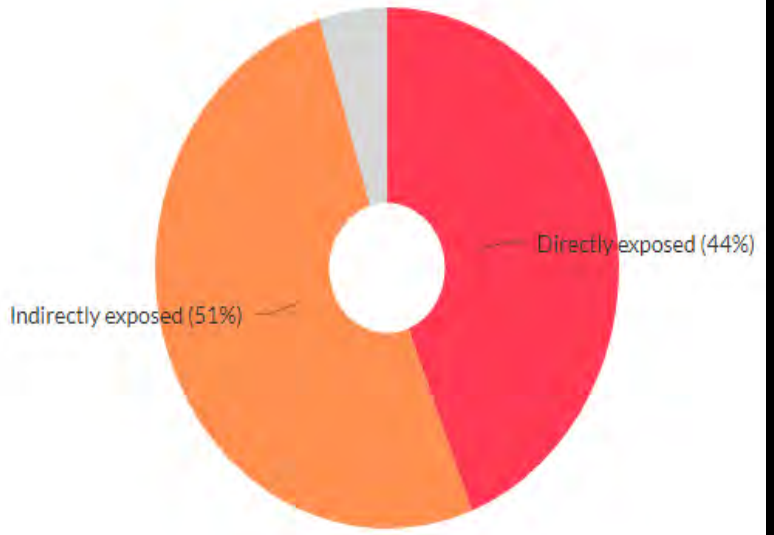
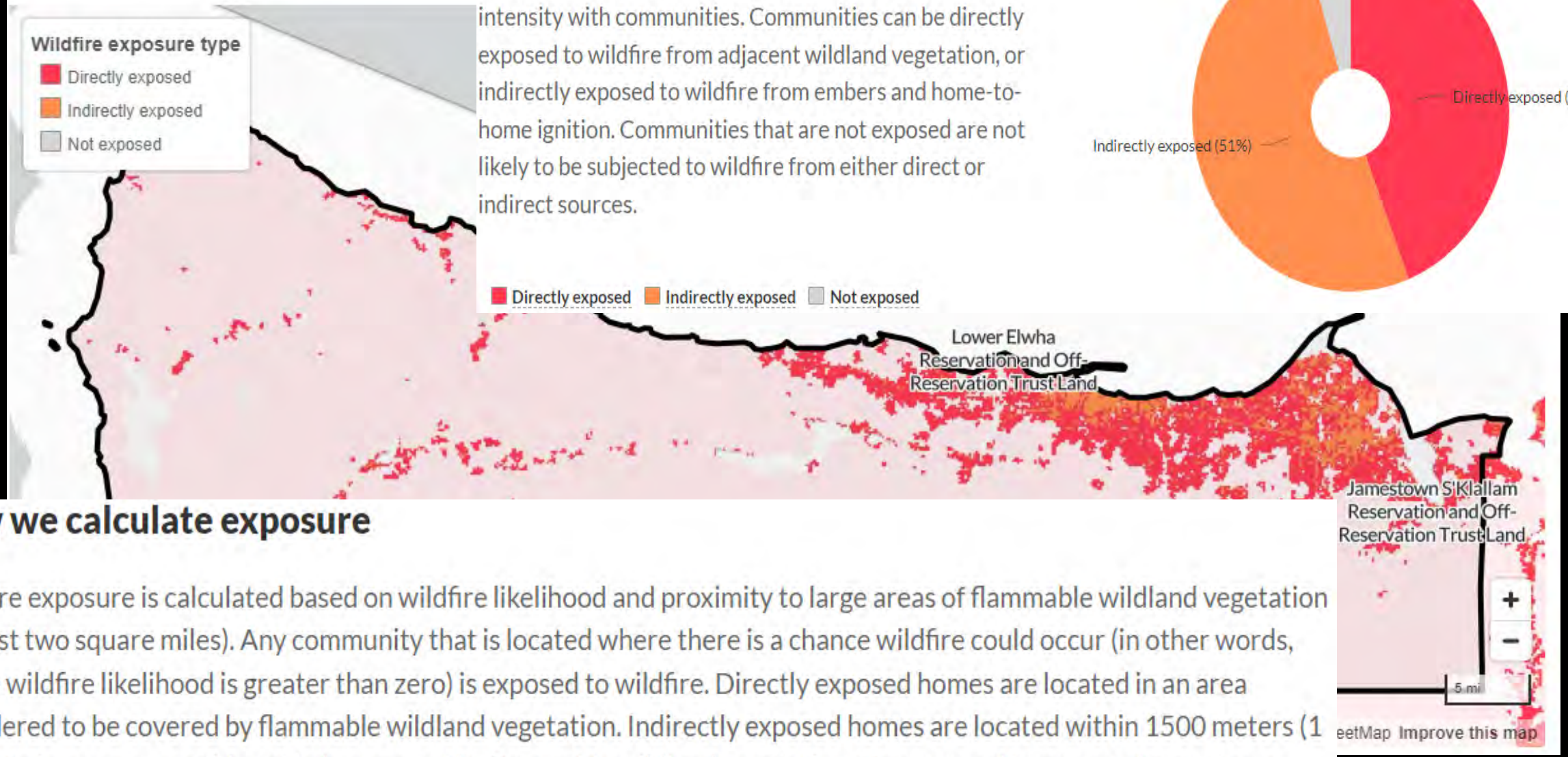


About exposure

Exposure is the intersection of wildfire likelihood and intensity with communities. Communities can be directly exposed to wildfire from adjacent wildland vegetation, or indirectly exposed to wildfire from embers and home-to-home ignition. Communities that are not exposed are not likely to be subjected to wildfire from either direct or indirect sources.





How we calculate exposure

Wildfire exposure is calculated based on wildfire likelihood and proximity to large areas of flammable wildland vegetation (at least two square miles). Any community that is located where there is a chance wildfire could occur (in other words, where wildfire likelihood is greater than zero) is exposed to wildfire. Directly exposed homes are located in an area considered to be covered by flammable wildland vegetation. Indirectly exposed homes are located within 1500 meters (1 mile) of a large area considered to be covered by flammable wildland vegetation. Nonexposed homes are located more than 1500 m (1 mile) from a large area considered to be covered by flammable wildland vegetation.

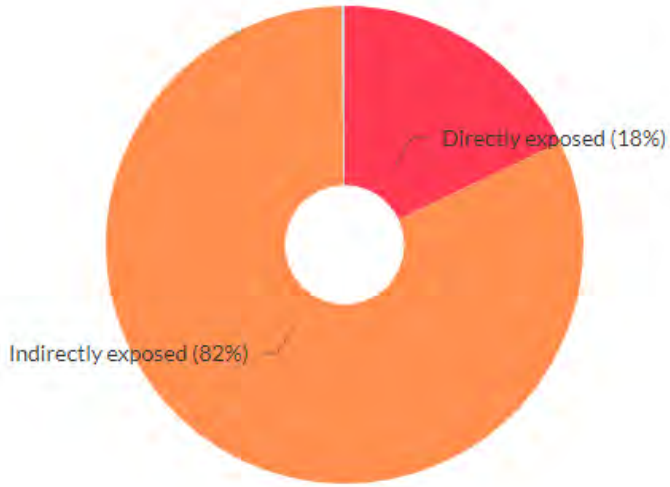
Sequim ⤢

Exposure

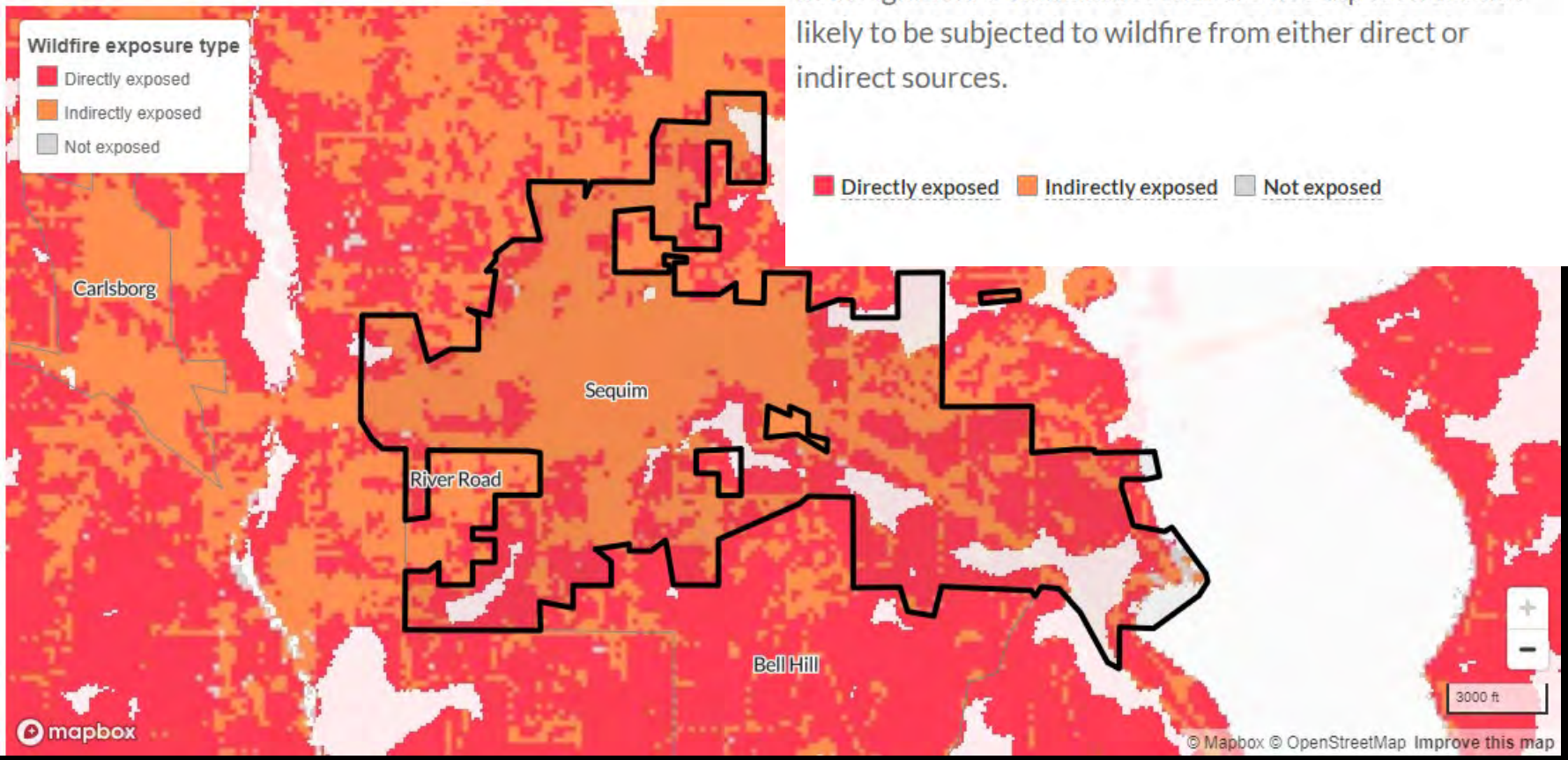
Populated areas in Sequim are predominantly exposed to wil
home ignition.

About exposure

Exposure is the intersection of wildfire likelihood and intensity with communities. Communities can be directly exposed to wildfire from adjacent wildland vegetation, or indirectly exposed to wildfire from embers and home-to-home ignition. Communities that are not exposed are not likely to be subjected to wildfire from either direct or indirect sources.



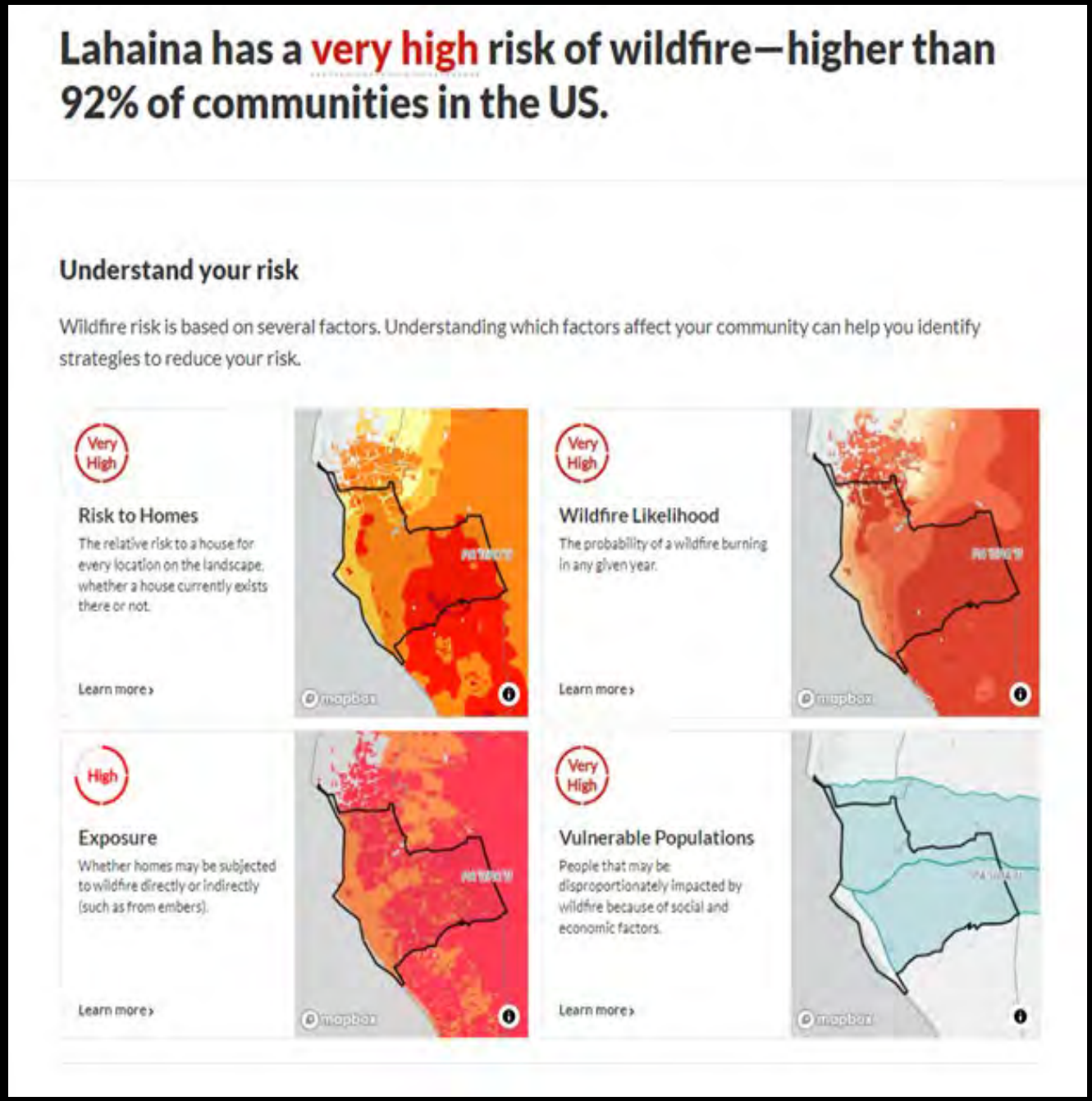
Directly exposed | Indirectly exposed | Not exposed



In Comparison...

Lahaina, Hawaii

August 11th, 2023



Fire district 3 has 11-16 fire personnel on duty daily, 24/7/365 for emergency response.

During an extended operation, personnel are called in and volunteers to either respond or to backfill for the next call.

A significant wildfire event is an extended operation.

We will respond with the appropriate apparatus and personnel to attend to the emergency with brush Engines, tenders, structural engines and ambulances.

How do I get information?

During a wildfire you can tune into local radio stations (KSQM, KONP), Monitor the County Emergency Management Website, Sign up for Code Red, Follow appropriate social media sites (Inci-web, CCFD3), etc.

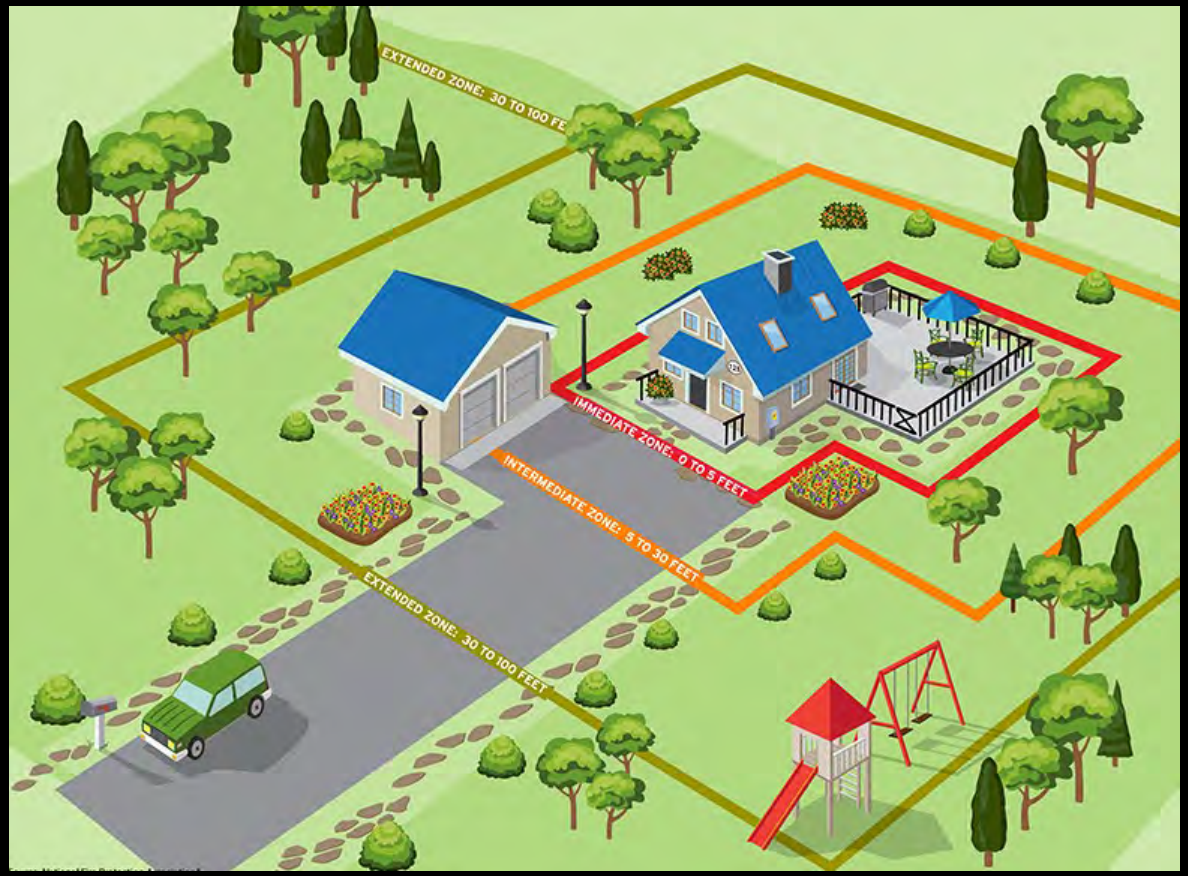
DO NOT CALL 911 for information on the fire.

DO CALL to report a Fire!

Educate yourself ahead of time (this is why you are here!)

What can I do to prepare myself and family?

- Fire Wise
  - + Prepare your home!
    - Vegetation Management
    - Fire Resistive Construction
    - Be Prepared
- Ready, Set, GO!
  - + Get Ready
    - Harden your home
  - + Get Set
    - Prepare your Family
  - + GO!
    - Go Early Checklist



Zone 1 (Immediate) 0-5 feet from home

Zone 2 (Intermediate) 5-30 feet from home

Zone 3 (Extended) 30-100 feet from home

Immediate Zone

FireWise Best Practice
Clean roofs and gutters of dead leaves, debris, and pine needles
Replace or repair any loose or missing shingles or roof tiles to prevent ember penetration
Reduce embers that could pass through vents by installing 1/8” metal mesh screening
Remove debris that may accumulate at roof-to-wall intersections
Screen or box-in areas below patios and decks with wire mesh to prevent debris and combustible accumulation
Move any flammable material away from wall exteriors – mulch, flammable plants, leaves, firewood piles
Trim tree limbs that overhang from the intermediate zone into the immediate zone
Use non-flammable fencing material when attaching directly to siding. Keep fences clear of vegetation

Intermediate Zone

FireWise Best Practice
Clear vegetation from under large stationary propane tanks
Create fuel breaks with driveways, walkways/paths, patios, and decks
Keep lawns and native grasses mowed to a height of 4”
Remove ladder fuels (vegetation under trees) so a surface fire cannot reach the crowns. Prune trees up to 6-10’ from the ground.
Space trees to have a minimum of 18’ between crowns with the distance increasing with percentage of slope
Tree placement should be planned to ensure the mature canopy is no closer than 10’ to the edge of the structure.

Extended Zone

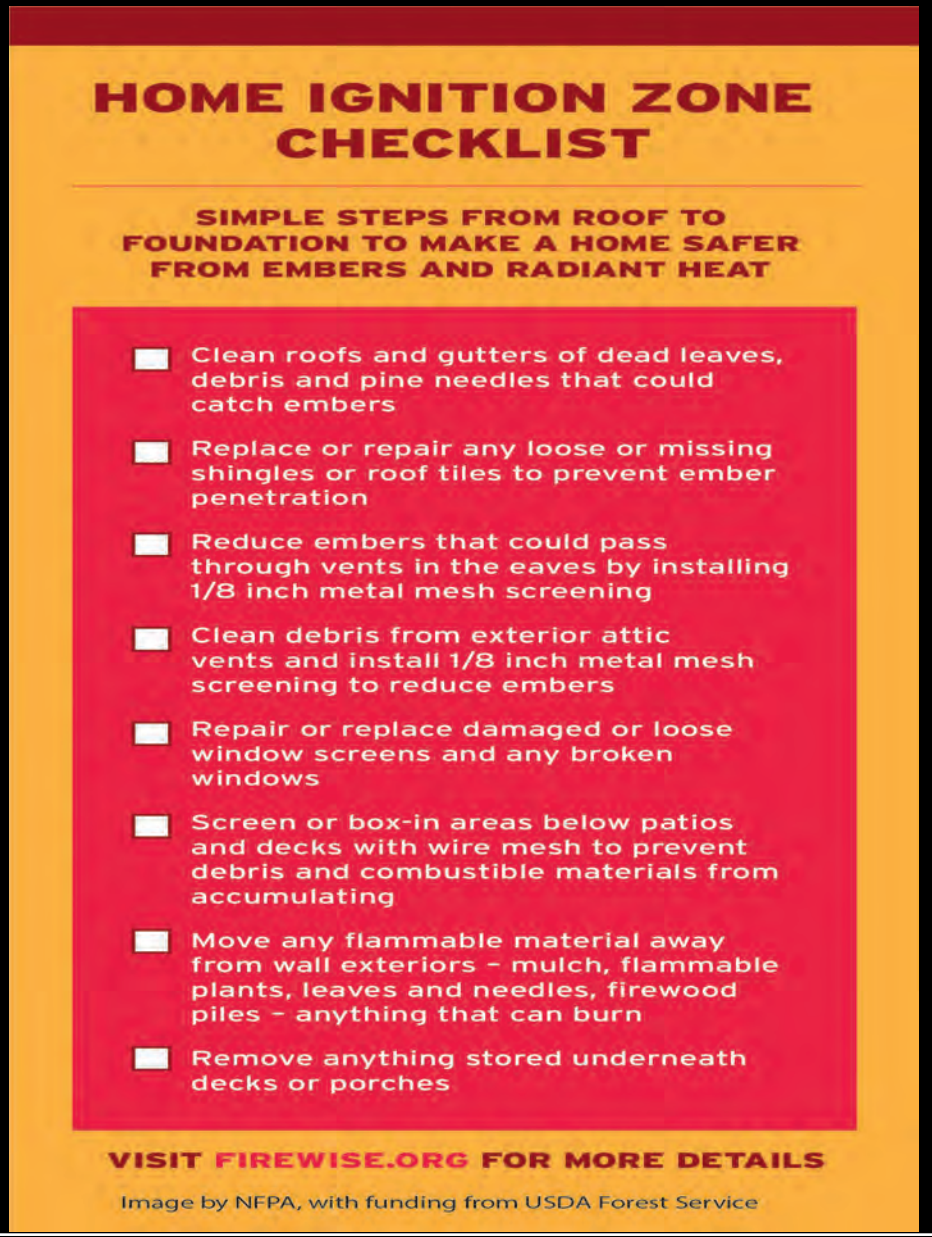
FireWise Best Practice
Dispose of heavy accumulations of ground litter debris
Remove dead plants and tree material
Remove small conifers growing between mature trees
Remove vegetation adjacent to storage sheds or other outbuildings within this area
Trees 30-60’ from the home should have at least 12’ between canopy tops
Trees 60-100’ from the home should have at least 6’ between the canopy tops

Vegetation Mitigation Before/After

EMBER RECEPTIVE

EMBER RESILIENT

Firewise benefits



HOME IGNITION ZONE CHECKLIST

SIMPLE STEPS FROM ROOF TO FOUNDATION TO MAKE A HOME SAFER FROM EMBERS AND RADIANT HEAT

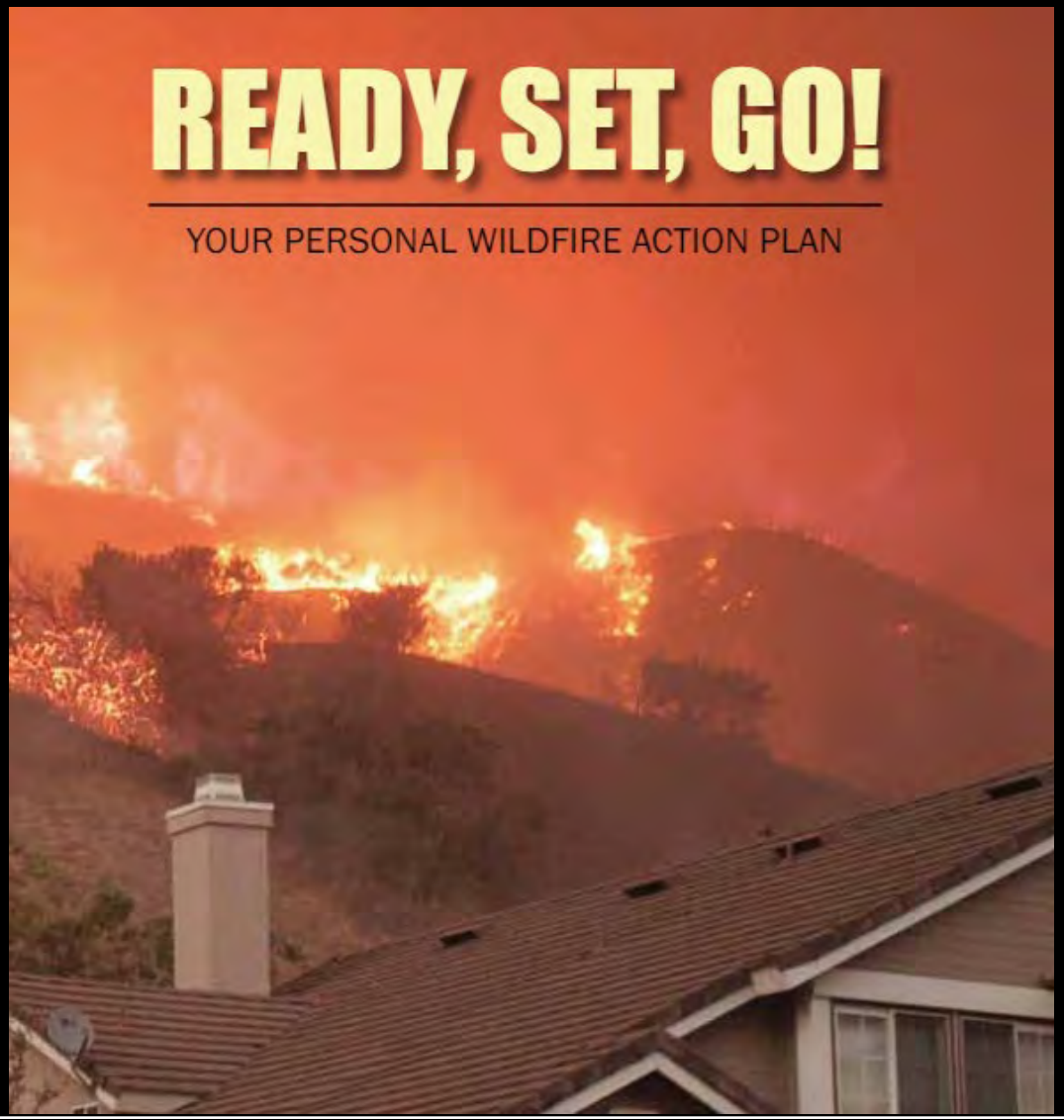
- ☐ Clean roofs and gutters of dead leaves, debris and pine needles that could catch embers
- ☐ Replace or repair any loose or missing shingles or roof tiles to prevent ember penetration
- ☐ Reduce embers that could pass through vents in the eaves by installing 1/8 inch metal mesh screening
- ☐ Clean debris from exterior attic vents and install 1/8 inch metal mesh screening to reduce embers
- ☐ Repair or replace damaged or loose window screens and any broken windows
- ☐ Screen or box-in areas below patios and decks with wire mesh to prevent debris and combustible materials from accumulating
- ☐ Move any flammable material away from wall exteriors – mulch, flammable plants, leaves and needles, firewood piles – anything that can burn
- ☐ Remove anything stored underneath decks or porches

VISIT FIREWISE.ORG FOR MORE DETAILS

Image by NFPA, with funding from USDA Forest Service

Ready, set, GO! benefits

- Defensible space
- Making your home Fire Resistant
- Making a Wildfire Ready Home
- Prepare your family
- Checklists
- Go Early
- Create your own Wildfire Protection Plan



How do I increase my chances of survival?

Create you Wildfire Action Plan

This should include:

- **Meeting Point:** A predetermined meeting location outside high-risk areas to determine who has evacuated.
- **Escape Routes:** Several escape routes, known to all your household. Practice these often so everyone knows where to go.
- **Animal Arrangements:** Specific arrangements for pets and larger animals, like horses and livestock.
- **Communication Plan:** A family communication strategy names someone outside the area to be the main contact point for all family members if you get separated.

The 6 P's of Evacutation

- **People and Pets**
- **Papers, phone numbers & important documents**
- **Prescriptions, vitamins and eyeglasses**
- **Pictures and irreplaceable memorabilia**
- **Personal Computer, hard drive and disks**
- **"Plastic" (credit/ATM cards) and cash**

Who is going to help me?

- **Mutual Aid Capabilities**

FireWise Community Survives Wildfire

Thank you

Justin Grider, Fire Chief
360-683-4242 x112
jgrider@ccfd3.org
www.ccfd3.org

Washington State Department of Natural Resources

Olympic Region

RCW 76.04 gives DNR authority to the actively engage in fire suppression activities on state owned land and department protected land.

Department protected lands" means all lands subject to the forest protection assessment under RCW 76.04.610 or covered under contract or agreement pursuant to RCW 76.04.135 by the department.

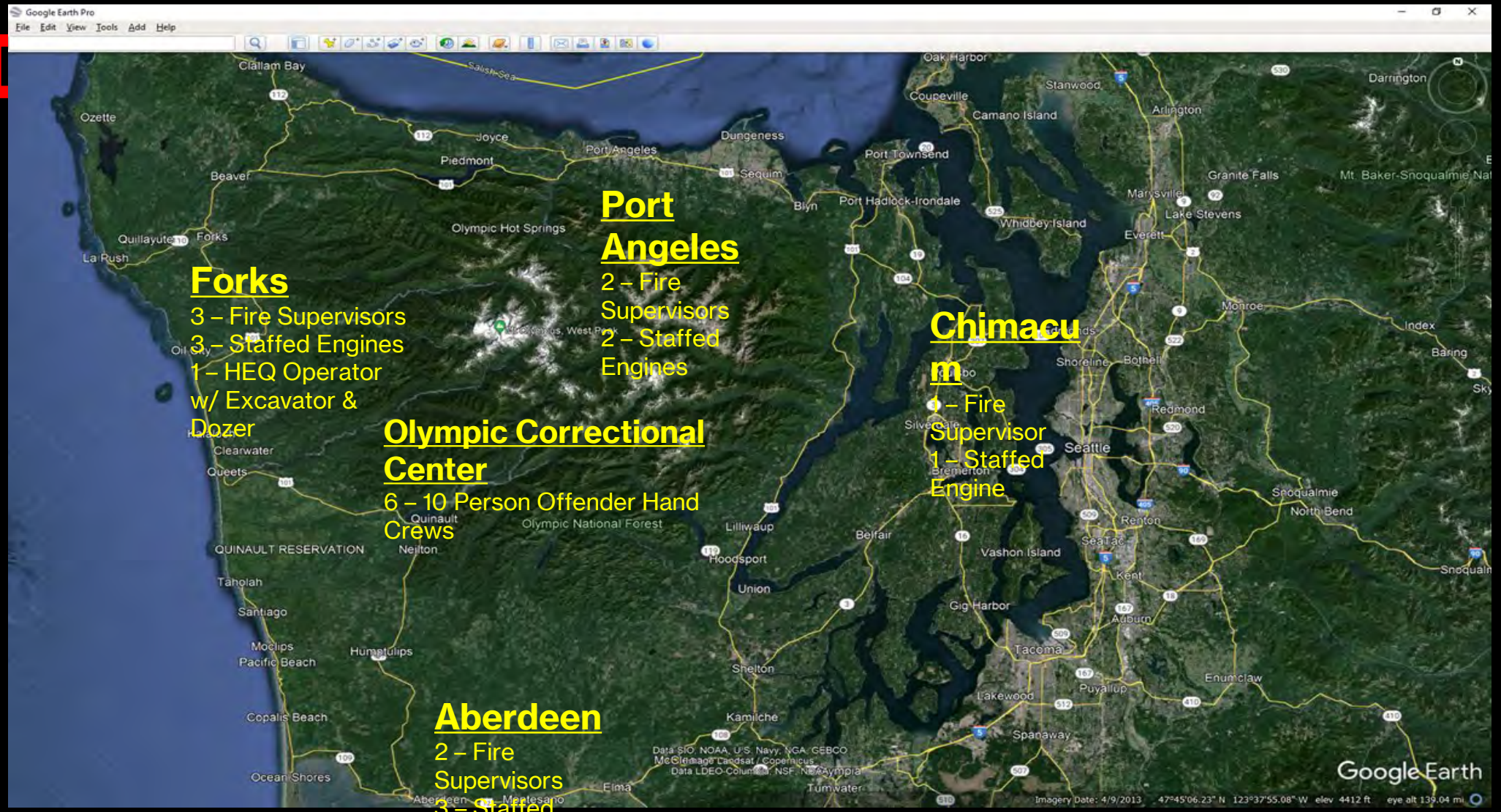
When we receive a report of smoke/fire:

- We will dispatch at least 1 Incident Commander (IC) and 1 Engine
- When the IC arrives on scene will get the LAT/LONG of the fire's location and give that information to our dispatch to determine jurisdiction (Sole, Joint, or Federal)
- The IC will get a size up of the fire and come up with a plan on how many resource they might need to control and extinguish this fire. If the fire district is on scene the and it is joint jurisdiction, IC will work with the FD IC and establish unified command.

When we receive a report of smoke/fire

continued:

- If the fire is threatening homes or a community and we need to evacuate the area, we will contact the Sheriff's office and have them start evacuating the area.
- We will protect all structures as best as we can from a wildfire, but if a structure becomes involved in fire, we can’t engage in fighting a structure fire.



Forks
3 – Fire Supervisors
3 – Staffed Engines
1 – HEQ Operator w/ Excavator & Dozer

Port Angeles
2 – Fire Supervisors
2 – Staffed Engines

Olympic Correctional Center
6 – 10 Person Offender Hand Crews

Chimacum
1 – Fire Supervisor
1 – Staffed Engine

Aberdeen
2 – Fire Supervisors
3 – Staffed Engines

To Contact DNR

- Monday - Friday 0800 – 1630 call 360-374-2800

- After Hours and on weekends call 1-800-562-6010

Clallam County American Red Cross Wildfire Preparedness

American Red Cross

American Red Cross (ARC) Role

- Wildfire preparedness information
- Coordinate with the CCEM and/or the local EOC to determine what mass care (ESF 6) and health services (ESF 8) are needed.
- Canteen personnel services for fire department until DNR and/or USFS fire crews take over.
- Shelter support and/or set up.
- Perform disaster relief for impacted members of the community

Wildfire Alert and Warning

Clallam County Sheriff's Office

Emergency Management Division

What is Emergency Management and what do we do?

We staff and run the Emergency Operations Center

We find the resources needed that the boots on the ground need and don’t have.

We are responsible for Alert and Warning the public

When everything is all over, we coordinate with FEMA for recovery

We teach preparedness during “Blue Sky Days”

Alert and Warning

- https://www.youtube.com/watch?v=wdpLWML_tDU

Emergency Alert System (EAS)

- Broadcast Media only
- Used local TV Stations
- Everyone got the alerts

Wireless Emergency Alerts

- Uses Cell phones
- IPAWS hits every phone that pings a tower
- Relies Heavily on “Customer Opt In”

How do you get your alerts?

- Social Media?
- Radio?
- TV?
- Newspaper?

If we need to tell you that a danger was imminent and you needed to get out, how would you get that message?

Visit clallamcountywa.gov and sign up today!

- In January of 2024, Clallam County moved to a new system for initiating Alerts and Warnings.

- The old system was only able to alert about 34, 000 people
- County Population is 77,000

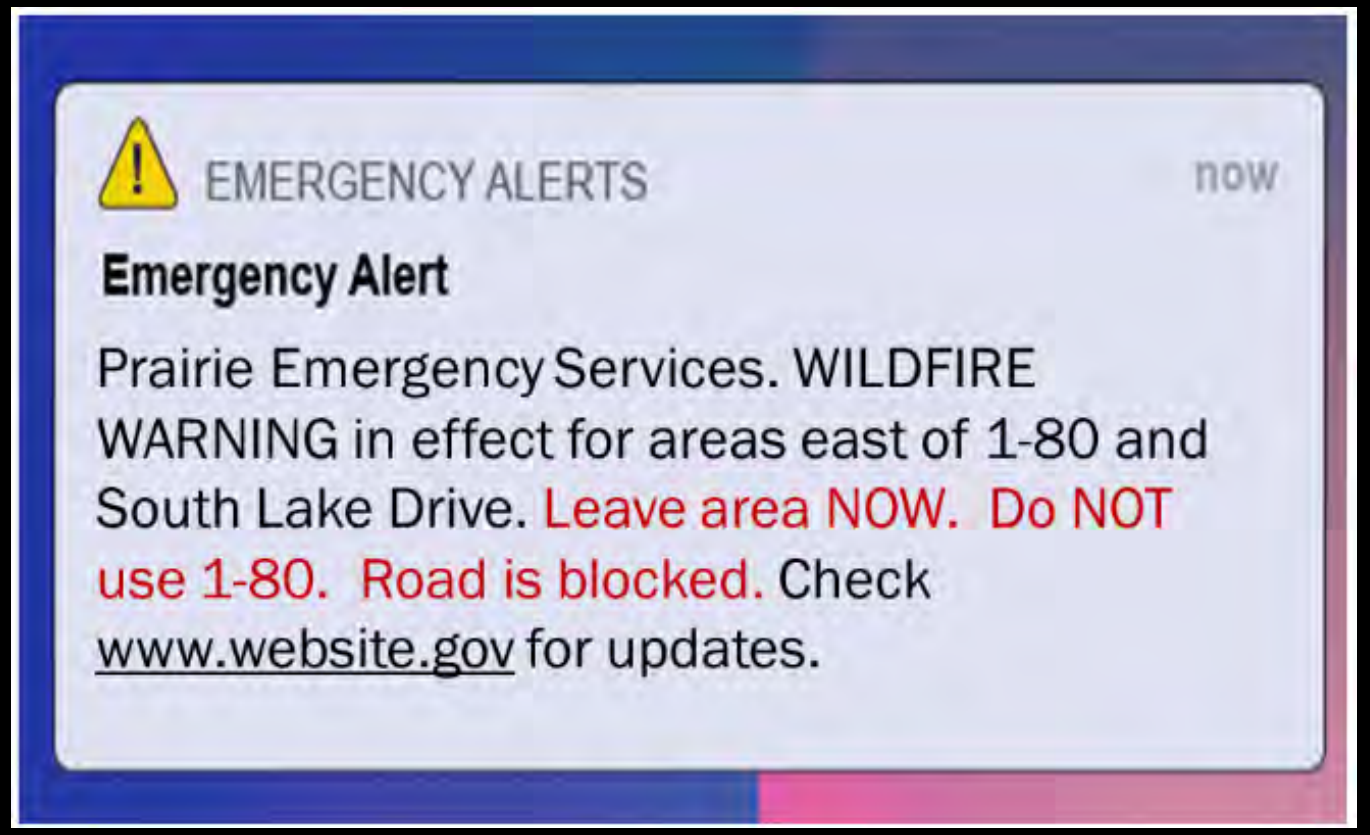
- The new system is cheaper and easier but we still need you to sign up

Clallam Co.
Alert System

What to expect from a wildfire alert

- It will state it’s from the Clallam County Sheriff’s Office
- It will clearly state the danger and location
- It will tell you how this is threat to you
- It will list actions we want you to take
- It will give you a timeline
- It will give you a site for more information

Sample of a typical wildfire alert



Three levels of Evacuation

Ready

Set

Go

Ready!

- Danger exists but you are not in immediate danger
- How will you leave if you have to?
- Think about how much time you will need to get out
- Know your evacuation route and what is the alternate
- Make sure you are able to receive alerts
- This level may escalate quickly

Set

- A clear and imminent danger exists
- Monitor all warning sources carefully for updates
- Pack your emergency items
- You could relocate to a safer location
- If you choose to remain, have a plan.
- This will likely escalate with very little warning
- Be ready to leave immediately

Go

Go	Do not stop	Leave
Go now!	Do not stop to pack	You must leave immediately!

Pre planning makes it all easier

Have a go bag packed ahead of time

Know how to get out and have a backup plan

Do not wait until you need to leave to create a plan

Know where to get good information on the fire

- Anne Chastain
- anne.chastain@clallamcountywa.gov
- 360.417.2483

- Justine Chorley
- justine.chorley@clallamcountywa.gov
- 360.417.2525

If you need help in making your plan, call us

Wildfire can and does happen here!

Learn how to prepare your home and family for Wildfires at a public presentation.

Guy Cole Event Center
202 N Blake Ave
Sequim, WA
Saturday, May 25th
1:00pm

Presentations by:

- **National Weather Service**
- **Department of Natural Resources**
- **Clallam County Emergency Management**
- **Clallam County Public Health**
- **Sequim Fire Department**
- **Sequim CERT**
- **US Forest Service**
- **American Red Cross**

A Question and Answer session will follow the presentations

For more information, call 360.417.2305

APPENDIX C.8

Public Review Period

Appendix C.8: MJHMP Public Comment

A draft of the MJHMP was made available on the County webpage for the public to review and comment for a 2-week period beginning on December 4, 2024, and ending on December 31, 2024. The MJHMP was posted on the Clallam County website and emails were sent to notify the public of the opportunity to review the document. The MJHMP received six public comments on the draft plan.

Source	Comments	Response
Maureen McElravy, Clallam CO, WA	There are many reasons to retain all drinking water sources, any of which may be at risk from landslides, windstorms, sea level rise and earthquakes which can alter geology above and below ground aquifers. They can damage wells and other infrastructure whether it be pipelines, storage facilities and or treatment plants. The ever-increasing regulations requiring flows for fish passage, priority water rights and fire suppression as well as overuse by other systems drawing from the same aquifer or surface body should be considered, as well as contamination from known or unknown sources, malfunction of equipment, lack of maintenance and destruction of infrastructure whether those means be intentional or not are more reasons to protect and secure those sources. An additional source also provides greater capacity for growth and technologies that require more water or better water. It can be used in times of contamination, maintenance and repair of other sources. When other systems fail, those with ample sources can provide for others. It is also an allowed use for fire suppression, important to any area whether it be in a fire district or not. The WA State Dept of Drinking Water will no longer allow any new public systems that draw from surface waters regardless of the absence of risk from microbes. Water, particularly on the east side of the Olympics and shallow wells on the west are vulnerable to iron, manganese , reduced flows, salt water intrusion and capacity. The fact that so few responded to the survey should be evidence enough that the public has not been given proper notice. The groups that are allowed to participate are most likely composed of individuals with little to no experience of life here. The tribal members' livelihood is considered in this document, but those from multiple generations, young and old, with whom they share many aspects of culture and heritage are not. They too have and will suffer losses of property and more from the overreaching arm of government, lack of representation and like treatment. I might have had more to say if I had known of this proposal, so focus on two points today. My comments should be of great interest and consideration to the authors of this proposal and to the BOCC whose duties to provide for and protect its citizens will decide our fate. As a senior	Public engagement is described in detail in section 2.1.7 of the MJHMP and Appendix C. This included both meetings with the public and a website in which the public had an opportunity to comment throughout the process. Additionally, all HMCR Steering Committee minutes and presentations were made publicly available. The MJHMP Community Survey received 619 responses—considered a high response rate for the County's population—and a 13% increase from the 2019 HMP Community Survey (550 responses).

	member of a family long a part of the county and a director and part owner of a public water system, it is mine.	
The League of Women Voters of Clallam County (LWVCLA) Future of Water committee *(See attached)*	The League of Woman Voters of Clallam County established a committee to study aspects of Dungeness Basin water resources and how they are affected by climate change. This "Future of Water" committee of 8-10 LWVCLA members has been conducting a monthly series of open meetings studying existing plans and interviewing subject matter experts since early 2024. Pertinent to hazard mitigation planning, we focused this August-October on a public awareness campaign regarding drought effects on the Dungeness River with two "Low Flow Alert" roadside/trailside signs – one of which is featured in a photograph in section 4 of the draft plan. Another study area for the LWV water committee has been the recommendations put forward in 2022 by the Water Resources Technical Group (WRTG), a new subcommittee of the Dungeness River Management Team (DRMT, an advisory committee to the BOCC). The DRMT Executive Committee established the WRTG by inviting local water managers and hydrologists to identify and assess priority water resource management topics and studies in the context of current and future effects of climate change in the Dungeness Basin. The WRTG report includes a Summary1, listing areas of concern and 13 recommendations that should be considered by local, state and federal agencies and tribes for further efforts, and the Appendix2, which provides significant additional details for each recommendation including verbatim input from local and state experts. To start, the DRMT provided the WRTG with questions to consider in bolstering future water resources planning and preparation, including the following: • What is the most essential data/information to obtain? • What are the most essential technical studies? • What are the most essential management tools (new or updated)? Throughout spring of 2022, the WRTG identified, vetted, and fleshed out 13 priority water resources topics, listed below in the order they were discussed: • 6.1 Updated Ground Water Characterization • 6.2 Expanded Monitoring Programs • 6.3 Characterization of 4th Aquifer • 6.4 Updated Water Demand Projections • 6.5 Climate Research on Impacts to Fish	The County and Project team reviewed the comments and attachment provided, and accepted suggestions to modify both hazard mitigation project #16 and #17.

	• 6.6 Community Support through Public Outreach • 6.7 Interactive Hydrologic Map • 6.8 Comprehensive, Integrated Forecasting Model • 6.9 Saltwater Intrusion Studies • 6.10 Expanded Snowpack Study • 6.11 Mitigating Potential Use of 4th Aquifer • 6.12 Shallow Aquifer Recharge Effectiveness • 6.13 Future Water Sourcing Studies As a reliable source of vetted activities needed for prudent future water management, the WRTG report has been used by LWV water committee members to prioritize their ongoing efforts. To date, however, the recommended studies have not been advanced by local entities, other than 6.6 regarding outreach (which has been embraced by our water committee, Clallam Conservation District, WSU Extension and several others). A quick look at the 13 topics deemed high priorities by the WRTG shows that there is great need for research and other activities pertinent to be well prepared for hazards including drought, decline of ambient water storage in the mountains, and wildfire. **The LWV water committee strongly recommends that the WRTG report (including appendix) be reviewed for relevance in the Multi-Jurisdictional Hazard Mitigation Plan, and that resulting findings – including recommendations for research – be included in the final Plan and project lists**. 1 https://dungenessriverteam.org/wp-content/uploads/2023/07/Dungeness-Water-Resources-Planning-Recommendations-Summary-Report_Approved.pdf 2 https://dungenessriverteam.org/wp-content/uploads/2023/07/APPENDIX-to-Summary-Report_Approved.pdf	
Ian Miller	Comments provided via a PDF file of the MJHMP draft. 1) What an incredible document and effort! I am stunned and amazed by what is in here, and how it is organized and presented, especially given how fast the process was. 2) There were a few instances...some that I commented on and some that I didn't, where I was really craving some mapped presentations of data. Those kinds of things are hard to make, especially at this stage of a project, but I just wanted to raise it.	The County and project team accepted and incorporated all of the changes suggested in the PDF file Ian Miller provided. Additionally, the MJHMP Introduction section acts as an executive summary, including Table 1-1 which describes the changes

	3) Obviously, this document is HUGE, which led me to spend the entire time I was reviewing trying to think of suggestions for how to break out pieces for something like an executive summary, or a summary for policy-makers, or some kind of fact sheet that would break out the most relevant information for most readers, while leaving this volume available for the full documentation. Something like this is such a rich compendium of hazards information for the county, but really isn't accessible to the average Clallam County resident, so I started to think about how to facilitate that kind of access such that all of this insight becomes useful as an educational tool. 4) I could quibble on a few of the scores (the impact scores for tsunami in Port Angeles in Volume 2, for example), or rankings of a few of the projects, but trust the process. I was also surprised to see a few things missing...the big one in my mind is some link drawn between toxics storage at the base of Ediz Hook, and impacts associated with tsunamis or severe storms. I seem to recall us talking about that in a meeting, but might be making that up...and I also might have missed it. Not important...there is plenty in here to work with, but I've always viewed that as an important connection to draw for the county.	made from the 2019 MJHMP.
Jeff Tozzer *(See attached)*	This article summarizes my views about the drafted update to the Hazard Mitigation Plan. County leaders actively avoid public engagement and instead create a policy with a predetermined agenda. I also believe the Plan favors certain groups over other Clallam County residents based on special interest status. Please include this article in the public record as it is my comment. Mitigating public engagement	Public engagement is described in detail in section 2.1.7 of the MJHMP and Appendix C. This included both meetings with the public and a website in which the public had an opportunity to comment throughout the process. Additionally, all HMCR Steering Committee minutes and presentations were made publicly available. The MJHMP Community Survey received 619 responses—considered a high response rate for the County's population—and a 13% increase from the 2019 HMP Community Survey (550 responses).

Mark Ozias	CC01: Which of the three district public works sites? I wouldn't think any of the three are in tsunami zones. Are any of them in liquefaction or other seismic zones? If so, we should be more specific. Could this be referring to the Clallam Bay/Sekiu sewer treatment plant? (And if not, should we add that to the list?) CC06: Should this be expanded to all FD facilities across county, and/or wrapped in to our other wildfire planning work? CC09: Assuming this would encompass both public and private facilities, but should we be specific? For that matter, do we need to add any items specific to any of the irrigation ditching companies? CC10: Can we add doing an inventory/analysis of private water systems as an additional item (probably separate from this one?) DOH has a $50k-ish grant we can apply for that will provide us with a consolidation study and recommendations. CC17: This is too vague. It would be better to state that we need to first identify which areas we're talking about (making that its own action item if necessary) and then to develop infrastructure that would allow those alternate sources to be tapped when needed. It would also be important to differentiate between emergency sources of water and the more slowly-unfolding need to be more creative about water as population increases/moves and as supply declines. CC18: Does this need to be limited to just one or should we be shooting for several? CC20: Do we need to add language specific to food banks or other non-governmental partners? Also, this action item makes me think we should consider adding one relating to coordination with private industry, for example developing a mutual aid agreement of sorts so paperwork is in place when the emergency hits. Construction companies, heavy equipment operators, etc. CC28: This is one of my biggest worries and I think it might be helpful to be a bit more specific. ONP is certainly the biggest entity, but should we develop a separate action related to coordination with private businesses like hotels, campgrounds, RV parks, etc? Or our own county parks for that matter? Should we specifically mention the Forest Service? It might be worth breaking these down into several separate actions since the outreach to ONP will likely flow through different channels than ONF, DNR, etc.	The County and project team reviewed each of the comments on hazard mitigation projects and made all applicable changes suggested. The team also added two new hazard mitigation projects in response to these comments.

	CC30: Is the Elwha the only river we're interested in? There are likely others in the west end we could/should add to this list. More generally, • It might be helpful to break out and organize FD projects by district rather than having them scattered throughout the document. Also I am not sure why those are categorized as "Clallam County" projects vs. FDx projects. • Should we have an action item related to purchase/stockpile/storage of PPE and/or other basic medical supplies? • Do we want to specifically call out any school building retrofits or rebuilds related to seismic danger? • It doesn't appear the Port has any projects or action items related to the QV airport. Do we need to include any? • Could/should Clallam Transit be included as a jurisdiction of sorts? If so, perhaps we could build one or more action items related to fuel storage and/or bus infrastructure specific to cooling/warming. Or maybe a community resilience hub at Transit Centers and/or transit's home base up on Lauridsen? • Have we reached out to public health for their input? I don't really see any significant action items related to a public health hazard. • Is there anything more specific we can do around stockpiling basic medications? Would this effort warrant its own action item? • Have we looked into securing temporary bridges that could be deployed after an earthquake? Is this even a reasonable thought? • Could these actions be organized by category in any way? At least "climate resilience" actions together, and "emergency management" actions together? • Should we have one or more action items specific to food storage projects with food banks and/or other community partners? • Should we have any action items specific to outreach to the Developmental Disability community? • Should we have any action items specific to "supported housing" developments like those managed by PBH? • Should we have any action items specific to any other populations that might have special needs and/or require special considerations? • Should we add any action items specific to our jail? Perhaps listing seismic improvements or similar can help us apply for different funding sources. • Do we suspect we will have any issues with standardizing communication systems? I am specifically thinking about the Trump assassination attempt where some LE were	

	using radios and others were using text, resulting in a crucial lack of coordination when needed. If so, do we need to create an action item specific to ensuring all partners (including ONP, DNR, Tribes, etc.) have and use compatible communications equipment? • Would any projects need to be done to accommodate the new barges, to compliment the existing "create an MOU" item? • Is there any specialized equipment we might wish to have that could be included as an action item just in case a funding opportunity becomes available? For example, would we want to make sure that all fire districts, maybe some CERT teams, maybe others have one or more "gator" type vehicles that can be used when roads are out?	
Chip Keen	Mickey got in touch with me asking whether CCEM had incorporated the ShakeAlert Earthquake Early Warning system in the existing HMP. I told him "not to my knowledge." He put me in touch with Gabriel Lotto, who coordinates a number of outreach activities at PNSN - especially in regard to ShakeAlert. I asked Gabe for some specific examples of how ShakeAlert would be incorporated into a MJHMP. He sent me a link to the 404-page draft HMP being worked on by the City of Manhattan Beach, California. I've copied and pasted the references below.	The County and project team reviewed this suggestion and the attached example and added an action to seek grant funding to assess the ShakeAlert earthquake warning system.

COUNTYWIDE

Mitigating public engagement

Updated county plan caters to "most important partner"

JEFF TOZZER
DEC 29, 2024

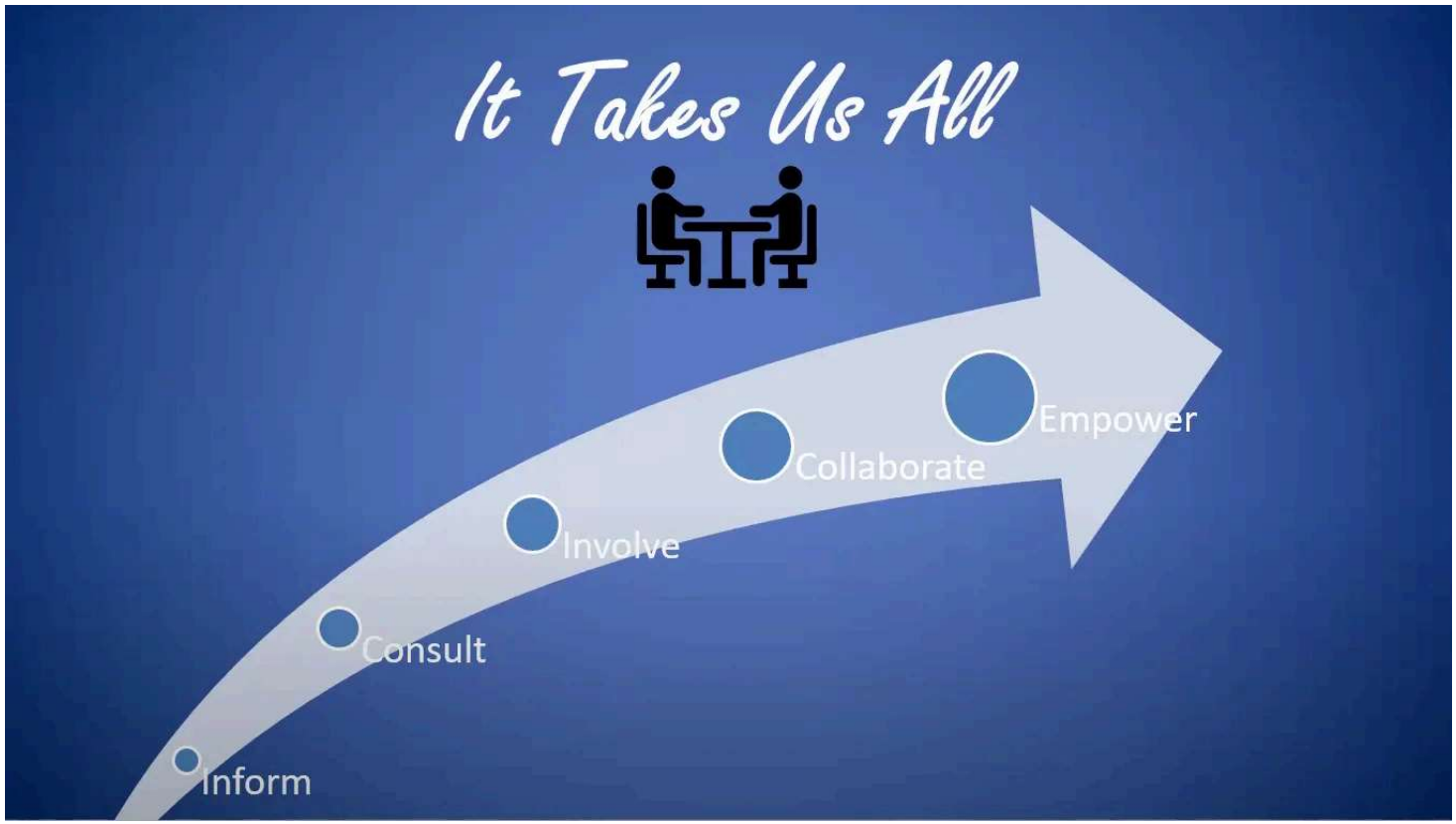
22 65 1 Share

County sidesteps community engagement. Climate change may cause earthquakes. Ozias reveals who is important. More levees slated for removal. Germany's vision for Clallam County. Community leaders aren't even hiding who their favorite is anymore.

Clallam County has released a draft of the updated Hazard Mitigation Plan. It's 2,057 pages long (including the "annexes" that address cities), and the public has been invited to provide comments from December 4th until December 31st.

The plan, updated every five years, identifies hazards such as earthquakes, tsunamis, wildfires, flooding, and landslides and highlights ways to prepare for them. County

leaders said that community engagement, which began in February, would include informing, consulting, involving, collaborating, and empowering the public.



Earlier this year, on a "Coffee with Colleen" episode, the Department of Community Development stressed that community engagement would be a key component of updating the plan.

Robust public disengagement

The Hazard Mitigation Plan was developed by Cascadia Consulting Group (not to be confused with Cascadia Water, featured in *Water Woes*). In February, the commissioners interviewed Cascadia and asked about public engagement, which has been challenging for the commissioners this year.

- In October, the commissioners invited the public to a presentation of the 2025 proposed budget. Although it was advertised as a "public meeting," those unwilling to pay a $30 fee were turned away at the door.
- Commissioner French has reminded attendees that meetings "are not meetings of the public; they are meetings of the board conducted in public."
- Recently, the commissioners have limited public comment to only 10 minutes regarding agenda items.
- After initially supporting a monthly forum where the public could ask questions *and* receive answers, the commissioners now indicate this will not happen again. October's first (and apparently, last) Q&A revealed that the commissioners are astonishingly unaware of county matters and unable to answer questions without a script.

The message from county leaders seems to be, *"We need you to fund government, but we don't want you to engage."*

"I will prioritize robust public engagement, respect for my colleagues, and intentional outreach to our business community..." — PA City Councilman Mike French, campaigning for County Commissioner, 2022 Voter's Guide

"For public engagement," explained Mary Ann Rozance of Cascadia Consulting Group, "We are recommending in-person and hybrid... engagement for public meetings, as well as other types of engagement touchpoints, including having a robust website for this project." Rozance was answering questions from the commissioners who, in February, were considering hiring Cascadia to update the County's Hazard Mitigation Plan.

Cascadia's Mike Chang, who also attended February's meeting, said intentional engagement would be a focus in addition to websites, surveys, press releases, and public notices "just so there is that public touchpoint in terms of communication strategy."

County employee Diane Harvey assured the commissioners, "We will go out to the public, and we will do a survey, and we will also do events in which we interact with the public to get their views on what they would like to see."

"Any entity that is going to have their plan approved by FEMA, we're going to have to have a public outreach moment." — Diane Harvey, Clallam County Special Projects Manager

Commissioners Ozias and French emphasized that the updated Hazard Mitigation Plan should focus on climate change. Harvey explained that some hazards, traditionally considered natural, were now linked to climate change. "There is some scientific data that they're thinking about that maybe climate change is impacting the probability of earthquakes."

At the end of February's presentation, commissioners French and Ozias agreed to hire Cascadia for $369,000 (Commissioner Johnson was absent). However, eight months later, the entire Board of Commissioners, the county's CFO, and the administrator denied having ties with the consultant.

A year of public outreach

Earlier this year, the County outlined its plan for public engagement regarding the Hazardous Mitigation Plan update:

A schedule outlines the County's aggressive plans for community engagement.

- The County had a booth at the Home Show in Port Angeles in March. An article in the Peninsula Daily News also invited residents to take a survey to be completed by May 10th.
- In April, Clallam County participated in a KONP radio show.
- In August, outreach occurred at the Joyce Festival and the Clallam County Fair. A "Jamestown S'Klallam Workshop" was also held.

- In October, the County attended Sequim's Public Safety Fair. However, an article advertising the event did not mention the County's participation.
- In late October, the County performed a "community engagement" event at a closed-door private meeting hosted by the North Olympic Development Council (NODC) at the 7 Cedars Casino. The public paid for the event but was not allowed to attend.

"We'll work closely to identify the specific meeting locations that make the most sense for public participation for public meetings, and thinking about how the hybrid option is really important as well." — Mary Ann Rozance, senior associate at Cascadia Consulting Group

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Lackluster survey participation, which garnered only 619 responses, suggests that community engagement reached less than 1% of the County.

Jurisdiction	Responses	Percentage
Port Angeles	176	28.4%
Sequim	193	31.2%
Forks	29	4.7%
Jamestown S'Klallam Tribe	6	1.0%
Elwha Klallam Tribe	0	0.0%
Quileute Nation	1	0.2%
Makah Tribe	16	2.6%
Unincorporated Clallam County	160	25.9%
Other (please specify)	38	6.1%

The most important partner

“I believe that the Jamestown S'Klallam Tribe is our most important partner in local governance,” Commissioner Ozias announced during a commissioner meeting in April.

Surprisingly, Ozias indicated that Jamestown tribal members were more important than the Elwha, Quileute, or Makah tribal members living in the County. Meeting attendees in the gallery that day were unaware of a hierarchy that put 217 local Jamestown tribal members ahead of the 77,620 Clallam County residents and taxpayers who fund county government.

The importance of the Jamestown Tribe is reflected in the updated plan; “Jamestown” is mentioned 389 times. “Elwha” is mentioned 382 times, “Makah” 95 times, and

"Quileute" 57 times. The Plan occasionally departs from discussing hazards and instead documents the historic territory and treaty rights of the S'Klallam Tribe:

> *"The Klallam or S'Klallam ('the strong people') occupied the largest portion of Clallam County, and it is from these native people that the County derived its name. The Klallam people's territory stretched along the Strait of Juan de Fuca from the Hoko River to the east beyond Discovery Bay... In 1855, S'Klallam leaders signed the Treaty of Point No Point with the U.S. Federal Government, trading vast amounts of land and resources in exchange for the right to continue to hunt, fish, and gather in their "usual and accustomed ground... [After World War II] Clallam County tribes reclaimed traditions and reasserted tribal fishing rights. The Jamestown S'Klallam tribe won federal recognition in 1981, and received trust land at Blyn on Sequim Bay, which now houses the tribal center and casino.*

All four tribes are recognized regarding the dangers of climate change. The updated plan outlines how some special interest groups are more at risk than others during hazard events.

> *Each of these tribes may face unique challenges during hazard events and are considered socially vulnerable due to their close dependence on and connection with the natural environment for their culture, health, and livelihoods. Most tribes have reservations and treaty rights that are connected to specific places and resources, challenging tribes' mobility, and flexibility to go elsewhere in response to disasters or*

> *other changing conditions. Additionally, many tribal communities face social and economic conditions that are likely to be exacerbated by climate change.*
>
> *As climate change alters land, ecosystems, and species distributions, tribes with resource-based livelihoods may lose access to natural resources within traditional homelands, Usual and Accustomed areas, and ceded or ancestral territories. Climate change also negatively impacts tribal community health and well-being—which involves the interconnection of social, cultural, spiritual, environmental, and psychological health—through reductions in the quality and quantity of or access to culturally important species, subsistence foods, and traditional nutrition sources.*
>
> *Considerations for tribes have been incorporated into the mitigation strategy to reduce risks for these populations in Section 5.0.*

The document describes land use and economic development assets that have become vulnerable: "*Jamestown S'Klallam moved some commercial fishing operations to Kona, HI due to increasing PH levels for geoduck and oysters.*"

The Plan says responses to climate impacts should include *"Weatherization of homes (Jamestown S'Klallam Tribe owns 50+).*"

The Jamestown Tribe is in a difficult position. For cultural reasons, the Tribe has *"a unique relationship with the shoreline"* and continues to build near the water. However,

tribal leaders say they *"are relocating some of our facilities to higher ground, away from the shoreline."*

> The Tribe has made significant investments in its medical facilities in the City of Sequim, as well as at the Dungeness River Nature Center, Jamestown Beach, and Blyn. We are relocating some of our facilities to higher ground, away from the shoreline of Sequim Bay. The Jamestown S'Klallam Tribe is mindful of where it builds but Tribes have a unique relationship with the shoreline and are often situated more proximal for cultural reasons.

Highlights

One section regarding "Lower Dungeness River Floodplain Restoration, including 3 Crabs Rd" states, "…removal of dikes and levees continues — more completed and more to come." The document gives a timeframe of 5 years but does not detail what remaining dikes and levees will be removed.

JKS03	Lower Dungeness River Floodplain Restoration, including 3 Crabs Rd.	2015 Action – Ongoing, funding secured, and removal of dikes and levees continues.	More completed, and more to come	Yes	Tribe, Clallam County, Washington Department of Fish and Wildlife	5 years	same	Flooding	WA Floodplains by Design, Construction funding from ACOE	River's edge project completed in 2022

Action ID#	Mitigation Action Description	UPDATED ACTION STATUS	Retain Action in MJHMP Update?	Lead Department	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
JSK02	Improve communications in Blyn Basin, including building cellular tower and installing fiber internet.	Completed	No	Tribe	Constructed in 2019-20	All hazards	Tribe	Located in Blyn, Verizon, T-mobile, County EM repeater
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.	Completed Potential New Action: need to decommission old well close to shoreline	No	Tribe	1 year	Flooding, Tsunami	CDBG-GP Grand, EPA Grants, USDA Rural Development Loans or Grants	New well has been developed and water storage constructed. Well will soon serve community system
JKS03	Lower Dungeness River Floodplain Restoration, including 3 Crabs Rd.	More completed, and more to come	Yes	Tribe, Clallam County, Washington Department of Fish and Wildlife	5 years	Flooding	WA Floodplains by Design, Construction funding from ACOE	River's edge project completed in 2022

By the numbers, one might suspect that the updated plan has imbalances:

- "Tribe" is mentioned 835 times.
- "Resident" is mentioned 12 times.
- "Tribal" is mentioned 505 times.
- "Residential" is mentioned 353 times.
- "Reservoir" is mentioned 186 times.
- "Drought" is mentioned 433 times.

- "Climate" is mentioned 2,964 times.

Preferential treatment

The NODC (North Olympic Development Council) is mentioned 271 times and was hugely influential in drafting the Hazard Mitigation Plan. The non-governmental organization is led by its president, Clallam County Commissioner Mark Ozias, whose last campaign was funded 53% by the Jamestown Tribe.

The NODC has worked closely with Cascadia Consulting Group on other projects, and so has the Jamestown Tribe. Cascadia uses software programs developed by ICLEI, a German non-governmental organization that seeks to *"build and serve a worldwide movement"* through *"institutional reorganization."* The NODC and the Jamestown Tribe are ICLEI members and subscribe to its ideology that divides people into groups labeled *"colonizer"* and *"colonized"* and promotes reparations for former colonized communities.

By working with the Jamestown Tribe and the NODC, Cascadia can draft the Hazard Mitigation Plan away from public view. Laws promoting transparency do not apply to private corporations, sovereign nations, and non-governmental organizations.

> ***"Many have expressed belief that this work has taken place in private, without informing the public. One core belief I have as an elected official is that local***

government only works when citizens participate. It troubles me greatly to think that so many feel they have been left out of the process." — Commissioner Mark Ozias, Facebook, August 2019.

Clallam County Commissioner Mark Ozias is president of a non-governmental organization that appears to be drafting county policy favoring his top campaign donor, the Jamestown Tribe. The commissioner will be positioned to approve the updated plans when they are finalized and submitted to the County. Local policy is being influenced by a German non-governmental organization that seeks to *"create new relationships of power for the future through reparations."*

Clallam County has entered a new era.

A new era

Community leaders are no longer hiding who gets preferential treatment: The Jamestown Tribe is Clallam County's most important partner, and there are signs of that everywhere.

Without soliciting competitive bids from other contractors, Jamestown Excavating, Jamestown Land Survey, and Jamestown Concrete were selected to complete an estimated $2.6 million project for Habitat for Humanity of Clallam County.

The Jamestown Corporation avoids paying many taxes and thus has an advantage over its competitors. Those small businesses not only provide jobs and economic growth, but they also pay taxes that fund local government. When asked if other small businesses had been invited to bid on the project, Habitat CEO Colleen Robinson said, "We have an emergent availability of labor and resources from JKT" and "We are not required to do a formal bid process."

Two days before Christmas, Commissioner Mark Ozias turned the first shovelful of dirt for Habitat for Humanity's planned 48-home development in Carlsborg. His top campaign donor, Jamestown Tribe CEO Ron Allen, was beside him, doing the same with his shovel. A row of Jamestown Excavating trucks gleamed in the sunlight behind them.

From the Habitat for Humanity Clallam County Facebook page.

Public comments about the drafted Hazard Mitigation Plan update can be sent to diane.harvey@clallamcountywa.gov by December 31st.

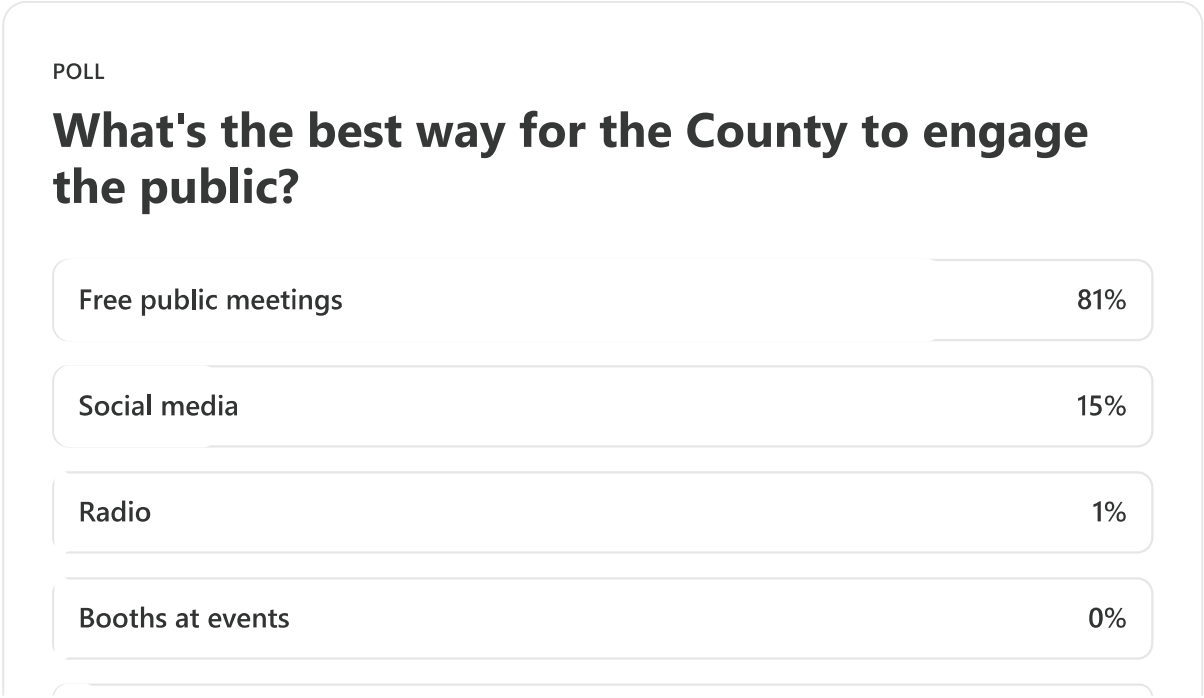
The commissioners will consider a resolution granting $800,000 to Habitat for Humanity of Clallam County for the housing development in Carlsborg during a public hearing on Tuesday, December 31st, at 10:30 am. Public comment is allowed in person at the courthouse in Port Angeles or virtually by clicking here.

Correction

Last week's article incorrectly said that Clallam County approved an *additional* $4 million for Peninsula Behavioral Health's permanent housing facility for the homeless. The $4 million that was *secured* in September was *approved* this month, and the commissioners have approved a total of $4 million for the housing project (not $8 million, as the article said). The article has been updated.

Poll

Last week, 155 subscribers voted in the poll asking if this was their first time hearing about 4PA. 67% said it was the first time, and 33% already knew about the organization.



Other (specify in comments) 4%

164 VOTES · POLL CLOSED

22 Likes · 1 Restack

← Previous Next →

Discussion about this post

Comments Restacks

Write a comment...

Rick Lehman Dec 29

public input is a must.these closed door meetings with the tribe need to be stopped.the decisions made effect literally all of clallam county

LIKE (20) REPLY SHARE

marolee smith Dec 29

Both the city of PA AND the County have gone to this restricted public comment for "only what is on the agenda" which makes zero sense at all. What public comment was FOR, was to speak with, and engage with those who make decisions for us.

Restricting comments is the exact opposite of what should be happening.

Public comment for a government body used to only be limited by "disruptive conduct" and often time limited (not always the case), but government is not supposed to exclude particular speakers because of their views. However, now unless you can tie it to an "agenda" (and the public has zero input on agenda) then you cannot speak, until (in the case of PA) the end comment period. In WA state, as of 2022, the laws have changed to restrict to the agenda. Unlike, anytime, previously. In fact, this was a bill slipped in... with 87 yeas, 11 nays. No real notice to the public house bill 1329, creates more barriers to open public comment. (Likewise, the full meeting packet USED to include letters written to the council. No more.) The changes are "minor" but in reality MAJOR. It is not int he spirit of the Open Public Meetings Act of 1971. And, it was fast tracked. Bills usually take much longer, and have more public input.

https://lawfilesext.leg.wa.gov/biennium/2021-22/Pdf/Bills/Session%20Laws/House/1329-S.SL.pdf?cite=2022%20c%20115%20s%2013

By comparison: Look at how popular, and effective the Mayor of Honolulu is. Rick Blangiardi does a DAILY podcast (One O'ahu Podcast) to update the residents of what is going on, then he takes CALLS, and answer them, or will get back to them (usually within days). He doesn't restrict to any agenda, it's whatever the public wants to talk about. He also has an "Ask the Mayor!" website, where you can submit your questions, and ... OMG ... the Mayor will get back to you!!

Expand full comment

LIKE (14) REPLY SHARE

6 replies by Jeff Tozzer and others

63 more comments...

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To: Diane Harvey, Clallam County Project Lead diane.harvey@clallamcountywa.gov
Subj: Multi-Jurisdictional Hazard Mitigation Plan – Request for Comments
Date: December 30, 2024

The League of Women Voters of Clallam County (LWVCLA) Future of Water committee strongly recommends that the June 2022 report of the Water Resources Technical Group (including appendix; described in detail below) be reviewed for relevance to the Multi-Jurisdictional Hazard Mitigation Plan, and that resulting findings – including recommendations for research – be included in the final Plan and project lists.

Background Information:

The League of Woman Voters of Clallam County established a committee to study aspects of Dungeness Basin water resources and how they are affected by climate change. This "Future of Water" committee of 8-10 LWVCLA members has been conducting a monthly series of open meetings studying existing plans and interviewing subject matter experts since early 2024.

Pertinent to hazard mitigation planning, we focused this August-October on a public awareness campaign regarding drought effects on the Dungeness River with two "Low Flow Alert" roadside/trailside signs – one of which is featured in a photograph in section 4 of the draft plan.

Another study area for the LWV water committee has been the recommendations put forward in 2022 by the Water Resources Technical Group (WRTG), a new subcommittee of the Dungeness River Management Team (DRMT, an advisory committee to the BOCC). The DRMT Executive Committee established the WRTG by inviting local water managers and hydrologists to identify and assess priority water resource management topics and studies in the context of current and future effects of climate change in the Dungeness Basin. The WRTG report includes a Summary[1], listing areas of concern and 13 recommendations that should be considered by local, state and federal agencies and tribes for further efforts, and the Appendix[2], which provides significant additional details for each recommendation including verbatim input from local and state experts.

To start, the DRMT provided the WRTG with questions to consider in bolstering future water resources planning and preparation, including the following:

1. What is the most essential data/information to obtain?
2. What are the most essential technical studies?
3. What are the most essential management tools (new or updated)?

[1] https://dungenessriverteam.org/wp-content/uploads/2023/07/Dungeness-Water-Resources-Planning-Recommendations-Summary-Report_Approved.pdf
[2] https://dungenessriverteam.org/wp-content/uploads/2023/07/APPENDIX-to-Summary-Report_Approved.pdf

Throughout spring of 2022, the WRTG identified, vetted, and fleshed out 13 priority water resources topics, listed below in the order they were discussed:

6.1 Updated Ground Water Characterization
6.2 Expanded Monitoring Programs
6.3 Characterization of 4th Aquifer
6.4 Updated Water Demand Projections
6.5 Climate Research on Impacts to Fish
6.6 Community Support through Public Outreach
6.7 Interactive Hydrologic Map
6.8 Comprehensive, Integrated Forecasting Model
6.9 Saltwater Intrusion Studies
6.10 Expanded Snowpack Study
6.11 Mitigating Potential Use of 4th Aquifer
6.12 Shallow Aquifer Recharge Effectiveness
6.13 Future Water Sourcing Studies

As a reliable source of vetted activities needed for prudent future water management, the WRTG report has been used by LWV water committee members to prioritize their ongoing efforts. To date, however, the recommended studies have not been advanced by local entities, other than 6.6 regarding outreach (which has been embraced by our water committee, Clallam Conservation District, WSU Extension and several others).

A quick look at the 13 topics deemed high priorities by the WRTG shows that there is great need for research and other activities pertinent to be well prepared for hazards including drought, decline of ambient water storage in the mountains, and wildfire. The LWV water committee strongly recommends that the WRTG report (including appendix) be reviewed for relevance in the Multi-Jurisdictional Hazard Mitigation Plan, and that resulting findings – including recommendations for research – be included in the final Plan and project lists.

Thank you for consideration of these comments of the LWV water committee. Please contact me at annsoule@olympus.net or Jeene Hobbs at jeenemarie@gmail.com with any questions.

Sincerely,

Ann Soule

Retired hydrologist and water resource planner
Chair, LWV Future of Water committee

Cc: Jeene Hobbs, Environmental Committee chair, Liaison with LWV council
LWV Future of Water committee
DRMT Exec Committee
BOCC

Appendix C.8: MJHMP Public Comment

A draft of the MJHMP was made available on the County webpage for the public to review and comment for a 2-week period beginning on December 4, 2024, and ending on December 31, 2024. The MJHMP was posted on the Clallam County website and emails were sent to notify the public of the opportunity to review the document. The MJHMP received six public comments on the draft plan.

Source	Comments	Response
Maureen McElravy, Clallam CO, WA	There are many reasons to retain all drinking water sources, any of which may be at risk from landslides, windstorms, sea level rise and earthquakes which can alter geology above and below ground aquifers. They can damage wells and other infrastructure whether it be pipelines, storage facilities and or treatment plants. The ever-increasing regulations requiring flows for fish passage, priority water rights and fire suppression as well as overuse by other systems drawing from the same aquifer or surface body should be considered, as well as contamination from known or unknown sources, malfunction of equipment, lack of maintenance and destruction of infrastructure whether those means be intentional or not are more reasons to protect and secure those sources. An additional source also provides greater capacity for growth and technologies that require more water or better water. It can be used in times of contamination, maintenance and repair of other sources. When other systems fail, those with ample sources can provide for others. It is also an allowed use for fire suppression, important to any area whether it be in a fire district or not. The WA State Dept of Drinking Water will no longer allow any new public systems that draw from surface waters regardless of the absence of risk from microbes. Water, particularly on the east side of the Olympics and shallow wells on the west are vulnerable to iron, manganese , reduced flows, salt water intrusion and capacity. The fact that so few responded to the survey should be evidence enough that the public has not been given proper notice. The groups that are allowed to participate are most likely composed of individuals with little to no experience of life here. The tribal members' livelihood is considered in this document, but those from multiple generations, young and old, with whom they share many aspects of culture and heritage are not. They too have and will suffer losses of property and more from the overreaching arm of government, lack of representation and like treatment. I might have had more to say if I had known of this proposal, so focus on two points today. My comments should be of great interest and consideration to the authors of this proposal and to the BOCC whose duties to provide for and protect its citizens will decide our fate. As a senior	Public engagement is described in detail in section 2.1.7 of the MJHMP and Appendix C. This included both meetings with the public and a website in which the public had an opportunity to comment throughout the process. Additionally, all HMCR Steering Committee minutes and presentations were made publicly available. The MJHMP Community Survey received 619 responses—considered a high response rate for the County's population—and a 13% increase from the 2019 HMP Community Survey (550 responses).

	member of a family long a part of the county and a director and part owner of a public water system, it is mine.	
The League of Women Voters of Clallam County (LWVCLA) Future of Water committee *(See attached)*	The League of Woman Voters of Clallam County established a committee to study aspects of Dungeness Basin water resources and how they are affected by climate change. This "Future of Water" committee of 8-10 LWVCLA members has been conducting a monthly series of open meetings studying existing plans and interviewing subject matter experts since early 2024. Pertinent to hazard mitigation planning, we focused this August-October on a public awareness campaign regarding drought effects on the Dungeness River with two "Low Flow Alert" roadside/trailside signs – one of which is featured in a photograph in section 4 of the draft plan. Another study area for the LWV water committee has been the recommendations put forward in 2022 by the Water Resources Technical Group (WRTG), a new subcommittee of the Dungeness River Management Team (DRMT, an advisory committee to the BOCC). The DRMT Executive Committee established the WRTG by inviting local water managers and hydrologists to identify and assess priority water resource management topics and studies in the context of current and future effects of climate change in the Dungeness Basin. The WRTG report includes a Summary1, listing areas of concern and 13 recommendations that should be considered by local, state and federal agencies and tribes for further efforts, and the Appendix2, which provides significant additional details for each recommendation including verbatim input from local and state experts. To start, the DRMT provided the WRTG with questions to consider in bolstering future water resources planning and preparation, including the following: • What is the most essential data/information to obtain? • What are the most essential technical studies? • What are the most essential management tools (new or updated)? Throughout spring of 2022, the WRTG identified, vetted, and fleshed out 13 priority water resources topics, listed below in the order they were discussed: • 6.1 Updated Ground Water Characterization • 6.2 Expanded Monitoring Programs • 6.3 Characterization of 4th Aquifer • 6.4 Updated Water Demand Projections • 6.5 Climate Research on Impacts to Fish	The County and Project team reviewed the comments and attachment provided, and accepted suggestions to modify both hazard mitigation project #16 and #17.

	• 6.6 Community Support through Public Outreach • 6.7 Interactive Hydrologic Map • 6.8 Comprehensive, Integrated Forecasting Model • 6.9 Saltwater Intrusion Studies • 6.10 Expanded Snowpack Study • 6.11 Mitigating Potential Use of 4th Aquifer • 6.12 Shallow Aquifer Recharge Effectiveness • 6.13 Future Water Sourcing Studies As a reliable source of vetted activities needed for prudent future water management, the WRTG report has been used by LWV water committee members to prioritize their ongoing efforts. To date, however, the recommended studies have not been advanced by local entities, other than 6.6 regarding outreach (which has been embraced by our water committee, Clallam Conservation District, WSU Extension and several others). A quick look at the 13 topics deemed high priorities by the WRTG shows that there is great need for research and other activities pertinent to be well prepared for hazards including drought, decline of ambient water storage in the mountains, and wildfire. **The LWV water committee strongly recommends that the WRTG report (including appendix) be reviewed for relevance in the Multi-Jurisdictional Hazard Mitigation Plan, and that resulting findings – including recommendations for research – be included in the final Plan and project lists**. 1 https://dungenessriverteam.org/wp-content/uploads/2023/07/Dungeness-Water-Resources-Planning-Recommendations-Summary-Report_Approved.pdf 2 https://dungenessriverteam.org/wp-content/uploads/2023/07/APPENDIX-to-Summary-Report_Approved.pdf	
Ian Miller	Comments provided via a PDF file of the MJHMP draft. 1) What an incredible document and effort! I am stunned and amazed by what is in here, and how it is organized and presented, especially given how fast the process was. 2) There were a few instances...some that I commented on and some that I didn't, where I was really craving some mapped presentations of data. Those kinds of things are hard to make, especially at this stage of a project, but I just wanted to raise it.	The County and project team accepted and incorporated all of the changes suggested in the PDF file Ian Miller provided. Additionally, the MJHMP Introduction section acts as an executive summary, including Table 1-1 which describes the changes

	3) Obviously, this document is HUGE, which led me to spend the entire time I was reviewing trying to think of suggestions for how to break out pieces for something like an executive summary, or a summary for policy-makers, or some kind of fact sheet that would break out the most relevant information for most readers, while leaving this volume available for the full documentation. Something like this is such a rich compendium of hazards information for the county, but really isn't accessible to the average Clallam County resident, so I started to think about how to facilitate that kind of access such that all of this insight becomes useful as an educational tool. 4) I could quibble on a few of the scores (the impact scores for tsunami in Port Angeles in Volume 2, for example), or rankings of a few of the projects, but trust the process. I was also surprised to see a few things missing...the big one in my mind is some link drawn between toxics storage at the base of Ediz Hook, and impacts associated with tsunamis or severe storms. I seem to recall us talking about that in a meeting, but might be making that up...and I also might have missed it. Not important...there is plenty in here to work with, but I've always viewed that as an important connection to draw for the county.	made from the 2019 MJHMP.
Jeff Tozzer *(See attached)*	This article summarizes my views about the drafted update to the Hazard Mitigation Plan. County leaders actively avoid public engagement and instead create a policy with a predetermined agenda. I also believe the Plan favors certain groups over other Clallam County residents based on special interest status. Please include this article in the public record as it is my comment. Mitigating public engagement	Public engagement is described in detail in section 2.1.7 of the MJHMP and Appendix C. This included both meetings with the public and a website in which the public had an opportunity to comment throughout the process. Additionally, all HMCR Steering Committee minutes and presentations were made publicly available. The MJHMP Community Survey received 619 responses—considered a high response rate for the County's population—and a 13% increase from the 2019 HMP Community Survey (550 responses).

Mark Ozias	CC01: Which of the three district public works sites? I wouldn't think any of the three are in tsunami zones. Are any of them in liquefaction or other seismic zones? If so, we should be more specific. Could this be referring to the Clallam Bay/Sekiu sewer treatment plant? (And if not, should we add that to the list?) CC06: Should this be expanded to all FD facilities across county, and/or wrapped in to our other wildfire planning work? CC09: Assuming this would encompass both public and private facilities, but should we be specific? For that matter, do we need to add any items specific to any of the irrigation ditching companies? CC10: Can we add doing an inventory/analysis of private water systems as an additional item (probably separate from this one?) DOH has a $50k-ish grant we can apply for that will provide us with a consolidation study and recommendations. CC17: This is too vague. It would be better to state that we need to first identify which areas we're talking about (making that its own action item if necessary) and then to develop infrastructure that would allow those alternate sources to be tapped when needed. It would also be important to differentiate between emergency sources of water and the more slowly-unfolding need to be more creative about water as population increases/moves and as supply declines. CC18: Does this need to be limited to just one or should we be shooting for several? CC20: Do we need to add language specific to food banks or other non-governmental partners? Also, this action item makes me think we should consider adding one relating to coordination with private industry, for example developing a mutual aid agreement of sorts so paperwork is in place when the emergency hits. Construction companies, heavy equipment operators, etc. CC28: This is one of my biggest worries and I think it might be helpful to be a bit more specific. ONP is certainly the biggest entity, but should we develop a separate action related to coordination with private businesses like hotels, campgrounds, RV parks, etc? Or our own county parks for that matter? Should we specifically mention the Forest Service? It might be worth breaking these down into several separate actions since the outreach to ONP will likely flow through different channels than ONF, DNR, etc.	The County and project team reviewed each of the comments on hazard mitigation projects and made all applicable changes suggested. The team also added two new hazard mitigation projects in response to these comments.

	CC30: Is the Elwha the only river we're interested in? There are likely others in the west end we could/should add to this list. More generally, • It might be helpful to break out and organize FD projects by district rather than having them scattered throughout the document. Also I am not sure why those are categorized as "Clallam County" projects vs. FDx projects. • Should we have an action item related to purchase/stockpile/storage of PPE and/or other basic medical supplies? • Do we want to specifically call out any school building retrofits or rebuilds related to seismic danger? • It doesn't appear the Port has any projects or action items related to the QV airport. Do we need to include any? • Could/should Clallam Transit be included as a jurisdiction of sorts? If so, perhaps we could build one or more action items related to fuel storage and/or bus infrastructure specific to cooling/warming. Or maybe a community resilience hub at Transit Centers and/or transit's home base up on Lauridsen? • Have we reached out to public health for their input? I don't really see any significant action items related to a public health hazard. • Is there anything more specific we can do around stockpiling basic medications? Would this effort warrant its own action item? • Have we looked into securing temporary bridges that could be deployed after an earthquake? Is this even a reasonable thought? • Could these actions be organized by category in any way? At least "climate resilience" actions together, and "emergency management" actions together? • Should we have one or more action items specific to food storage projects with food banks and/or other community partners? • Should we have any action items specific to outreach to the Developmental Disability community? • Should we have any action items specific to "supported housing" developments like those managed by PBH? • Should we have any action items specific to any other populations that might have special needs and/or require special considerations? • Should we add any action items specific to our jail? Perhaps listing seismic improvements or similar can help us apply for different funding sources. • Do we suspect we will have any issues with standardizing communication systems? I am specifically thinking about the Trump assassination attempt where some LE were	

	using radios and others were using text, resulting in a crucial lack of coordination when needed. If so, do we need to create an action item specific to ensuring all partners (including ONP, DNR, Tribes, etc.) have and use compatible communications equipment? • Would any projects need to be done to accommodate the new barges, to compliment the existing "create an MOU" item? • Is there any specialized equipment we might wish to have that could be included as an action item just in case a funding opportunity becomes available? For example, would we want to make sure that all fire districts, maybe some CERT teams, maybe others have one or more "gator" type vehicles that can be used when roads are out?	
Chip Keen	Mickey got in touch with me asking whether CCEM had incorporated the ShakeAlert Earthquake Early Warning system in the existing HMP. I told him "not to my knowledge." He put me in touch with Gabriel Lotto, who coordinates a number of outreach activities at PNSN - especially in regard to ShakeAlert. I asked Gabe for some specific examples of how ShakeAlert would be incorporated into a MJHMP. He sent me a link to the 404-page draft HMP being worked on by the City of Manhattan Beach, California. I've copied and pasted the references below.	The County and project team reviewed this suggestion and the attached example and added an action to seek grant funding to assess the ShakeAlert earthquake warning system.

Appendix D-1: HAZUS Technical Manual 6.0

Hazus Inventory Technical Manual

Hazus 6.0

November 2022

FEMA

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Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
ACS	American Community Survey
AEBM	Advanced Engineering Building Module
AGR	Agriculture
ASCE	American Society of Civil Engineers
ATC	Applied Technology Council
BEA	Bureau of Economic Analysis
BFE	Base Flood Elevation
BLS	Bureau of Labor Statistics
BUR	Built-Up Roof
C	Concrete
CBECS	Commercial Buildings Energy Consumption Survey
CCD	Community College District
CDE	California Department of Education
CDMS	Comprehensive Data Management System
CECB	Concrete, Engineered Commercial Building
CEIWR	USACE Institute for Water Resources
CERB	Concrete, Engineered Residential Building
CID	Community Identification Number
CIS	Community Information System
COM	Commercial
CONUS	Continental United States
CPI	Consumer Price Index
DHS	U.S. Department of Homeland Security
DOE	Department of Energy
EDU	Education
EF	Essential Facilities
EIA	Energy Information Administration
EOC	Emergency Operations Center

Acronym/ Abbreviation	Definition
EPA	Environmental Protection Agency
EQ	Earthquake
ESRI	Environmental Systems Research Institute
ETM+	Enhanced Thematic Mapper+ (Landsat)
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FHBM	Flood Hazard Boundary Map
FIPS	Federal Information Processing Standards
FIRM	Flood Insurance Rate Map
FFHAG	First Floor Height Above Grade
FL	Flood
ft	Feet
ft^2	Square Feet
FHWA	Federal Highway Administration
GBS	General Building Stock
GCS	Geographic Coordinate System
GEOID	Geographic Identifiers
GHIN	Global Hazards Information Network
GIS	Geographic Information Systems
GOV	Government
GS	Ground Shaking
HC	High-Code
HEC-FIA	USACE Hydrologic Engineering Center, Flood Impact Assessment
HIFLD	Homeland Infrastructure Foundation-Level Data
hp	Horsepower
HPL	High Potential Loss
HS	Special High-Code
HU	Hurricane
HUC	Hydrologic Unit Code
HUD	U.S. Department of Housing and Urban Development

Acronym/ Abbreviation	Definition
IND	Industrial
IPUMS	Integrated Public Use Series
IR	Income Ratio
km	Kilometer
kV	Kilovolt
kW	Kilowatt
Lidar	Light detection and ranging
LEHD	Longitudinal Household Employer Dynamic Database
LC	Low-Code
LS	Special Low-Code
M	Masonry
MC	Moderate-Code
MECB	Masonry, Engineered Commercial Building
MERB	Masonry, Engineered Residential Building
MGD	Million Gallons per Day
MH	Mobile Homes or Manufactured Housing
MLR	Masonry, Low-Rise
MMcf	Million Cubic Feet
MMUH	Masonry, Multi-Unit Housing
MPP	Map Production Pro
MR	Maintenance Release
MRLC	Multi-Resolution Land Characteristics Consortium
MS	Special Moderate-Code
MSF	Masonry, Single-family
MTFCC	Master Address File (MAF)/TIGER Feature Class Code
MW	Megawatts
NAICS	North American Industry Classification System
NBI	National Bridge Inventory
NEHRP	National Earthquake Hazards Reduction Program
NFHL	National Flood Hazard Layer

Acronym/ Abbreviation	Definition
NFIP	National Flood Insurance Program
NGA	National Geospatial-Intelligence Agency
NHGIS	National Historical Geographic Information System
NHRAP	FEMA Natural Hazards Risk Assessment Program
NIBS	National Institute of Building Sciences
NLCD	National Land Cover Database
NSI	National Structure Inventory
OCONUS	Outside of the Continental United States
ORNL	Oak Ridge National Laboratory
PC	Precast Concrete
PC	Pre-code
PDC	Pacific Disaster Center
PGD	Permanent Ground Deformation
PGV	Peak Ground Velocity
RCMP	Residential Construction Mitigation Program
REL	Religion/Non-Profit
RES	Residential
RM	Reinforced Masonry
S	Steel
SBT	Specific Building Type
sec	Second
SECB	Steel, Engineered Commercial Building
SERB	Steel, Engineered Residential Building
SFHA	Special Flood Hazard Areas
SFR	Single-family Residential
SIC	Standard Industrial Classification
SLTT	State, Local, Tribal, and Territorial
SLUA	Special Land Use Area
SP	Service Pack
SPM	Single-Ply Membrane

Acronym/ Abbreviation	Definition
SPM	School Planning & Management Magazine
SPMB	Steel, Pre-Engineered Metal Building
SR	Service Release
TFID	Topological Face Identifier
TIGER	Topologically Integrated Geographic Encoding and Referencing
TS	Tsunami
UDF	User-Defined Facilities
URM	Unreinforced Masonry
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
VHAMF	Veteran's Health Administration Medical Facilities
W	Wood
WBC	Wind Building Characteristic
WBD	Watershed Boundary Dataset
WMUH	Wood, Multi-Unit Housing
WSF	Wood, Single-family
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

Section 1. Introduction to the FEMA Hazus Loss Estimation Methodology

1.1 Background

The Hazus Loss Estimation Methodology provides state, local, tribal, and territorial (SLTT) officials with a decision support software for estimating potential losses from four natural hazards: floods (FL), hurricanes (HU), earthquakes (EQ), and tsunamis (TS). This loss estimation capability enables users to anticipate the consequences of natural hazard events and develop plans and strategies for reducing risk. The Geographic Information Systems (GIS)-based software can be applied to study geographic areas of varying scale with diverse population characteristics and can be implemented by users with a wide range of technical and subject matter expertise.

This Methodology has been developed, enhanced, and maintained by the Federal Emergency Management Agency (FEMA) to provide a tool for developing natural hazard loss estimates for use in:

- Anticipating the possible nature and scope of the emergency response needed to cope with disasters.
- Developing plans for recovery and reconstruction following a disaster.
- Mitigating the possible consequences of natural hazards.

The use of this standardized Methodology provides nationally comparable estimates that allow the federal government to plan natural hazard responses and guide the allocation of resources to stimulate risk mitigation efforts.

This *Hazus Inventory Technical Manual* documents the background information used to establish the baseline datasets provided within the Hazus software. The focus of this manual is the common inventory datasets used by all four individual natural hazard models to provide a single source document that avoids repeating information within the hazard-specific Technical Manuals. Together, these technical documents provide a comprehensive overview of this nationally applicable loss estimation methodology.

In addition to this *Hazus Inventory Technical Manual* and the four hazard-specific Technical Manuals, there are separate Hazus User Guidance documents for each of the four hazards and the Hazus Comprehensive Data Management System (CDMS) tool. Those documents outline the background and instructions for developing a Study Region and defining a scenario to complete a hazard-specific loss estimation study using Hazus. They also provide information on how to modify inventory and improve hazard data and analysis parameters for advanced applications, and how to calculate and interpret loss results.

1.2 Hazus Uses and Applications

Hazus can be used by various users with a wide range of needs for information. An SLTT government official may be interested in the costs and benefits of specific mitigation strategies and may want to know the expected losses if mitigation strategies have (or have not) been applied. Emergency response teams may use the results of a loss analysis in planning and performing emergency response exercises. In particular, they might be interested in the operating capacity of emergency facilities such as fire stations, emergency operations centers, and police stations. Emergency planners may want estimates of temporary shelter requirements for different disaster events. Federal and state government officials may require an estimate of economic losses (both short-term and long-term) in order to direct resources to affected communities after an event. Insurance companies may be interested in the estimated monetary losses, so they can assess asset vulnerability.

Natural hazard loss estimation analyses have a variety of uses for various departments, agencies, and community officials. As users become familiar with the loss estimation methodology, they can determine which Hazus Methodology is the most suitable for their needs, and how to appropriately interpret the results of the analysis.

1.3 Assumed User Expertise

Users can be divided into two groups: those who perform the analysis and those who use the analysis results. For some analyses, these two groups occasionally consist of the same people, but generally this will not be the case. However, the more interaction that occurs between these two groups, the better the analysis will be. End users of the loss estimation analysis need to be involved from the beginning to make results more usable.

Any risk modeling effort can be complex and would benefit from input of an interdisciplinary group of experts. A loss analysis could be performed by a representative team consisting of the following:

- Geologists
- Geotechnical engineers
- Structural engineers
- Architects
- Economists
- Meteorologists
- Wind engineers
- Civil engineers
- Hydrologists
- Social scientists
- Emergency planners
- GIS specialists
- Policy makers

The individuals needed to perform the analysis can provide valuable insight into the risk assessment process. For example, with the direct integration of probabilistic and deterministic earthquake ground motion data from the U.S. Geological Survey (USGS) into Hazus, defining earthquake hazard scenarios using authoritative data has become much easier. In addition to subject matter expert involvement, at least one GIS specialist should participate on the team.

If an SLTT agency is performing the analysis, some of the expertise may be found in-house. Experts are generally found in several departments: building permitting, public works, planning, public health, engineering, information technologies, finance, historical preservation, natural resources, and land records. Although internal expertise may be readily available, the importance of external participation of individuals from academic institutions, citizen organizations, and private industry cannot be underestimated.

1.4 When to Seek Help

The results of a loss estimation analysis should be interpreted with caution because baseline values have a great deal of uncertainty. Baseline inventory datasets are the datasets that are provided with Hazus. If the loss estimation team does not include individuals with expertise in the areas described above, it is advisable to retain objective reviewers with subject matter expertise to evaluate and comment on map and tabular data outputs.

If the user intends to modify the baseline inventory data or default parameters, assistance from a subject matter expert would benefit the project. For example, if the user wishes to change baseline percentages of specific building types for the region, collaborating with a structural engineer with knowledge of regional design and construction practices will be helpful. Similarly, if damage-motion relationships (fragility curves) need editing, input from a structural engineer will be required.

1.5 Technical Support

Technical Support contact information is provided in the Hazus application at **Help|Obtaining Technical Support**. Technical assistance is available via the Hazus Help Desk by email at FEMA-Hazus-support@fema.dhs.gov (preferred) or by phone at 1-877-FEMA-MAP (1-877-336-2627). The FEMA Hazus website also provides answers to frequently asked questions, and information on software updates, training opportunities, and upcoming webinars.

FEMA-provided resources also include the Hazus Virtual Training Library, a series of short videos arranged into playlists that cover various Hazus topics, from an introduction to Hazus methodologies, to targeted tutorials on running Hazus analyses, to best practices when sharing results with decision makers. This easily accessible learning material provides quick topic refreshers, free troubleshooting resources, and engaging guides to further Hazus exploration.

The application's **Help** menu references the help files for ArcGIS. Since Hazus was built as an extension to ArcGIS functionality, knowing how to use ArcGIS and the ArcGIS Help Desk will help Hazus users.

Technical support on any of the four hazards is available at the contacts shown via **Help|Obtaining Technical Support**.

1.6 Uncertainties in Loss Estimates

Although the Hazus software offers users the opportunity to prepare comprehensive loss estimates, it should be recognized that uncertainties are inherent in any estimation methodology, even with state-of-the-art techniques. Any region or city studied will have an enormous variety of buildings and facilities of different sizes, shapes, and structural systems built over a range of years under varying design codes. A variety of components contribute to transportation and utility system damage estimations in certain hazard models.

There are also insufficient comprehensive data from past events or laboratory experiments to determine precise estimates of damage based on different measures of hazard severity, such as known ground motions, flood depths, or wind speeds. To deal with this complexity and lack of data, buildings and components of systems are grouped into categories based on key characteristics. The relationships between measures of hazard severity and average degree of damage with associated losses for each building category are based on current data and available theories.

The results of a natural hazard loss analysis should not be looked upon as a prediction. Instead, they are only an estimate, as uncertainty inherent to the model will be influenced by quality of inventory data and the hazard parameters.

1.7 Hazus Versions and Inventory Status

Table 1-1 below lists each of the Hazus versions and any major changes to baseline inventory data with each release.

Table 1-1 Hazus Versions and Inventory Data[1]

Hazus Version	Release Date	Hazards	Inventory Summary	Replacement Value Model Year
HAZUS97	1997	EQ	1990 Census data, Earthquake added using Census tracts	1994
HAZUS99	Dec. 1999	EQ	1990 Census data	1994
HAZUS99 SR1	2001	EQ	1990 Census data	1994
HAZUS99 SR2	Mar. 2002	EQ, FL	1990 Census data, Flood added using Census blocks	1994
HAZUS-MH 1.0	Jan. 2004	EQ, FL, HU	2000 Census data, Hurricane added using Census tracts	2002
HAZUS-MH MR1	Jan. 2005	EQ, FL, HU	2000 Census data	2002
HAZUS-MH MR2	May 2006	EQ, FL, HU	2000 Census data	2005
HAZUS-MH MR3	July 2007	EQ, FL, HU	2000 Census data, CDMS added	2006
HAZUS-MH MR4	Aug. 2009	EQ, FL, HU	2000 Census data	2006
HAZUS-MH MR5	Dec. 2010	EQ, FL, HU	2000 Census data	2006
Hazus-MH 2.0	Jun. 2011	EQ, FL, HU	2000 Census data, storm surge added (with Hurricane using Census block for analysis)	2006
Hazus-MH 2.1	Feb. 2012	EQ, FL, HU	2000 Census data	2006

Hazus Version	Release Date	Hazards	Inventory Summary	Replacement Value Model Year
Hazus 2.2	Jan. 2015	EQ, FL, HU	2010 Census data	2014
Hazus 2.2 SP1	May 2015	EQ, FL, HU	2010 Census data, optional dasymetric for flood	2014
Hazus 3.0	Nov. 2015	EQ, FL, HU	2010 Census data, dasymetric as default for flood	2014
Hazus 3.1	Apr. 2016	EQ, FL, HU	2010 Census data	2014
Hazus 3.2	Oct. 2016	EQ, FL, HU	2010 Census data	2014
Hazus 4.0	Mar. 2017	EQ, FL, HU, TS	2010 Census data, Tsunami added using National Structure Inventory (NSI) data (with new data in territories)	2014[2]
Hazus 4.2	Jan. 2018	EQ, FL, HU, TS	2010 Census data	2014[2]
Hazus 4.2 SP1	May 2018	EQ, FL, HU, TS	2010 Census data	2018[2]
Hazus 4.2 SP2	Feb. 2019	EQ, FL, HU, TS	2010 Census data	2018[2]
Hazus 4.2 SP3	May 2019	EQ, FL, HU, TS	2010 Census data, update of Essential Facilities with Homeland Infrastructure Foundation-Level Data (HIFLD) data	2018[2]
Hazus 4.2 SP3 Tools and Data	Dec. 2019	EQ, FL, HU, TS	2010 Census data; updated PR and VI data to work with EQ, FL, TS (FEMA, 2019); update of Essential Facilities and some Transportation and Utility Facility data with HIFLD data	2018[2]
Hazus 5.0	Apr. 2021	EQ, FL, HU, TS	2010 Census data, Hurricane modeling capabilities and coastal flood modeling added to PR and VI (FEMA, 2021a), added metadata for all previous 2019 HIFLD updates	2018[2]
Hazus 5.1	Oct. 2021	EQ, FL, HU, TS	2010 Census data, Essential Facilities and some Transportation and Utility Facility data with HIFLD data	2018[2]
Hazus 6.0	Nov. 2022	EQ, FL, HU, TS	2020 Census data, NSI 2022, dasymetric geometries, update of Essential Facilities and some Transportation and Utility Facilities with HIFLD Open data	2022

[1]EQ=Earthquake, FL=Flood, HU=Hurricane, TS=Tsunami, SR=Service Release, MR=Maintenance Release, SP=Service Pack.

[2]Prior to Hazus 6.0, NSI Data for Guam, American Samoa, and Northern Mariana Islands used the 2016 replacement value model.

Section 2. Introduction to Inventory Data

This brief overview of the Hazus Inventory Data is intended to provide general background on natural hazard modeling and how inventory data has been developed in the Hazus program.

The Hazus Methodologies will generate an estimate of the consequences to a city or region from a natural hazard scenario or from a probabilistic hazard. The resulting "loss estimate" will generally describe the scale and extent of damage and disruption that may result from a potential event. The following information can be obtained:

- *Quantitative estimates of losses* in terms of direct costs for repair and replacement of damaged buildings and system components, direct costs associated with loss of function (e.g., loss of business revenue, relocation costs), casualties, household displacements, and quantity of debris.
- *Functionality losses* in terms of loss of function and restoration times for critical facilities such as hospitals, components of transportation and utility systems, and simplified analyses of loss of system function for electrical distribution and potable water systems.
- *Extent of induced hazards* in terms of exposed population and building value due to potential fire following an earthquake.

To generate this information, the Hazus Methodology contains baseline inventory data, including:

- Classification systems used in assembling inventory and compiling information on the building stock, the components of transportation and utility systems, and demographic and economic data.
- Standard calculations for estimating type and extent of damage, and for summarizing losses.
- National and regional databases containing information for use as baseline (built-in) data useable in the calculation of losses if there is an absence of user-supplied data.

These systems, methods, and data have been combined in a user-friendly GIS software for this loss estimation application.

The Hazus software uses GIS technologies for performing analyses with inventory data and displaying losses and consequences on applicable tables and maps. The Methodology permits estimates to be made at several levels of complexity, based on the level of inventory entered for the analysis (i.e., baseline data versus locally enhanced data). The more concise and complete the inventory information, the more accurate the results.

The Methodology to conduct a Hazus analysis incorporates inventory collection and hazard identification into the natural hazards impact assessment. For example, the steps used in the Earthquake Model are as follows:

- *Select the area to be studied.* The Hazus Study Region (the region of interest) is created based on Census tract, county, or state level aggregation of data. The area generally includes a city, county, or

group of municipalities. It is generally desirable to select an area that is under the jurisdiction of an existing regional planning group.

- *Specify the earthquake hazard scenario.* In developing the scenario earthquake, consideration should be given to credible earthquake sources and potential fault locations using the USGS and Hazus datasets, or subject matter experts.

- *Provide information on local soil and geological conditions, if available.* Soil characteristics include site classification according to the National Earthquake Hazards Reduction Program (NEHRP) and susceptibility to landslides and liquefaction. Note that soil characteristics are not required when using a USGS ShakeMap.

- *Integrate local inventory data.* Include essential facilities, systems, General Building Stock, or user-defined facilities.

- *Use the formulas embedded in Hazus*. Compute probability distributions for damage to different classes of buildings, facilities, and system components. Then, estimate the loss-of-function.

- *Compute estimates of direct economic loss, casualties, and shelter needs* using the damage and functionality information.

- *Estimate fire risks following earthquake impacts*, such as the number of ignitions and extent of fire spread.

- *Estimate the amount and type of debris.*

The user plays a major role in selecting the scope and nature of the output of a loss estimation analysis. A variety of maps can be generated for visualizing the extent of the losses. Generated reports provide numerical results that may be examined at the level of the Census block or tract or aggregated by county or region.

2.1 Inventory Data Overview

An important requirement for estimating losses is the identification and valuation of the building stock, systems, and population exposed to a hazard, i.e., an inventory. Consequently, Hazus includes a comprehensive inventory for use in estimating losses. This inventory serves as the baseline when the users of the model do not have better data available. The inventory data represent the General Building Stock for the continental United States, Alaska, Hawaii and the U.S. Territories and also includes demographic information. Additionally, the model contains national data for essential facilities and systems. This inventory is used to estimate damage and the direct economic losses for the General Building Stock or the associated impact to functionality for essential facilities, transportation systems and utility systems.

There are differences in the terminology used to distinguish between types or categories of structures. The term “structure” refers to all constructions, such as a building, bridge, water tank, shed, carport, or other man-made thing that is at least semi-permanent. A building is a structure with a roof and walls

that is intended for use by people and/or inventory and contents, such as a house, school, office, or commercial storefront. A facility corresponds to a particular place, generally a building, with an intended purpose, such as a school, hospital, electric power station, or water treatment facility. Some facilities are defined as "essential facilities" meaning the facility is critical to maintaining services and functions vital to a community, especially during disaster events. The buildings, essential facilities, and transportation and utility systems considered by the Hazus Methodology are as follows:

- *General Building Stock:* The key General Building Stock databases in Hazus include building area (calculated as square footage) by occupancy and building type, building count by occupancy and building type, building and content valuation by occupancy and building type, and general occupancy mapping. Most of the commercial, industrial, and residential buildings in a region are not considered individually when calculating losses. Buildings within Census subdivisions (either Census tract or block, depending on the hazard) are aggregated and categorized. Building information derived from NSI data, USA Structures and other best-available public sources are used to form groups of specific building types for each hazard and 33 occupancy classes. Degree of damage is computed for each grouped combination of specific building type and occupancy class.

- *Essential and high potential loss facilities*: Essential facilities are those facilities vital to emergency response and recovery following a disaster. They can include medical care facilities, police and fire stations, emergency operations centers (EOC), and schools. For this class of structures, damage and loss-of-function are evaluated on a building-by-building basis. There may be significant uncertainties in each estimate and the losses are intended to help prioritize mitigation strategies including future studies. Essential facilities may also include high potential loss facilities. These facilities include dams and levees, nuclear power plants, and military installations; however, with the exception of military facility data in Puerto Rico and the U.S. Virgin Islands, these kinds of high potential loss facility data are not included in the baseline Hazus inventories.

- *Transportation systems*: Transportation systems, including highways, railways, light rail, bus systems, ports, ferry systems, and airports, are classified into components such as bridges, stretches of roadway or track, terminals, and port warehouses. Dependent on the hazard, probabilities of damage and losses are computed for each component of the system but total system performance is not evaluated, and cascading impacts from one system to another are not analyzed.

- *Utility systems*: Utility systems, including potable water, electric power, wastewater, communications, and liquid fuels (oil and gas), are treated in a manner like transportation systems. Dependent on the hazard, probabilities of damage and losses are computed for each component of the system but total system performance is not evaluated, and cascading impacts from one system to another are not analyzed.

2.2 Level of Analysis

Hazus is designed to support two general types of analysis, Basic and Advanced, split into three levels of data updates (Levels 1, 2, and 3). Figure 2-1 provides a graphic representation of the various levels of analysis.

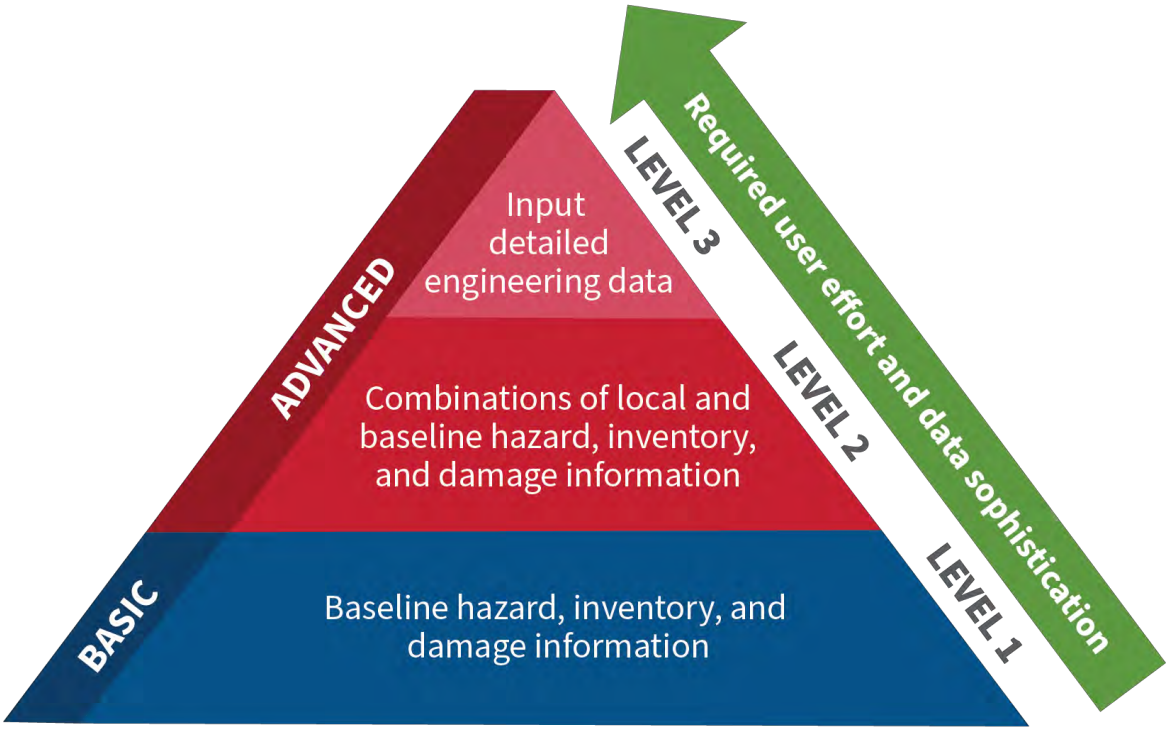

Figure 2-1 Level of Hazus Analysis

2.2.1 Analysis Based on Baseline Information

The basic level of analysis uses only the baseline databases built into the Hazus software and Methodology for building area and value, population characteristics, costs of building repair, and certain basic economic data. This level of analysis is commonly referred to as a Level 1 analysis. In a basic analysis (Level 1), hazard data is uniformly applied or generated from minimal input data and applied to the baseline inventory data with little to no user modification. Direct economic and social losses associated with the General Building Stock and essential facilities are computed. Baseline data for transportation and utility systems are included; thus, these systems are considered in the basic level of analysis. There is a significant level of uncertainty pertaining to the estimates and this basic analysis is only available in certain hazard models. However, with recent Hazus inventory updates, significant improvements to baseline inventories and application of hazard data continue to enhance the quality of the baseline loss estimates.

Other than defining the Study Region, selecting hazard information, and making decisions concerning the extent and format of the output, an analysis based on baseline data requires minimal effort from the user. As indicated, the estimates involve large uncertainties when inventories are limited to the baseline data. This level of analysis is suitable primarily for preliminary evaluations and comparing losses across jurisdictions or regions or Census blocks. A basic Level 1 analysis could be used for comparisons and preliminary evaluations to assist in identifying potential mitigation actions within a community, which could be useful if prioritizing mitigation strategies for mitigation planning based on the potential to reduce losses and risk.

2.2.2 Analysis with User-Supplied Inventory

Results from an analysis using only baseline inventory can be improved upon greatly with at least a minimum amount of locally developed input. Improved results are highly dependent on the quality and quantity of improved inventory data. The significance of the improved results also relies on the user's analysis priorities. This level of advanced analysis is commonly referred to as a Level 2 or Level 3 analysis. The following inventory improvements impact the accuracy of Level 2 and Level 3 advanced analysis results:

- Use of locally available data or estimates of the square footage of buildings in different occupancy classes.
- Use of local expertise to modify (primarily by professional judgment) the databases that determine the percentages of specific building types associated with different occupancy classes.
- Preparation of a detailed inventory of all essential facilities.
- Collection of detailed inventory and cost data to improve evaluation of losses and lack of function in various transportation and utility systems.
- Use of locally available data concerning construction costs or other economic parameters.
- Compilation of information concerning high potential loss facilities.

Section 3. General Building Stock: Spatial Data

Each of the four hazard models in Hazus uses a different baseline spatial approach to apply General Building Stock data.

- Earthquake and hurricane modeling are typically performed at the Census tract geometry.
- Flood modeling is performed at the Census block with geometries enhanced to represent developed areas to better reflect the geographic scale sensitivity of flood hazards.
- Tsunami modeling is performed using NSI 2022 point data distributed in the Census blocks representation.

The development of Hazus General Building Stock data has changed over time as more hazards were modeled and geographic coverage expanded to the territories.

- For the Earthquake Model, Hazus supports Study Regions and analysis in all 50 states, District of Columbia, Puerto Rico and the U.S. Virgin Islands.
- For the Flood Model, Hazus supports Study Regions and analysis in all 50 states, District of Columbia, Puerto Rico and the U.S. Virgin Islands. Hazus Level 1 Riverine Flood analysis limitations exist with Puerto Rico, U.S. Virgin Islands, Alaska, and Hawaii except Oahu due to lack of regional regression equations.
- For the Hurricane Model, Hazus supports Study Regions and analysis in Hawaii, Puerto Rico, U.S. Virgin Islands, and the 20 Atlantic and Gulf of Mexico states that fall within the American Society of Civil Engineers (ASCE) High Wind Zone (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, West Virginia, District of Columbia, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas).
- For the Tsunami Model, Hazus supports Study Regions and analysis in five very high-risk states on the Pacific coast (Hawaii, Alaska, Washington, Oregon, California) and five high risk territories (Puerto Rico, U.S. Virgin Islands, Guam, American Samoa and Northern Mariana Islands).

This section summarizes Hazus inventory information based on the different types of General Building Stock spatial data, all of which will be described in greater detail later in this section:

- *Census Boundary Data:* These data relate to Hazus's use of slightly modified (clipped for water features) baseline U.S. Census boundaries at the tract and block subdivision levels with tract centroids adjusted based on developed areas.
- *Dasymetric Data:* These block-level data, also primarily based on the U.S. Census boundaries, have been modified based on land cover and building footprint data to include those areas where structures are to be found. Dasymetric data serve as the analysis basis for the Hazus Flood Model.

- *Homogeneous Boundaries:* Homogeneous area boundaries are based on the original (clipped) U.S. Census block and tract features and are not limited to the developed areas reflected in the dasymetric data. They are referred to as "homogeneous" based on the assumption that the underlying Census data is uniformly distributed throughout the entirety of the Census block or tract. The homogeneous boundary datasets are used for Study Region aggregation for all hazards.

- *Community Boundary Data:* Community boundary data, utilized primarily by the Hazus Flood Model, include boundaries for local jurisdictions/communities, tribal areas and Special Land Use Areas (SLUAs).

- *Approximate Site-Level Data:* These site-level data approximated by points were developed using data from the NSI (USACE, 2022) for the U.S. states and FEMA Natural Hazards Risk Assessment Program (NHRAP) for the U.S. territories takes a different approach to identifying structure locations by distributing structure coordinates (points) within the developed areas of Census blocks. Table 1-1, shown earlier in this document, describes Hazus versions and includes information on when each of these spatial data types was first introduced in Hazus.

3.1 Census Boundary Data

Census blocks, the smallest geographic area for which the Bureau of the Census collects and tabulates decennial Census data, were formed by streets, roads, railroads, streams and other bodies of water, other visible physical and cultural features, and the legal boundaries shown on Census Bureau maps. Conceptually, a Census block can be thought of as a unit with roughly the population of a city block. However, there is no official minimum population for a Census block (almost half have zero population), and the original 1990 minimum size of 30,000 square feet can be overwritten, when it makes sense, by bounding features. There is also no maximum size for a Census block, so in low population rural areas Census blocks can be several to hundreds of square miles. In Hazus, the dasymetric blocks include only the developed areas and average just 0.03 square kilometers with a maximum of 10.6 square kilometers and a sum of the entire developed area for all U.S. (inclusive of the territories and DC) regions combined of about 225,000 square kilometers. To implement Census blocks (and other Census boundaries such as tracts) within a database environment, the Census Bureau made use of Geographic Identifiers (GEOIDs) to establish a unique naming convention to apply to different geographic areas. In Hazus, the most common GEOIDs used are Census blocks (15-digit code), Census tracts (11-digit code), and counties (5-digit code). More information on Census boundaries and the use of GEOIDs can be found at Census Bureau (2018) as listed in Section 11 of this document.

The baseline General Building Stock spatial data for the Earthquake and Hurricane Models use the 2020 Census tracts. The 2020 Census blocks are the original baseline General Building Stock spatial data for flood, and for when a combined storm surge analysis is conducted using both hurricane and flood. Tract and block data are clipped using the water features from the U.S. Census Bureau Topologically Integrated Geographic Encoding and Referencing (TIGER) Areal Hydrography Geodatabase and updated using the developed areas from the dasymetric processing.

The 2020 Census uses about 8 million Census blocks across the entire United States and its territories. This is about a 27% decrease from the number of blocks used in the 2010 Census. Almost every state

and territory saw a substantial reduction in total Census blocks, with only Rhode Island gaining in total Census blocks (+2%). This redistricting and consolidation of blocks required a complete regeneration of the Census block boundaries. In addition to incorporating the 2020 Census boundaries, the process refined representation of coastal boundaries and removed all water body blocks. As will be described in the next section, the baseline Census block boundary data has been further clipped or removed based on building data and land use, known as dasymetric data, for use in flood and storm surge analyses and distribution of the building points used in Tsunami analysis. Following this process some 6.8 million Census blocks are used in Hazus.

There are some data maintenance considerations Hazus users should keep in mind related to Census boundary data:

- *Boundary changes.* Many boundaries, especially at the Census block level, change over time. For areas with high growth, each decadal Census might alter existing tracts and blocks, both adding new features and changing spatial boundaries. There is not a simple 1-to-1 relationship between any two sets of Census data from different decennial Census. Even county-level information may change over time with new counties being created or old counties being merged and renamed. Also, modern surveying methods can correct past errors and alter county and sometimes state boundary data over time.

- *Census updates.* While new Census boundary data are often available prior to each Census, the associated detailed tabular data for population counts that is used by Hazus typically is not released until years after each Census. Therefore, Hazus Census-related data may not be updated until the data becomes available following each Census.

Some elements in the General Building Stock baseline database are established from Census Bureau sources that are at a courser resolution than individual state data. Table 3-1 displays the lists of states within Census regions and divisions. Territories are assigned to a Census Region but are not assigned to Census divisions.

Table 3-1 Census Regions and Divisions

Census Region	Census Division	States/Territories
Northeast	New England	CT, MA, ME, NH, RI, VT
Northeast	Middle Atlantic	NJ, NY, PA
Midwest	East North Central	IL, IN, MI, OH, WI
Midwest	West North Central	IA, KS, MN, MO, ND, NE, SD
South	South Atlantic	DC, DE, FL, GA, MD, NC, PR, SC, VA, VI, WV
South	East South Central	AL, KY, MS, TN
South	West South Central	AR, LA, OK, TX
West	Mountain	AZ, CO, ID, MT, NM, NV, UT, WY
West	Pacific	AK, AS, CA, GU, HI, MP, OR, WA

3.2 Dasymetric Data

Several types of input data sources were used to build the national dasymetric dataset, including geographic boundaries supplied by the U.S. Census Bureau, a land cover classification raster, and multiple sources of national building footprint spatial datasets. This data, detailed in Table 3-2, was used to more accurately define developed area in the final dasymetric output.

Table 3-2 Dasymetric Input Data

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage
Microsoft Bing Building Footprints Dataset	2018	Microsoft	Microsoft - open building footprints for the U.S., actual imagery dates vary.	Continental United Stated (CONUS)
National Land Cover Database (NLCD)	2019	Multi-Resolution Land Characteristics Consortium (MRLC)	Nationwide data on land cover at a 30 meter resolution with a 16-class legend based on a modified Anderson Level II classification system.	CONUS
NSI 2022	June 2022	USACE	Point-based structure inventories. Developed from Lightbox Parcel, NGA lidar, USA Structures and Bing footprints.	AK, HI, CONUS except DC
U.S. Territories Building Footprint Dataset	2018	FEMA NHRAP	Lidar-based polygon building footprints. AS lidar sourced from NOAA (2012). GU lidar sourced from USGS (2012-13) and parcel data from 2007. MP lidar sourced from USACE (2007) and parcel data from 2006.	AS, GU, MP
U.S. Territories Building Point Dataset	2018	FEMA NHRAP	Additional lidar-based point file.	GU
PR Building Footprint Dataset	2015	FEMA NHRAP	2015 USGS lidar-based building footprints, reprocessed in 2020 to remove slivers and duplicates.	PR
VI Building Footprint Dataset	2013	FEMA NHRAP	2013 USGS lidar-based building footprints, reprocessed in 2020 to remove slivers and duplicates.	VI

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage
USA Structures Dataset	2021	Department of Homeland Security, Federal Insurance and Mitigation Administration, FEMA's Response Geospatial Office, Oak Ridge National Lab (ORNL), USGS	Building footprints extracted from aerial imagery ranging in dates, urban areas are supplemented with National Geospatial-Intelligence Agency (NGA) lidar.	All U.S.
U.S. Census Bureau TIGER Areal Hydrography Geodatabase	2021	U.S. Census Bureau	Geometry and attributes of both perennial and intermittent area hydrography features.	All U.S.
U.S. Census Bureau TIGER Census Blocks Geodatabase	2021	U.S. Census Bureau	A geodatabase that contains all Census blocks for the nation.	All U.S.
U.S. Census Bureau TIGER Census Tract Layer	2021	U.S. Census Bureau	A layer containing all Census tracts for the nation.	All U.S.
U.S. Census Bureau TIGER Coastline National Shapefile	2021	U.S. Census Bureau	A shapefile containing coastline features.	All U.S.
U.S. Census Bureau TIGER County Layer	2021	U.S. Census Bureau	A layer containing all counties for the nation.	All U.S.
U.S. Census Bureau TIGER Faces County Files	2021	U.S. Census Bureau	These topological faces shapefiles contain the attributes of each topological primitive face. Each face has a unique topological face identifier (TFID) value.	All U.S.

To support the development of the national dasymetric dataset, a dedicated PostgreSQL database environment and custom dasymetric processing code was established. Using a relational database with spatial capabilities to process the necessary data in combination with dasymetric business logic code provides several benefits including ease of methodology implementation, better quality control, and repeatability. Figure 3-1 provides an example of new dasymetric Census blocks in Hazus 6.0 compared to the traditional 2020 U.S. Census blocks and world imagery.

Figure 3-1 Example of New Dasymetric Census Blocks in Hazus 6.0

Census blocks which contain only water were removed from input into the dasymetric processing of the TIGER Census block boundaries. The field "ALAND20" gives the total land area of the Census block. If this field value was zero, no dasymetric geometry was created for the Census block.

The 2019 NLCD raster pixels associated with the remaining Census blocks were identified for each Census block. The intersection of the input USA Structures dataset and the Census blocks were then used to identify NLCD pixels which included developed area based on building presence. If any pixel intersecting the USA Structures footprint had a value of 11 (indicating the land cover classification Open Water), that building was not used to create dasymetric geometry. Otherwise, pixels intersecting the footprint were marked for inclusion in further processing. This same process was then performed using the input Microsoft Bing Building Footprint and Census block intersection. At this point if the Census block had no marked pixels for the USA Structures and Microsoft Bing building footprints, all NSI locations for the Census block were evaluated to determine if they were valid locations. Otherwise, the NSI 2022 dataset was filtered to exclude points with a questionable source (NSI attributes: Source = 'X' and Ftprntsrc = 'Null'). The NSI point was then buffered by a radius extrapolated from the square footage of the building as denoted by the point's attributes. The resulting polygon was then used in the same way as the other building footprints to include the pixel for processing if the polygon did not intersect an Open Water pixel.

For the U.S. territories (American Samoa, Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands), the datasets identifying input buildings were each spatially intersected with the Census block polygons to establish a building-Census block relationship. These datasets were the USA Structures dataset, the U.S. Territories Building Footprint dataset, and U.S. Territories Building dataset. The U.S. Virgin Islands did not utilize the USA Structures dataset and only used the U.S. Territories Building dataset. USA Structures and U.S. Territories Building datasets were each spatially intersected with the water bodies in the 2021 TIGER Area Hydrography layer to establish a building-water body relationship. Any building footprint polygons in Puerto Rico specifically that intersected a water body of

MTFCC type “Stream/River” were filtered out of the dataset. This filtering was performed due to errors in the building source data where boats or piers may have been identified as buildings. All other territories utilized the same MTFCC filtering applied for the 50 states and the District of Columbia. A set of specific building attribute IDs were filtered out of inputs for American Samoa, Northern Mariana Islands, and the U.S. Virgin Islands, as they were identified as non-building objects such as pools, solar panels, bridges, or tanks.

Raster grids for each territory were created at a 30 meter resolution to emulate the NLCD 30 meter resolution grid used for the 50 states and the District of Columbia. After water-only Census blocks were removed, the raster pixels associated with the remaining Census blocks were identified. Pixels intersecting the USA Structures building footprints were marked for inclusion in further processing. This same process was then performed using the U.S. Territories Building Footprint dataset, U.S. Territories Building dataset and Census block intersection. For Guam specifically, the U.S. Territories Building Point Dataset identified buildings not captured in the U.S. Territories Building Footprint polygon dataset. After the U.S. Territories Building Point dataset was intersected with the Census block polygons, if the Guam points did not intersect a pixel already identified as USA Structures, then the point was buffered by a radius of 6 meters. The resulting polygon was then used in the same way as the other building footprints to include the pixel for processing.

For the entire national dataset, all marked pixels for a Census block were unioned and then the Census block boundary was used to clip the unioned shape to generate the final product, the Census block dasymetric geometry. The area associated with each Census block dasymetric geometry was calculated in the WGS84 geographic coordinate system (GCS) with the appropriate Universal Transverse Mercator (UTM) zone projection.

For more detailed information on specific processes used to implement this methodology, please contact the Hazus Help Desk to request further documentation (see Section 1.5).

3.2.1 Centroid Calculation

The Census block centroid was determined as the central point of the dasymetric area of the block. If the true centroid, the actual central point of the Census block regardless of Census boundaries, falls outside of the associated native TIGER Census block, the centroid was regenerated to be placed within the associated block boundary. During hurricane modeling efforts, 76 CONUS tract centroids and 17 tract centroids outside of the Continental United States (OCONUS) were updated. These adjustments were needed to support the Hazus wind model requirements that centroids are located inland of the coastline used for wind speed model calculations.

3.3 Homogenous Boundaries

Hazus historically used Census data that was uniformly (homogeneously) distributed throughout a Census block. Unlike dasymetric, homogenous boundaries include undeveloped areas and align with Census boundaries. The homogeneous boundary datasets are used for Study Region aggregation for all hazards and serve as the analysis basis for the Hazus Earthquake Model. The Hurricane Model uses

both homogeneous boundaries and dasymetric data. The Flood Model and Tsunami Model use the dasymetric block data.

TIGER 2021 native boundaries (Census block, Census tract and County) were primarily used for the hzBlock_TIGER, hzTract and hzCounty shapes except for modifications made in the vicinity of large lakes and coastal regions. Modified boundary shapes were created by first utilizing the 2021 TIGER Areal Hydrography dataset to identify and remove faces from the 2021 TIGER Faces dataset which intersect lakes larger than 500 square miles in area. Faces whose centroid intersected either the USGS National Boundary polygons (CONUS, Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands) or the 2020 TIGER Coastline represented as polygons (American Samoa, Guam, and the Northern Mariana Islands) were also removed. The remaining faces were then aggregated to the Census block-, tract-, and county-levels to produce the modified homogenous block, tract, and county boundaries. Table 3-3 describes the fields and data sources used.

Table 3-3 Geodatabase Field Descriptions - hzCensusBlock and hzCensusBlock_Tiger

Field Name	Data Source	Description
OBJECTID	Hazus Program Generated	The national TIGER 2021 Census block data was loaded into a dedicated PostgreSQL database environment. These data records were ordered by statefp20, countyfp20, tractce20, and blockfce20 and had a unique identifier applied (hazus_object_id). This “internal” Census block-level hazus_object_id is the value that is being displayed in the OBJECTID field.
Shape	Hazus Program Generated	The dasymetric shape generated from business logic contained in the dasymetric area generation tool. Shape is provided in GCS WGS84.
CensusBlock	TIGER 2021 Census Block	The TIGER 2021 Census block geoid20 value; it is a unique identifier.
Tract	TIGER 2021 Census Block	A concatenation of the Census block’s statefp20, countyfp20 and tractce20 values.
BldgSchemesId	Hazus Program Generated	Building scheme unique ID, assigned at the County level. See *Hazus Earthquake Model Technical Manual* (FEMA, 2022a) for more information.
BlockType	Hazus Program Generated	Indicated Coastal, Riverine or Lake block assignments used for flood mapping schemes. See Section 5.6.1 and Section 5.6.3for more information.

Field Name	Data Source	Description
BlockArea	Hazus Program Generated	The area of the dasymetric block shape was calculated using UTM. To determine the appropriate UTM zone parameters for this calculation, the TIGER 2021 Census block internal point longitude value (intptlon20) was used. Each dasymetric block shape was projected to its appropriate UTM zone and then the area was calculated and stored in square meters using 4 decimal places. The value displayed in the BlockArea field has been converted to square kilometers representing the developed area only.
CenLat	Hazus Program Generated	Coordinate of the centroid latitude; it is in the GCS WGS84.
CenLongit	Hazus Program Generated	Coordinate of the centroid longitude; it is in the GCS WGS84.
PctWithBasemnt[1]	EIA (2009)	Percentage of buildings with an Occupancy code of RES1 that have a basement (see Table 6-8).
Pct1StoryRes1[1]	EIA (2009)	Percentage of buildings with an Occupancy code of RES1 that are 1 Story (see Table 6-9).
Pct2StoryRes1[1]	EIA (2009)	Percentage of buildings with an Occupancy code of RES1 that are 2 Story (see Table 6-9).
Pct3StoryRes1[1]	EIA (2009)	Percentage of buildings with an Occupancy code of RES1 that are 3 Story (see Table 6-9).
PctSplitLvlRes1[1]	EIA (2009)	Percentage of buildings with an Occupancy code of RES1 that are Split Level (see Table 6-9).
Pct1to2StryRes3[1]	EIA (1997)	Percentage of buildings with an Occupancy code of RES3A - RES3F that are 1 to 2 Story buildings. Used in precompiled flood mapping schemes from [flTmpDB].[dbo].[flGBSDistRes].
Pct3to4StryRes3[1]	EIA (1997)	Percentage of buildings with an Occupancy code of RES3A - RES3F that are 3 to 4 Story.
Pct5StryplusRes3[1]	EIA (1997)	Percentage of buildings with an Occupancy code of RES3A - RES3F that are 5 Story or more.
PctLowRiseOther[1]	EIA (2003)	Percentage of buildings with Occupancy codes other than RES1 or RES3A – RES3F that are low-rise buildings. Used in precompiled flood mapping schemes from [flTmpDB].[dbo].[flGBSDistNonRes].
PctMidRiseOther[1]	EIA (2003)	Percentage of buildings with Occupancy codes other than RES1 or RES3A – RES3F that are mid-rise buildings.
PctHighRiseOther[1]	EIA (2003)	Percentage of buildings with Occupancy codes other than RES1 or RES3A – RES3F that are high-rise buildings.

Field Name	Data Source	Description
Pct1CarGarage[1]	EIA (2009)	Percentage of buildings with Occupancy code RES1 with a 1-car garage (see Table 5-5).
Pct2CarGarage[1]	EIA (2009)	Percentage of buildings with Occupancy code RES1with a 2-car garage (see Table 5-5).
Pct3CarGarage[1]	EIA (2009)	Percentage of buildings with Occupancy code RES1with a 3-car garage (see Table 5-5).
PctCarPort[1]	EIA (2009)	Percentage of buildings with Occupancy code RES1with a carport(see Table 5-5).
PctNoGarage[1]	EIA (2009)	Percentage of buildings with Occupancy code RES1with no garage (see Table 5-5).
IncomeRatio	U.S. Census Bureau	The Census block group median income divided by the average median income for the State.
dasymetric_log_id	Hazus Program Generated	A generated identifier that provides traceability to the dasymetric area generation tool settings used to produce each record.

[1]*Values vary by State.*

The hzCensusBlock_TIGER table has the same content as the hzCensusBlock with the following exceptions: shape was provided in GCS WGS84 and the shape was the native TIGER Census block geometry with the exception of modifications made in the vicinity of large lakes and coastal regions.

Centroid was determined for Census tract dasymetric area. If the true centroid fell outside of the associated native TIGER Census tract, the centroid was regenerated to be placed within the associated Census tract boundary. An additional check was performed to verify that the centroid did not fall within a water-only native TIGER Census block. If it did, the centroid was regenerated to be placed within the union-aggregated shape of all native TIGER Census blocks associated with the tract.

Table 3-4 describes the fields and data sources used for hzTract and Table 3-5 describes the fields and data sources used for hzCounty.

Table 3-4 Geodatabase Field Descriptions - hzTract

Field Name	Data Source	Description
OBJECTID	Hazus Program Generated	The national TIGER 2021 Census tract data was loaded into a dedicated PostgreSQL database environment. These data records were ordered by statefp20, countyfp20, and tractce20 and a unique identifier applied (hazus_object_id). This “internal” tract-level hazus_object_id is the value that is displayed in the OBJECTID field.

Field Name	Data Source	Description
Shape	Hazus Program Generated	Shape is provided in GCS WGS84. The shape is the native TIGER Census tract geometry with the exception of modifications made in the vicinity of large lakes and coastal regions.
Tract	TIGER 2021 Tract	A concatenation of the Census tract statefp20, countyfp20 and tractce20 values.
CountyFips	TIGER 2021 Tract	A concatenation of the Census tract statefp20 and countyfp20 values.
BldgSchemesId	Hazus Program Generated	The ID that relates to the Building Mapping Schemes used to calculate damages for a specific hazard (see Section 5.4).
Tract6	TIGER 2021 Tract	TIGER 2021 tract tractce20 value.
TractArea	Hazus Program Generated	The calculated area associated with each tract. This value is generated by projecting the geometries into the GCS WGS84 UTM Zone and calculating the areas in square kilometers. These areas represent the entire homogeneous geometries of each tract including both the developed and undeveloped areas.
NumAggrBlocks	Hazus Program Generated	The count of Census blocks that have dasymetric area within this tract.
CenLat	Hazus Program Generated	Coordinate of each centroid latitude in the GCS WGS84.
CenLongit	Hazus Program Generated	Coordinate of each centroid longitude in the GCS WGS84.
Length	Hazus Program Generated	Value generated by determining a relationship from roads to tract using TIGER roads, edges, faces, and tracts and measuring the length of these roads. The road types included in this analysis are Primary Roads (MTFCC = S1100), Secondary Roads (MTFCC = 1200), and Local Neighborhood Road/Rural Road/City Street (MTFCC = S1400). When a road link borders more than one tract, the length of the edges that make up the road link are equally distributed (50%) between the left and right tract that the link borders. All edges within a tract are summed and then converted from meters to kilometers to produce the hzTract Length value.
dasymetric_log_id	Hazus Program Generated	A generated identifier that provides traceability to the dasymetric area generation tool settings used to produce each record.

Table 3-5 Geodatabase Field Descriptions - hzCounty

Field Name	Data Source	Description
OBJECTID	Hazus Program Generated	The national TIGER 2021 County data was loaded into a dedicated PostgreSQL database environment. These data records were ordered by statefp20 and countyfp20 and had a unique identifier applied (hazus_object_id). This "internal" county-level hazus_object_id is the value that is being displayed in the OBJECTID field.
Shape	Hazus Program Generated	Shape is provided in GCS WGS84. The shape is the native TIGER county geometry with the exception of modifications made in the vicinity of large lakes and coastal regions.
CountyFips	TIGER 2021 County	A concatenation of the county's statefp20 and countyfp20 values.
CountyFips3	TIGER 2021 County	TIGER 2021 Tract countyfp20 value.
CountyName	TIGER 2021 County	TIGER 2021 County Name value.
State	TIGER 2021 State	TIGER 2021 State stusps value.
StateFips	TIGER 2021 County	TIGER 2021 County statefp20 value.
NumAggrTracts	Hazus Program Generated	The count of Census tracts that have dasymetric area within this county.

3.4 Community Boundary Data

The hzCommunity layer is a composite of three FEMA datasets, as described in Table 3-6.

Table 3-6 hzCommunity Input Data

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
National Flood Insurance Program (NFIP) Map Production Pro (MPP) Jurisdictions v3.0.26	Extracted April 21, 2022	FEMA	Community layer of participating NFIP jurisdictions.	All U.S.	NFIP Community Layer (2014)
NFIP Community Layer v3 - Tribal	2020	FEMA	Community layer of participating NFIP Tribal Governments.	All U.S.	NFIP Community layer of all tribes

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
NFIP Community Layer v3 - SLUA	2020	FEMA	Community layer of participating NFIP SLUAs.	All U.S.	NFIP Community layer of all SLUAs

It was determined that all communities were to be represented, whether they had a Community Identification Number (CID) or not. CID was used where available and a customized Area_ID was developed for others.

The three layers were merged together with the appropriate attributes for each column listed below in Table 3-7. All communities that did not have a CID were then deleted.

Table 3-7 hzCommunity Attributes by Data Source

Attribute	NFIP MPP Jurisdictions Data Sources	Tribal Data Sources	SLUA Data Sources
Area_ID	CID Column and GEOID. CID is used for participating jurisdictions and custom IDs developed from GEOID was used for others.	CID for participating tribes and custom GEOID for others.	CID for participating SLUAs and custom GEOID for others.
CommunityName	Names were populated from other fields in priority order based on: 1. CIS_COMMUN; 2. CENSUS_COM; 3. COMMUNITY_; 4. alt_name.	cen_namelsad column supplemented with cis_community_name_full column when required.	cs_community_name_full
CommunityType	0	1	2
Block Count	Null	Null	Null
Shape	27,905 total polygon entries	860 total entries	27 total entries

Since each community needs a unique Area_ID, polygons with the same Area_ID values were merged. The community names for these areas sometimes contained slightly different community names. Therefore, during the dissolve, the first name was selected.

Users are able to build flood Study Regions based on all the Census blocks within their entire community boundary. The three different files (Jurisdictions, Tribal, and SLUAs) are merged into one dataset where the Hazus shell allows selection of each based on CommunityType. The resulting dataset

was then clipped to the hzCounty layer to reduce the number of islands outside of the areas assessed by Hazus. Table 3-8 describes the input data and data source information for this layer.

Table 3-8 hzCommunity_Block Input Data

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
Hazus Dasymetric Census Blocks	2022	Hazus Program Generated	Dasymetric Census block feature class (see Section 3.2).	All U.S.	2010 U.S. Census blocks, 2011 NLCD Dataset
NFIP MPP Jurisdictions v3.0.26	Extracted April 21, 2022	FEMA	Community layer of participating NFIP jurisdictions.	All U.S.	NFIP Community Layer (2014)
NFIP Community Layer v3 - Tribal	2020	FEMA	Community layer of participating NFIP Tribal Governments.	All U.S.	NFIP Community layer
NFIP Community Layer v3 - SLUA	2020	FEMA	Community layer of participating NFIP SLUAs.	All U.S.	NFIP Community layer

The Area_ID field values were calculated for each community in the Jurisdictions, Tribal Areas, and SLUA communities using the source data as outlined in Table 3-9. Each of the three jurisdiction layers (Jurisdictions, Tribal, and SLUA), were treated separately, determining for each Census block which community occupied the largest percentage of space within the Census block. This percentage was then listed within the Ratio attribute. Once all three community layers were finished they were merged.

Table 3-9 hzCommunity Layer Fields by Data Source

Attribute	NFIP MPP Jurisdictions Data Sources	Tribal Data Sources	SLUA Data Sources
Area_ID	CID is used for participating jurisdictions and custom IDs developed from GEOID was used for others.	CID is used for participating jurisdictions and custom IDs developed from GEOID was used for others.	CID is used for participating jurisdictions and custom IDs developed from GEOID was used for others.
CensusBlock	The Census block number from the Hazus Dasymetric Census blocks.	The Census block number from the Hazus Dasymetric Census blocks.	The Census block number from the Hazus Dasymetric Census blocks.
Ratio	Based on the Area_ID with the maximum percentage.	Based on the Area_ID with the maximum percentage.	Based on the Area_ID with the maximum percentage.

The hzCommunity_State layer provides the list of all communities in each state and is derived from the hzCommunity_Block file, which was an aggregate of the Jurisdiction data from the NFIP MPP v3.0.26 data and the Tribal and SLUA communities' data from the NFIP Community Layer v3. Table 3-10 describes the input data and data source information for this layer.

Table 3-10 hzCommunity_State Input Data

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
hzCommunity_Block	2022	Hazus Program Generated	Hazus Community Boundary layer in Census blocks (see Table 3-8).	All U.S.	NFIP Community Information System (CIS) data
NFIP MPP Jurisdictions v3.0.26	Extracted April 21, 2022	FEMA	Community layer of participating NFIP jurisdictions.	All U.S.	NFIP Community Layer (2014)
NFIP Community Layer v3 - Tribal	2020	FEMA	Community layer of participating NFIP Tribal Governments.	All U.S.	NFIP Community layer
NFIP Community Layer v3 - SLUA	2020	FEMA	Community layer of participating NFIP SLUAs.	All U.S.	NFIP Community layer

For each Census block, the community covering the majority of the Census block's geographic area was used to populate the Area_ID field with the CID. The CID was then used to populate the hzCommunity_State layer by dissolving all of the entries by the Area_ID field, reducing each community to one entry. Once this dissolution was complete, a StateFips field was added to the resulting file and populated with the left two characters of the Area_ID field.

Table 3-11 summarizes the input data and data source information for the hzWatershed, syWatershed and syWatershed_Block layers.

Table 3-11 hzWatershed, syWatershed and syWatershed_Block Input Data

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
Hazus Dasymetric Census Blocks	2022	Hazus Program Generated	Dasymetric Census block feature class (see Section 3.2).	All U.S.	2010 U.S. Census blocks, 2011 NLCD Dataset

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
USGS National Watershed Boundary Dataset in FileGDB 10.1 format	May 2022	USGS	The Watershed Boundary Dataset (WBD) is a comprehensive aggregated collection of hydrologic unit data consistent with the national criteria for delineation and resolution. It defines the areal extent of surface water drainage to a point.	All U.S.	USGS, CONUS only

The hzWatershed layer was created using the latest eight-digit hydrologic unit code (HUC-8) watersheds from the USGS National Watershed Boundary Dataset, using the fields described in Table 3-12.

Table 3-12 hzWatershed Fields by Data Source

Field Name	Data Source	Description
Shape	Hazus Program Generated	Shape is provided in GCS WGS84.
HUC	USGS	Watershed HUC-8 value.
NAME	USGS	Watershed name value.

The syWatershed layer was created using the updated geometries in hzWaterShed and the updated table containing the new Block Counts, which are based on the 2020 Census blocks in syWaterShed_Block. The syWatershed field was comprised of the fields described in Table 3-13.

Table 3-13 syWaterShed Fields by Data Source

Field Name	Data Source	Description
HUC	USGS	Watershed HUC-8 value.
WaterShedName	USGS	Watershed name value.
BlockCount	Hazus Program Generated	The count of the native TIGER Census block geometries modified to remove the shapes of large lakes and coastal regions which intersect the watershed.

The syWatershed_Block layer is based on 2020 Census blocks with the removal of water blocks and those with no development or data. To create the syWatershed_Block data, a spatial intersect was performed with syWaterShed geometries using the fields described in Table 3-14.

Table 3-14 syWatershed_Block Fields by Data Source

Field Name	Data Source	Description
CensusBlock	TIGER 2021 Census blocks	TIGER 2021 Census block geoid20 value.
HUC	USGS	Watershed HUC-8 value.

For the creation of syHazus State, County, and Tract layers, the output from the dasymetric processing of Census blocks was used to populate the syTract, syCounty, and syState tables. Table 3-15 summarizes the input data and data source information.

Table 3-15 syHazus State, County, and Tract Input Data

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
hzCounty	2022	U.S. Census Bureau	A geodatabase of homogeneous counties.	All U.S.	2010 Census
hzTract	2022	U.S. Census Bureau	A geodatabase of homogeneous tracts.	All U.S.	2010 Census
U.S. Census Bureau TIGER Census Blocks Geodatabase	2021	U.S. Census Bureau	A geodatabase that contains all Census blocks for the nation.	All U.S.	2010 Census

To create the syTract and syCounty tables, geometries and other attributes were pulled from the hzTract and hzCounty tables, respectively. The syState geometries were union-aggregated from the hzCounty geometries. Table 3-16, Table 3-17, and Table 3-18 document the fields for each.

Table 3-16 syTract Fields by Data Source

Field Name	Data Source	Description
Shape	Hazus Program Generated	Shape is provided in GCS WGS84. The shape is the native TIGER Census tract geometry with the exception of modifications made in the vicinity of large lakes and coastal regions.
Tract	TIGER 2021 Tract	A concatenation of the Census tract statefp20, countyfp20 and tractce20 values.
CountyFips	TIGER 2021 Tract	A concatenation of the Census tract statefp20 and countyfp20 values.
Tract6	TIGER 2021 Tract	TIGER 2021 tract tractce20 value.

Field Name	Data Source	Description
TractArea	Hazus Program Generated	The calculated area associated with each tract. This value is generated by projecting the geometries into the GCS WGS84 UTM Zone and calculating the areas in square kilometers. These areas represent the entire homogeneous geometries of each tract including both the developed and undeveloped areas.
CenLongit	Hazus Program Generated	Coordinate of each centroid longitude in GCS WGS84.
CenLat	Hazus Program Generated	Coordinate of each centroid latitude in GCS WGS84.

Table 3-17 syCounty Fields by Data Source

Field Name	Data Source	Description
Shape	Hazus Program Generated	Shape is provided in GCS WGS84. The shape is the native TIGER Census tract geometry with the exception of modifications made in the vicinity of large lakes and coastal regions.
CountyFips	TIGER 2021 County	A concatenation of the county's statefp20 and countyfp20 values.
CountyFips3	TIGER 2021 County	TIGER 2021 Tract countyfp20 value.
CountyName	TIGER 2021 County	TIGER 2021 County Name value, in states where duplicate county equivalent names occur (MD, MO, VA) the feature representing the city was updated with the word "City".
State	TIGER 2021 State	TIGER 2021 State stusps value.
StateFips	TIGER 2021 County	TIGER 2021 County statefp20 value.
NumTracts	Hazus Program Generated	The count of Census tracts having dasymetric area within the county.
TSCounty	Hazus Program Generated	TSCounty is a flag to indicate which counties are supported by the Hazus Tsunami model and available for selection when a Tsunami Study Region is created. The coastal counties for each Tsunami state (CA, OR, WA, AK) that could be impacted by tsunamis includes a flag =1, as well as all counties in HI, all Municipios in PR, and all counties for AS, MP, GU, and VI.

Table 3-18 syState Fields by Data Source

Field Name	Data Source	Description
Shape	Hazus Program Generated	Shape is provided in GCS WGS84. The shape is the native TIGER Census tract geometry with the exception of modifications made in the vicinity of large lakes and coastal regions.

Field Name	Data Source	Description
StateFips	TIGER 2021 State	TIGER 2021 State statefp20 value.
StateID	TIGER 2021 State	TIGER 2021 State stusps value.
StateName	TIGER 2021 State	TIGER 2021 State name value.
EorW	Hazus Program Generated	Indicates the state as East or West region for the purpose of mapping to earthquake attenuation functions and source fault modeling capabilities. Value=E/W. For the purpose of attenuation function selection, PR and VI are considered W.
Region	Hazus Program Generated	Aligns with EorW, 1 denotes W for West, 0 denotes E for East.
NumCounties	Hazus Program Generated	Number of counties within the state.
HUState	Hazus Program Generated	Marks the state as available for Hurricane analysis. Value=0 for non-Hurricane states, 1 for Hurricane states.
TSState	Hazus Program Generated	Marks the state as available for Tsunami analysis. Value=0 for non-Tsunami states, 1 for Tsunami states.

3.5 Site Level Data

The NSI 2022 dataset from the USACE was used as the primary data source for the General Building Stock site level data updates for CONUS, Alaska and Hawaii, and also in the dasymetric boundary revision process as described in the previous section. Data developed by FEMA NHRAP in 2019 for the Hazus 5.0 Caribbean hurricane modeling capability served as the data source for Puerto Rico and the U.S. Virgin Islands (FEMA, 2019).

The site level data development extended beyond spatial features to other Hazus General Building Stock databases, which will be described in more detail in Section 4, Section 5, and Section 6. Table 3-19 summarizes the site-level data used in Hazus 6.0.

Table 3-19 Site Level Data Input Data

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage
NSI 2022	June 2022	USACE	Point-based structure inventories. Developed from Lightbox Parcel, NGA lidar, USA Structures and Bing footprints.	AK, HI, CONUS except DC
Income Ratios	June 2022	Hazus Program Generated	Income ratios developed from Census data. Calculated using the block group median income divided by state median income.	CONUS, AK, HI, PR[1]

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage
Census Geometry	June 2022	U.S. Census Bureau	Census block TIGER data	All U.S.
DC Data	June 2022	Open Data DC	Attributes for buildings, building use, police stations and tax/sales information for properties.	DC
PR Data	2019	FEMA NHRAP	Polygon and point data of PR structures, occupancy types.	PR
VI Data	July 2019	FEMA NHRAP	Polygon and point data of VI structures, Income Ratios, and additional attributes.	VI
U.S. Territories Building Footprint Dataset	2018	FEMA NHRAP	Lidar-based polygon building footprints. AS lidar sourced from NOAA (2012). GU lidar sourced from USGS (2012-13) and parcel data from 2007. MP lidar sourced from USACE (2007) and parcel data from 2006.	AS, GU, MP

[1]*No income ratio data were available for the Pacific Territories (AS, GU, MP)*

3.6 District of Columbia General Building Stock Data

Data developed by FEMA NHRAP from Open Data DC data in 2022 was used as the initial data source for the District of Columbia in Hazus. Open Data DC data was used to create the DC dataset for Hazus 6.0 due to lack of Lightbox Parcel data for the District of Columbia. Table 3-20 summarizes the input data used to create the DC data.

Table 3-20 District of Columbia General Building Stock Input Data

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage
Computer_Assisted_Mass_Appraisal_-_Commercial.csv	April 2022	Open Data DC	Attribution for commercial.	DC
Computer_Assisted_Mass_Appraisal_-_Residential.csv	April 2022	Open Data DC	Attribution for residential.	DC
Computer_Assisted_Mass_Appraisal_-_Condominium.csv	April 2022	Open Data DC	Attribution for condominiums.	DC
Address_Points.csv	April 2022	Open Data DC	Used for address information mostly.	DC
Historical_Data_on_DC_Buildings.shp	April 2022	Open Data DC	Attribution for all.	DC
Property_Use_Code_List_Lookup.csv	April 2022	Open Data DC	Attribution for all.	DC

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage
Existing_Land_Use.shp	May 2022	Open Data DC	Attribution for features that did not have Use Code information from Computer Assisted Mass Appraisal datasets.	DC
Police_Stations.shp	May 2022	Open Data DC	Police station locations in DC.	DC
Integrated_Tax_System_Public_Extract_Property_Sales.csv	April 2022	Open Data DC	Tax and sales info on properties.	DC
Default Full Structure Replacement Cost	Feb 2021	Hazus Program Generated (see Table 6-2)	Default stories and sq ft for Hazus Specific Occupancy Classes.	All U.S.

To process the Open Data DC data for use in Hazus, any buildings noted as demolished before 2002 that did not intersect with the DC Structures building footprint data were filtered out. Historical data polygons were then spatially joined to the address point data. The three Computer Assisted Mass Appraisal csv files (see Table 3-20) were merged together into one file, keeping relevant fields. Additional processing was completed to populate the Use Code fields for properties with structures.

Open Data DC Use Codes for building occupancy were cross-walked over to Hazus specific occupancy classes, adding the short and long descriptions of the property codes, Hazus descriptions, and proxy Story and SqFt attribute information. Additionally, unit number attribution was used for classifying Hazus Specific Occupancy Classes for RES3A-RES3F.

3.7 Pacific Territories Tsunami General Building Stock Data

For American Samoa, Guam, and the Northern Mariana Islands General Building Stock data, Hazus 5.1 data was used as the basis and was enhanced using structure footprints from USA Structures and U.S. Territories Building Footprint data. The availability of building footprint data allowed for improvement of the existing tsNsiGbs data. Review of the data showed that in many places, multiple points overlapped within a single building footprint. To consolidate and remove potential duplications, all existing Hazus 5.1 structures were spatially joined to the closest structure footprint within 30 meters. The structures were then grouped by the Building ID number and then consolidated to a single point represented by the centroid of the building footprint. For information on the attribution of characteristics for these structures, see Section 5.8.

For American Samoa, Guam, and the Northern Mariana Islands, new structures were identified by selecting the footprints from either the USA Structures or U.S. Territories Building Footprint dataset that were further than 30 meters from an existing structure. These structures were then converted from a polygon to point format. Existing Hazus 5.1 structures were removed from the tsNsiGbs table if their

locations were not within 30 meters of an USA Structures or U.S. Territories Building Footprint data. For information on the attribution of characteristics for these structures, see Section 5.8.

Section 4. General Building Stock: Occupancy and Building Types

General Building Stock tabular data includes the characteristics of residential, commercial, industrial, agricultural, religious, governmental, and educational buildings. The entire composition within the Census blocks for the Flood Model are assumed to be evenly distributed through the dasymetric blocks which are adjusted through the dasymetric process in prior section.

All four hazard models use common data to ensure that users do not have inventory discrepancies when switching between hazards. The Flood Model displays General Building Stock data at the Census block level, while the Earthquake Model displays General Building Stock data at the Census tract level. To support hurricane surge modeling in Hazus, the Hurricane Model will display and perform analysis at the Census block level if the user selected a combined Hurricane and Flood Study Region.

The key General Building Stock databases include the following (denoting the *Hazus Inventory Technical Manual* section where described):

- *General Occupancy Mapping and Building Types* (Section 4): These data provide a general mapping for the General Building Stock inventory data from the general and specific occupancy to general (e.g., Wood) and specific building types. Generally, all four models agree. However, a user can modify the general occupancy mapping at the Census block level in the Flood Model. Because other models are based on Census tract-level data, modifying the general occupancy mapping at the Census block level will not affect the tract-level results in other models.

- *Building Area by Occupancy* (Section 5): These data are the estimated floor area in square feet by specific occupancy (e.g., COM1). These data are also aggregated for general occupancies (e.g., Residential).

- *Building Count by Occupancy* (Section 5): These data provide the user with an estimated building count by specific occupancy. These data are also aggregated for general occupancies.

- *Other Building Characteristics* (Section 5): These data include the additional General Building Stock supplemental databases used by one or multiple hazards for loss calculations, such as the number of stories, and hazard-specific characteristics like foundation types and First Floor Height Above Grade (FFHAG).

- *Demographics* (Section 5)**:** These data provide housing and population statistics.

- *Building Replacement Value by Occupancy* (Section 6): These data provide the user with estimated replacement values by specific occupancy. These data are also aggregated for general occupancies.

4.1 Occupancy

The primary purpose of building occupancy classifications is to group buildings with similar valuation, damage, and loss characteristics into a set of pre-defined groups for analysis. For example, the damage

and loss modules represent a typical response of the occupancy classification to inundation caused by flooding. Table 4-1 shows the 33 specific occupancy classifications used in Hazus.

Table 4-1 Hazus General and Specific Occupancy Classes

Hazus General Occupancy Class	Hazus Specific Occupancy Class	Class Description
Residential	RES1	Single-family Dwelling
Residential	RES2	Mobile Home
Residential	RES3A	Multi-Family Dwelling – Duplex
Residential	RES3B	Multi-Family Dwelling – 3-4 Units
Residential	RES3C	Multi-Family Dwelling – 5-9 Units
Residential	RES3D	Multi-Family Dwelling – 10-19 Units
Residential	RES3E	Multi-Family Dwelling – 20-49 Units
Residential	RES3F	Multi-Family Dwelling – 50+ Units
Residential	RES4	Temporary Lodging
Residential	RES5	Institutional Dormitory
Residential	RES6	Nursing Home
Commercial	COM1	Retail Trade
Commercial	COM2	Wholesale Trade
Commercial	COM3	Personal and Repair Services
Commercial	COM4	Business/Professional/Technical Services
Commercial	COM5	Depository Institutions (Banks)
Commercial	COM6	Hospital
Commercial	COM7	Medical Office/Clinic
Commercial	COM8	Entertainment & Recreation
Commercial	COM9	Theaters
Commercial	COM10	Parking
Industrial	IND1	Heavy
Industrial	IND2	Light
Industrial	IND3	Food/Drugs/Chemicals
Industrial	IND4	Metals/Minerals Processing
Industrial	IND5	High Technology
Industrial	IND6	Construction
Agriculture	AGR1	Agriculture
Religion	REL1	Church/Non-Profit
Government	GOV1	General Services
Government	GOV2	Emergency Response
Education	EDU1	Schools/Libraries
Education	EDU2	Colleges/Universities

During a review of NSI 2022 data, it was determined that structures identified with the North American Industry Classification System (NAICS) Codes 721310, 922140, 561210 had misassigned occupancy types, which were re-categorized to RES5 for Hazus.

4.2 Building Types

Each of the four Hazus Models uses different schemes related to building types. While each hazard has the same five general building types of Wood Frame, Steel Frame, Concrete, Masonry, and Manufactured Housing, the specific building types (SBTs) differ by hazard.

4.2.1 Earthquake and Tsunami Specific Building Types

Table 4-2 lists the 36 model SBTs used by the Earthquake and Tsunami Models. These specific building types are based on the classification system of FEMA 178, *NEHRP Handbook for the Seismic Evaluation of Existing Buildings* (FEMA, 1992) and may be found in more recent ASCE publications, including *FEMA 310, Handbook for the Seismic Evaluation of Buildings–A Prestandard* (FEMA, 1998). In addition, the Methodology breaks down FEMA 178 classes into height ranges and includes mobile homes.

Table 4-2 Earthquake and Tsunami Model Specific Building Types

Specific Building Type Label	Description	Height Range - Name	Height Range - Stories	Typical Height - Stories	Typical Height - Feet
W1	Wood, Light Frame (≤ 5,000 ft²)	N/A	1 – 2	1	14
W2	Wood, Commercial & Industrial (> 5,000 ft²)	N/A	All	2	24
S1L	Steel Moment Frame	Low-Rise	1 – 3	2	24
S1M	Steel Moment Frame	Mid-Rise	4 – 7	5	60
S1H	Steel Moment Frame	High-Rise	8+	13	156
S2L	Steel Braced Frame	Low-Rise	1 – 3	2	24
S2M	Steel Braced Frame	Mid-Rise	4 – 7	5	60
S2H	Steel Braced Frame	High-Rise	8+	13	156
S3	Steel Light Frame	N/A	All	1	15
S4L	Steel Frame with Cast-in-Place Concrete Shear Walls	Low-Rise	1 – 3	2	24
S4M	Steel Frame with Cast-in-Place Concrete Shear Walls	Mid-Rise	4 – 7	5	60
S4H	Steel Frame with Cast-in-Place Concrete Shear Walls	High-Rise	8+	13	156
S5L	Steel Frame with Unreinforced Masonry Infill Walls	Low-Rise	1 – 3	2	24

Specific Building Type Label	Description	Height Range - Name	Height Range - Stories	Typical Height - Stories	Typical Height - Feet
S5M	Steel Frame with Unreinforced Masonry Infill Walls	Mid-Rise	4 – 7	5	60
S5H	Steel Frame with Unreinforced Masonry Infill Walls	High-Rise	8+	13	156
C1L	Concrete Moment Frame	Low-Rise	1 – 3	2	20
C1M	Concrete Moment Frame	Mid-Rise	4 – 7	5	50
C1H	Concrete Moment Frame	High-Rise	8+	12	120
C2L	Concrete Shear Walls	Low-Rise	1 – 3	2	20
C2M	Concrete Shear Walls	Mid-Rise	4 – 7	5	50
C2H	Concrete Shear Walls	High-Rise	8+	12	120
C3L	Concrete Frame with Unreinforced Masonry Infill Walls	Low-Rise	1 – 3	2	20
C3M	Concrete Frame with Unreinforced Masonry Infill Walls	Mid-Rise	4 – 7	5	50
C3H	Concrete Frame with Unreinforced Masonry Infill Walls	High-Rise	8+	12	120
PC1	Precast Concrete Tilt-Up Walls	N/A	All	1	15
PC2L	Precast Concrete Frames with Concrete Shear Walls	Low-Rise	1 – 3	2	20
PC2M	Precast Concrete Frames with Concrete Shear Walls	Mid-Rise	4 – 7	5	50
PC2H	Precast Concrete Frames with Concrete Shear Walls	High-Rise	8+	12	120
RM1L	Reinforced Masonry Bearing Walls with Wood or Metal Deck Diaphragms	Low-Rise	1-3	2	20
RM1M	Reinforced Masonry Bearing Walls with Wood or Metal Deck Diaphragms	Mid-Rise	4+	5	50

Specific Building Type Label	Description	Height Range - Name	Height Range - Stories	Typical Height - Stories	Typical Height - Feet
RM2L	Reinforced Masonry Bearing Walls with Precast Concrete Diaphragms	Low-Rise	1 – 3	2	20
RM2M	Reinforced Masonry Bearing Walls with Precast Concrete Diaphragms	Mid-Rise	4 – 7	5	50
RM2H	Reinforced Masonry Bearing Walls with Precast Concrete Diaphragms	High-Rise	8+	12	120
URML	Unreinforced Masonry Bearing Walls	Low-Rise	1 – 2	1	15
URMM	Unreinforced Masonry Bearing Walls	Mid-Rise	3+	3	35
MH	Mobile Homes	N/A	All	1	10

A general description of each of the 16 structural systems of specific building types is provided below.

4.2.1.1 WOOD, LIGHT FRAME (W1)

These are typically single-family or small, multi-family dwellings of not more than 5,000 square feet of floor area. The essential structural feature of these buildings is repetitive framing by wood rafters or joists on wood stud walls. Loads are light and spans are small. These buildings may have relatively heavy masonry chimneys and may be partially or fully covered with masonry veneer. Most of these buildings, especially the single-family residences, are not engineered but constructed in accordance with “conventional construction” provisions of building codes. Hence, they usually have the components of a lateral-force-resisting system even though it may be incomplete. Lateral loads are transferred by diaphragms to shear walls. The diaphragms are roof panels and floors that may be sheathed with sawn lumber, plywood, or fiberboard sheathing. Shear walls are sheathed with boards, stucco, plaster, plywood, gypsum board, particle board, or fiberboard, or interior partition walls sheathed with plaster or gypsum board.

4.2.1.2 WOOD, GREATER THAN 5,000 FT² (W2)

These buildings are typically commercial or industrial buildings, or multi-family residential buildings with a floor area greater than 5,000 square feet. These buildings include structural systems framed by beams or major horizontally spanning members over columns. These horizontal members may be glue-laminated (glu-lam) wood, solid-sawn wood beams, or wood trusses, or steel beams or trusses. Lateral loads usually are resisted by wood diaphragms and exterior walls sheathed with plywood, stucco, plaster, or other paneling. The walls may have diagonal rod bracing. Large openings for stores and garages often require post-and-beam framing. Lateral load resistance on those lines may be achieved with steel rigid frames (moment frames) or diagonal bracing.

4.2.1.3 STEEL MOMENT FRAME (S1)

These buildings have a frame of steel columns and beams. In some cases, the beam-column connections have very small moment resisting capacity but, in other cases, some of the beams and columns are fully developed as moment frames to resist lateral forces. Usually, the structure is concealed on the outside by exterior nonstructural walls, which can be of almost any material (curtain walls, brick masonry, or precast concrete panels), and on the inside by ceilings and column furring. Diaphragms transfer lateral loads to moment-resisting frames. The diaphragms can be almost any material. The frames develop their stiffness by full or partial moment connections. The frames can be located almost anywhere in the building. Usually, the columns have their strong directions oriented, so some columns act primarily in one direction while the others act in the other direction. Steel moment frame buildings are typically more flexible than shear wall buildings. This low stiffness can result in large inter-story drifts that may lead to relatively greater nonstructural damage.

4.2.1.4 STEEL BRACED FRAME (S2)

These buildings are like steel moment frame buildings except that the vertical components of the lateral-force-resisting system are braced frames rather than moment frames.

4.2.1.5 STEEL LIGHT FRAME (S3)

These buildings are pre-engineered and prefabricated with transverse rigid frames. The roof and walls consist of lightweight panels, usually corrugated metal. The frames are designed for maximum efficiency, often with tapered beam and column sections built up of light steel plates. The frames are built in segments and assembled in the field with bolted joints. Lateral loads in the transverse direction are resisted by the rigid frames with loads distributed to them by diaphragm elements, typically rod-braced steel roof framing bays. Tension rod bracing typically resists loads in the longitudinal direction.

4.2.1.6 STEEL FRAME WITH CAST-IN-PLACE CONCRETE SHEAR WALLS (S4)

The shear walls in these buildings are cast-in-place concrete and may be bearing walls. The steel frame is designed for vertical loads only. Diaphragms of almost any material transfer lateral loads to the shear walls. The steel frame may provide a secondary lateral-force-resisting system depending on the stiffness of the frame and the moment capacity of the beam-column connections. In modern “dual” systems, the steel moment frames are designed to work together with the concrete shear walls.

4.2.1.7 STEEL FRAME WITH UNREINFORCED MASONRY INFILL WALLS (S5)

This is one of the older types of buildings. The infill walls usually are offset from the exterior frame members, wrap around them, and present a smooth masonry exterior with no indication of the frame. Solidly infilled masonry panels, when they fully engage the surrounding frame members (i.e., lie in the same plane), may provide stiffness and lateral load resistance to the structure.

4.2.1.8 REINFORCED CONCRETE MOMENT RESISTING FRAMES (C1)

These buildings are like steel moment frame buildings except that the frames are reinforced concrete. There are a large variety of frame systems. Some older concrete frames may be proportioned and detailed such that brittle failure of the frame members can occur in earthquakes, leading to a partial or

full collapse of the buildings. Modern frames in zones of high seismicity are proportioned and detailed for ductile behavior and are likely to undergo large deformations during an earthquake without brittle failure of frame members and collapse.

4.2.1.9 CONCRETE SHEAR WALLS (C2)

The vertical components of the lateral force-resisting system in these buildings are concrete shear walls that are usually bearing walls. In older buildings, the walls often are quite extensive, and the wall stresses are low, but reinforcing is light. In newer buildings, the shear walls often are limited in extent, generating concerns about boundary members and overturning forces.

4.2.1.10 CONCRETE FRAME BUILDINGS WITH UNREINFORCED MASONRY INFILL WALLS (C3)

These buildings are like steel frame buildings with unreinforced masonry infill walls except that the frame is of reinforced concrete. In these buildings, the shear strength of the columns, after cracking of the infill, may limit the semi-ductile behavior of the system.

4.2.1.11 PRECAST CONCRETE TILT-UP WALLS (PC1)

These buildings have a wood or metal deck roof diaphragm, which often is very large, distributing lateral forces to precast concrete shear walls. The walls are thin but relatively heavy, while the roofs are relatively light. Older or non-seismic-code buildings often have inadequate connections for the anchorage of the walls to the roof for out-of-plane forces, and the panel connections are often brittle. Tilt-up buildings are usually one or two stories in height. Walls can have numerous openings for doors and windows of such size that the wall looks more like a frame than a shear wall.

4.2.1.12 PRECAST CONCRETE FRAMES WITH CONCRETE SHEAR WALLS (PC2)

These buildings contain floor and roof diaphragms, typically composed of precast concrete elements with or without cast-in-place concrete topping slabs. Precast concrete girders and columns support the diaphragms. The girders often bear on column corbels. Closure strips between precast floor elements and beam-column joints are usually cast-in-place concrete. Welded steel inserts are often used to interconnect precast elements. Precast or cast-in-place concrete shear walls resist lateral loads. For buildings with precast frames and concrete shear walls to perform well, the details used to connect the structural elements must have enough strength and displacement capacity; however, in some cases, the connection details between the precast elements have negligible ductility.

4.2.1.13 REINFORCED MASONRY BEARING WALLS WITH WOOD OR METAL DECK DIAPHRAGMS (RM1)

These buildings have perimeter bearing walls of reinforced brick or concrete-block masonry. These walls are the vertical elements in the lateral-force-resisting system. The floors and roofs are framed with wood joists and beams either with plywood or braced sheathing, the latter either straight or diagonally sheathed, or with steel beams with metal deck with or without concrete fill. Interior wood posts or steel columns support wood floor framing; steel columns support steel beams.

4.2.1.14 REINFORCED MASONRY BEARING WALLS WITH PRECAST CONCRETE DIAPHRAGMS (RM2)

These buildings have bearing walls like those of reinforced masonry bearing wall structures with wood or metal deck diaphragms, but the roof and floors are composed of precast concrete elements such as planks or tee-beams and the precast roof and floor elements are supported on interior beams and columns of steel or concrete (cast-in-place or precast). The precast horizontal elements often have a cast-in-place topping.

4.2.1.15 UNREINFORCED MASONRY BEARING WALLS (URM)

These buildings include structural elements that vary depending on the building's age and, to a lesser extent, its geographic location. In buildings built before 1900, the majority of floor and roof construction consists of wood sheathing supported by wood framing. In large multistory buildings, the floors are cast-in-place concrete supported by the unreinforced masonry walls and/or steel or concrete interior framing. In unreinforced masonry constructed after 1950 outside California, wood floors usually have plywood rather than board sheathing. In regions of lower seismicity, buildings of this type constructed more recently can include floor and roof framing consisting of metal deck and concrete fill supported by steel framing elements. The perimeter walls, and possibly some interior walls, are unreinforced masonry. The walls may or may not be anchored to the diaphragms. Ties between the walls and diaphragms are more common for the bearing walls than for walls parallel to the floor framing. Roof ties are usually less common and more erratically spaced than those at the floor levels. Interior partitions that interconnect the floors and roof can reduce diaphragm displacements.

One additional note in earthquake specific building type exposures for Puerto Rico and the U.S. Virgin Islands; the default distributions have been adjusted resulting in fewer concrete and more unreinforced masonry single family homes based on local expertise and the known prevalence of informal construction (FEMA, 2021a). These changes are reflected in Appendix A.

4.2.1.16 MOBILE HOMES (MH)

These are prefabricated housing units trucked to the site and placed on isolated piers, jack stands, or masonry block foundations (usually without any positive anchorage). Floors and roofs of mobile homes are usually constructed with plywood and outside surfaces are covered with sheet metal.

4.2.2 Flood Specific Building Types

Although most flood depth-damage functions are independent of structural system or construction material, the Hazus inventory database includes SBT as a basic parameter because of the importance of structure type on the estimation of earthquake, tsunami, and hurricane damage. Within the Flood Model, the SBTs are a simplified version of the ones used by the Earthquake Model and are listed in Table 4-3.

Table 4-3 Flood Model Specific Building Types

Specific Building Type Label	Description	Height Range - Name	Height Range - Stories	Typical Height - Stories	Typical Height - Feet
Wood (W)	Wood (light frame, commercial and industrial)	N/A	All	1 to 2	14 to 24
Steel (S)	Steel frame structures including those with infill walls or concrete shear walls	Low-Rise	1 – 3	2	24
		Mid-Rise	4 – 7	5	60
		High-Rise	8+	13	156
Concrete (C)	Concrete frame or shear wall structures including tilt-up, precast, and infill walls	Low-Rise– 1 - 3	2	20	20
		Mid-Rise– 4 - 7	5	50	50
		High-Rise	8+	12	120
Masonry (M)	All structures with masonry bearing walls	Low-Rise– 1 - 3	2	20	20
		Mid-Rise– 4 - 7	5	50	50
		High-Rise	8+	12	120
Manufactured Housing (MH)	Manufactured Housing	N/A	All	1	10

A general discussion of the five specific building types for flood modeling is provided below.

4.2.2.1 WOOD (W)

Within Hazus, there are two general types of wood structures: 1) small, multi-family or single-family dwellings of not more than 5,000 square feet of floor area; and 2) large multi-family, commercial, or industrial buildings of more than 5,000 square feet of floor area. The essential structural feature of the smaller (5,000 square feet or less) buildings is repetitive framing by wood rafters or joists on wood stud walls. These buildings may have masonry chimneys and may be partially or fully covered with masonry veneer. Most of these buildings, especially the single-family residences, are not engineered but are constructed in accordance with “conventional construction” provisions of building codes. The floors and roofs may be sheathed with sawn lumber, plywood, or fiberboard sheathing. Walls are covered with boards, stucco, plaster, plywood, gypsum board, particleboard, or fiberboard, or a combination of several materials. Interior partition walls are usually covered with plaster or gypsum board.

The larger buildings (floor areas greater than 5,000 square feet) have framing systems consisting of beams or major horizontal members spanning between columns supporting lighter floor joists or rafters. These horizontal members may be glue-laminated wood, solid-sawn wood beams, wood or steel trusses, or steel beams. The exterior walls are covered with plywood, stucco, plaster, other types of paneling, or a combination of materials. The interior surfaces of the walls and interior partitions usually are covered with gypsum board or plaster.

4.2.2.2 STEEL (S)

Steel buildings are usually framed with a series of steel girders spanning between steel columns supporting beams and various forms of wood or concrete floors and roof. Exterior walls are constructed of steel siding, window walls, or cladding panels, but may include cast-in-place concrete shear walls or unreinforced masonry infill walls. If ceilings are used in these buildings, they are usually suspended acoustical tiles. These buildings most commonly accommodate offices, warehouses, commercial, or industrial occupancies.

4.2.2.3 CONCRETE (C)

Concrete buildings are those where the structural frames and/or exterior walls are made of reinforced concrete, either cast-in-place, pre-cast tilt-up, or pre-cast elements. Interior framing can be steel, wood, concrete, pre-cast, or any combination. These buildings are most commonly used for office, warehouse, commercial, or industrial occupancies. Interior finishes are usually concrete, gypsum board, or plaster.

4.2.2.4 MASONRY (M)

Masonry buildings are those where the exterior walls are masonry, either reinforced or unreinforced. These buildings are most commonly used for office, warehouse, commercial, industrial, or multi-family occupancies. Interior finishes are usually concrete, gypsum board, or plaster.

4.2.2.5 MANUFACTURED HOUSING (MH)

These are prefabricated housing units that are trucked to the site and then placed on isolated piers, jack stands, or masonry block foundations (usually without any positive anchorage). Floors and roofs of mobile homes usually are constructed with plywood and outside surfaces are covered with sheet metal.

4.2.3 Hurricane Specific Building Types

The 39 SBTs used in the Hurricane Model are listed and briefly described in Table 4-4. Each identifier begins with W, M, C, S, or MH, representing the general building type to which the SBT belongs.

Table 4-4 Hurricane Model Specific Building Types

Specific Building Type Label	Description
WSF1	Wood, Single-family, One-story
WSF2	Wood, Single-family, Two or More Stories
WMUH1	Wood, Multi-Unit Housing, One-story
WMUH2	Wood, Multi-Unit Housing, Two Stories
WMUH3	Wood, Multi-Unit Housing, Three or More Stories
MSF1	Masonry, Single-family, One-story
MSF2	Masonry, Single-family, Two or More Stories
MMUH1	Masonry, Multi-Unit Housing, One-story
MMUH2	Masonry, Multi-Unit Housing, Two Stories
MMUH3	Masonry, Multi-Unit Housing, Three or More Stories

Specific Building Type Label	Description
MLRM1	Masonry, Low-Rise Strip Mall, Up to 15 Feet
MLRM2	Masonry, Low-Rise Strip Mall, More than 15 Feet
MLRI	Masonry, Low-Rise Industrial/Warehouse/Factory Buildings
MERBL	Masonry, Engineered Residential Building, Low-Rise (1-2 Stories)
MERBM	Masonry, Engineered Residential Building, Mid-Rise (3-5 Stories)
MERBH	Masonry, Engineered Residential Building, High-Rise (6+ Stories)
MECBL	Masonry, Engineered Commercial Building, Low-Rise (1-2 Stories)
MECBM	Masonry, Engineered Commercial Building, Mid-Rise (3-5 Stories)
MECBH	Masonry, Engineered Commercial Building, High-Rise (6+ Stories)
CERBL	Concrete, Engineered Residential Building, Low-Rise (1-2 Stories)
CERBM	Concrete, Engineered Residential Building, Mid-Rise (3-5 Stories)
CERBH	Concrete, Engineered Residential Building, High-Rise (6+ Stories)
CECBL	Concrete, Engineered Commercial Building, Low-Rise (1-2 Stories)
CECBM	Concrete, Engineered Commercial Building, Mid-Rise (3-5 Stories)
CECBH	Concrete, Engineered Commercial Building, High-Rise (6+ Stories)
SPMBS	Steel, Pre-Engineered Metal Building, Small
SPMBM	Steel, Pre-Engineered Metal Building, Medium
SPMBL	Steel, Pre-Engineered Metal Building, Large
SERBL	Steel, Engineered Residential Building, Low-Rise (1-2 Stories)
SERBM	Steel, Engineered Residential Building, Mid-Rise (3-5 Stories)
SERBH	Steel, Engineered Residential Building, High-Rise (6+ Stories)
SECBL	Steel, Engineered Commercial Building, Low-Rise (1-2 Stories)
SECBM	Steel, Engineered Commercial Building, Mid-Rise (3-5 Stories)
SECBH	Steel, Engineered Commercial Building, High-Rise (6+ Stories)
MHPHUD	Manufactured Home, Pre-Housing and Urban Development (HUD)
MH76HUD	Manufactured Home, 1976 HUD
MH94HUD-I	Manufactured Home, 1994– HUD - Wind Zone I
MH94HUD-II	Manufactured Home, 1994– HUD - Wind Zone II
MH94HUD-III	Manufactured Home, 1994– HUD - Wind Zone III

The descriptions of the 39 Hurricane specific building types are provided below.

4.2.3.1 WOOD, SINGLE-FAMILY, ONE-STORY (WSF1)

The WSF1 model building is a wood-framed, single-story, single-family house. This class also includes additional subclasses reflecting different roof types added for the Caribbean (FEMA, 2021a).

4.2.3.2 WOOD, SINGLE-FAMILY, TWO OR MORE STORIES (WSF2)

The WSF2 model building is a wood-framed, two-story, single-family house. This class also includes additional subclasses reflecting different roof types added for the Caribbean (FEMA, 2021a).

4.2.3.3 WOOD, MULTI-UNIT HOUSING, ONE-STORY (WMUH1)

The WMUH1 model building is a wood-framed, single-story, marginally engineered or non-engineered, multi-family dwelling or hotel/motel.

4.2.3.4 WOOD, MULTI-UNIT HOUSING, TWO STORIES (WMUH2)

The WMUH2 model building is a wood-framed, two-story, marginally engineered or non-engineered, multi-family dwelling or hotel/motel.

4.2.3.5 WOOD, MULTI-UNIT HOUSING, THREE OR MORE STORIES (WMUH3)

The WMUH3 model building is a wood-framed, three-story, marginally engineered or non-engineered, multi-family dwelling or hotel/motel.

4.2.3.6 MASONRY, SINGLE-FAMILY, ONE-STORY (MSF1)

The MSF1 model building is a masonry wall, single-story, single-family house. The masonry walls can be either reinforced or unreinforced. This class also include additional subclasses reflecting different roof types added for the Caribbean (FEMA, 2021a).

4.2.3.7 MASONRY, SINGLE-FAMILY, TWO OR MORE STORIES (MSF2)

The MSF2 model building is a masonry wall, two-story, single-family house. The masonry walls can be either reinforced or unreinforced. This class also include additional subclasses reflecting different roof types added for the Caribbean (FEMA, 2021a).

4.2.3.8 MASONRY, MULTI-UNIT HOUSING, 1-STORY (MMUH1)

The MMUH1 model building is a masonry wall, single-story, marginally engineered or non-engineered, multi-family dwelling or hotel/motel. The masonry walls can be either reinforced or unreinforced.

4.2.3.9 MASONRY, MULTI-UNIT HOUSING, TWO STORIES (MMUH2)

The MMUH2 model building is a masonry wall, single-story, marginally engineered or non-engineered, multi-family dwelling or hotel/motel. The masonry walls can be either reinforced or unreinforced.

4.2.3.10 MASONRY, MULTI-UNIT HOUSING, THREE OR MORE STORIES (MMUH3)

The MMUH3 model building is a masonry wall, single-story, marginally engineered or non-engineered, multi-family dwelling or hotel/motel. The masonry walls can be either reinforced or unreinforced.

4.2.3.11 MASONRY, LOW-RISE STRIP MALL, UP TO 15 FEET (MLRM1)

The MLRM1 model building is a masonry wall, low-rise strip mall building, up to 15 feet in height. The masonry walls can be either reinforced or unreinforced.

4.2.3.12 MASONRY, LOW-RISE STRIP MALL, MORE THAN 15 FEET (MLRM2)

The MLRM2 model building is a masonry wall, low-rise strip mall building, more than 15 feet in height. The masonry walls can be either reinforced or unreinforced.

4.2.3.13 MASONRY, LOW-RISE INDUSTRIAL/WAREHOUSE/FACTORY BUILDINGS (MLRI)

The MLRI model building is a 240,000 square foot, masonry wall, industrial building or warehouse. The masonry walls can be either reinforced or unreinforced.

4.2.3.14 MASONRY, ENGINEERED RESIDENTIAL BUILDING, LOW-RISE (MERBL)

The MERBL model building is a two-story, engineered, reinforced masonry wall, residential building with a compartmented floor plan.

4.2.3.15 MASONRY, ENGINEERED RESIDENTIAL BUILDING, MID-RISE (MERBM)

The MERBM model building is a five-story, engineered, reinforced masonry wall, residential building with a compartmented floor plan.

4.2.3.16 MASONRY, ENGINEERED RESIDENTIAL BUILDING, HIGH-RISE (MERBH)

The MERBH model building is an eight-story, engineered, reinforced masonry wall, residential building with a compartmented floor plan.

4.2.3.17 MASONRY, ENGINEERED COMMERCIAL BUILDING, LOW-RISE (MECBL)

The MECBL model building is a two-story, engineered, reinforced masonry wall, commercial building with an open floor plan.

4.2.3.18 MASONRY, ENGINEERED COMMERCIAL BUILDING, MID-RISE (MECBM)

The MECBM model building is a five-story, engineered, reinforced masonry wall, commercial building with an open floor plan.

4.2.3.19 MASONRY, ENGINEERED COMMERCIAL BUILDING, HIGH-RISE (MECBH)

The MECBH model building is an eight-story, engineered, reinforced masonry wall, commercial building with an open floor plan.

4.2.3.20 CONCRETE, ENGINEERED RESIDENTIAL BUILDING, LOW-RISE (CERBL)

The CERBL model building is a two-story, engineered, reinforced concrete, residential building with a compartmented floor plan.

4.2.3.21 CONCRETE, ENGINEERED RESIDENTIAL BUILDING, MID-RISE (CERBM)

The CERBM model building is a five-story, engineered, reinforced concrete, residential building with a compartmented floor plan.

4.2.3.22 CONCRETE, ENGINEERED RESIDENTIAL BUILDING, HIGH-RISE (CERBH)

The CERBH model building is an eight-story, engineered, reinforced concrete, residential building with a compartmented floor plan.

4.2.3.23 CONCRETE, ENGINEERED COMMERCIAL BUILDING, LOW-RISE (CECBL)

The CECBL model building is a two-story, engineered, reinforced concrete, commercial building with an open floor plan.

4.2.3.24 CONCRETE, ENGINEERED COMMERCIAL BUILDING, MID-RISE (CECBM)

The CECBM model building is a five-story, engineered, reinforced concrete, commercial building with an open floor plan.

4.2.3.25 CONCRETE, ENGINEERED COMMERCIAL BUILDING, HIGH-RISE (CECBH)

The CECBH model building is an eight-story, engineered, reinforced concrete, commercial building with an open floor plan.

4.2.3.26 STEEL, PRE-ENGINEERED METAL BUILDING, SMALL (SPMBS)

The SPMBS model building is a 4,000 square foot, pre-engineered, steel frame, metal clad building.

4.2.3.27 STEEL, PRE-ENGINEERED METAL BUILDING, MEDIUM (SPMBM)

The SPMBS model building is a 50,000 square foot, pre-engineered, steel frame, metal clad building.

4.2.3.28 STEEL, PRE-ENGINEERED METAL BUILDING, LARGE (SPMBL)

The SPMBL model building is a 500,000 square foot, pre-engineered, steel frame, metal clad building.

4.2.3.29 STEEL, ENGINEERED RESIDENTIAL BUILDING, LOW-RISE (SERBL)

The SERBL model building is a two-story, engineered, steel frame, residential building with a compartmented floor plan.

4.2.3.30 STEEL, ENGINEERED RESIDENTIAL BUILDING, MID-RISE (SERBM)

The SERBM model building is a five-story, engineered, steel frame, residential building with a compartmented floor plan.

4.2.3.31 STEEL, ENGINEERED RESIDENTIAL BUILDING, HIGH-RISE (SERBH)

The SERBH model building is an eight-story, engineered, steel frame, residential building with a compartmented floor plan.

4.2.3.32 STEEL, ENGINEERED COMMERCIAL BUILDING, LOW-RISE (SECBL)

The SECBL model building is a two-story, engineered, steel frame, commercial building with an open floor plan.

4.2.3.33 STEEL, ENGINEERED COMMERCIAL BUILDING, MID-RISE (SECBM)

The SECBM model building is a five-story, engineered, steel frame, commercial building with an open floor plan.

4.2.3.34 STEEL, ENGINEERED COMMERCIAL BUILDING, HIGH-RISE (SECBH)

The SECBH model building is an eight-story, engineered, steel frame, commercial building with an open floor plan.

4.2.3.35 MANUFACTURED HOME, PRE-HUD (MHPHUD)

The MHPHUD model building is a manufactured home built prior to the 1976 HUD standard. The home can be either tied-down or unrestrained.

4.2.3.36 MANUFACTURED HOME, 1976 HUD (MH76HUD)

The MH76HUD model building is a manufactured home built to the 1976 HUD standard. The home can be either tied-down or unrestrained.

4.2.3.37 MANUFACTURED HOME, 1994 HUD REGION I (MH94HUD-I)

The MH94HUD-I model building is a manufactured home built to the 1994 HUD standard for Wind Zone I. The home can be either tied-down or unrestrained.

4.2.3.38 MANUFACTURED HOME, 1994 HUD REGION II (MH94HUD-II)

The MH94HUD-II model building is a manufactured home built to the 1994 HUD standard for Wind Zone II. The home can be either tied-down or unrestrained.

4.2.3.39 MANUFACTURED HOME, 1994 HUD REGION III (MH94HUD-III)

The MH94HUD-III model building is a manufactured home built to the 1994 HUD standard for Wind Zone III. The home can be either tied-down or unrestrained.

Section 5. General Building Stock: Baseline Database for Building Characteristics

The Hazus Occupancy and Building Types provide the framework for establishing the detailed Hazus baseline database for building characteristics. This section provides details on each of the main General Building Stock tabular database elements, including background information on how the database was developed.

Table 5-1 provides a general overview of the current status of the major General Building Stock tabular database elements by data type, hazard, and sources. Section 3 provides additional information on the geographic coverage of Hazus data.

Table 5-1 Baseline General Building Stock Database Summary Table

Tabular Data Type	Data Element	Hazards	Hazus 6.0 Dataset Source	Hazus 6.0 Dataset Date
Building Count	Building Count by Specific Occupancy	All	NSI 2022 (USACE)	2022
Building Area	Building Area by Specific Occupancy	All	NSI 2022 (USACE)	2022
Specific Occupancy to General Building Type	Mapping Scheme: Specific Occupancy to Gen. Bldg. Type	All	Applied Technology Council (ATC) 13 (ATC, 1985), FEMA (2019)[1]	1985
EQ General Building Type to EQ Specific Bldg. Type and Design Level	Mapping Scheme: Gen. Bldg. Type to EQ Spec. Bldg. Type and EQ Design Level	EQ, TS	ATC 13 (ATC, 1985)	1985
EQ Specific Building Type to Foundation Type	Mapping Scheme: Spec. Bldg. Type to Foundation Type	EQ, TS	Department of Energy (DOE)	1997
FL Specific Occupancy to Foundation Type	Mapping Scheme: Foundation Types to Specific Occupancy	FL, TS	DOE Reports	1997
HU General Building Type to HU Specific Building Type	Mapping Scheme: Gen. Bldg. Type to HU Spec. Bldg. Type	HU	Florida Residential Construction Mitigation Program (RCMP) database and Contractor Surveys[2]	1999 (CONUS) 2001 (HI) 2021 (PR, VI)
HU Specific Building Type to HU Wind Characteristics	Mapping Scheme: HU Spec. Bldg. Type to Wind Characteristics	HU	Florida RCMP database and Contractor Surveys[2]	1999 (CONUS) 2001 (HI) 2021 (PR, VI)

[1]Updates in 2019 for Puerto Rico and U.S. Virgin Islands were based on individual structure data and were not developed using the same methods as other Census GBS and NSI data (FEMA, 2019).
[2]Updates in 2001 for Hawaii (ARA, 2001) and 2021 for Puerto Rico and U.S. Virgin Islands (FEMA, 2021a) were based on individual structure data and were not developed using the same methods as other Census GBS and NSI data.

5.1 Background

Hazus 6.0 uses NSI 2022 data, 2020 Census data and primarily 2022 economic values. The valuations were updated at the structure level. The NSI 2022 is a more robust data source and includes many structure-level attributes to identify a structure's number of stories, type of basement, and other features when available (USACE, 2022). Although the current availability of the NSI 2022 data is not yet nationwide and Hazus weighting factors are still in use, in regions where the NSI 2022 data is available it has allowed for more precise evaluations.

Table 5-2 describes the input data used to develop the updated General Building Stock dataset.

Table 5-2 General Building Stock Input Data

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
NSI 2022	June 2022	USACE	Point-based structure inventories. Developed from Lightbox Parcel, NGA lidar, USA Structures and Bing footprints.	AK, HI, CONUS except DC	2010 Census and 2006 Dun & Bradstreet
DC Data	June 2022	FEMA NHRAP	Dataset developed from Open Data DC due to the lack of Lightbox Parcel Data for DC.	DC	2010 Census and 2006 Dun & Bradstreet
PR Data	2019	FEMA NHRAP	Polygon and point data of PR structures, occupancy types.	PR	U.S. Census Bureau
VI Data	July 2019	FEMA NHRAP	Polygon and point data of VI structures, Income Ratios, and additional attributes.	VI	Census and Landscan
Hazus College & University (EDU2) database	May 2022	Hazus Program Generated	Created from: 2022 HIFLD Open data, 2019 hzTract, 2022 hzMeansCountyLocationFactor (see Section 6.3) and 2022 College and University Replacement Cost Model (see Section 7.2.5.3.) Provides structure level EDU2 data. The number of students field to use is 'NumStudents. This file is used to replace the NSI 2022 EDU2 data.	All U.S.	2010 Census, 2006 Dun & Bradstreet, and NSI 1.0 (for Tsunami GBS only)
Income Ratios	June 2022	Hazus Program Generated	Income ratios developed from Census data. Calculated using the block group median income divided by state median income.	CONUS, AK, HI, PR[1]	U.S. Census Bureau

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
Hazus Replacement Cost Model and other Economic Models	2022	Hazus Program Generated	RSMeans derived values to calculate the valuation of structures and content, models for commercial inventory value and business interruption loss parameters (rent, relocation, income and wages). Derived from RSMeans (RSMeans, 2022a); also uses data from U.S. Census 2020 Manufactured Housing Survey Annual Data (for RES2), Bureau of Economic Analysis (BEA)(2022a and b) and Bureau of Labor Statistics (BLS) (2022). See Section 6.	All U.S.	2018 RSMeans derived

[1]*No income ratio data were available for the Pacific Territories (AS, GU, MP).*

5.2 Building Characteristics

Building characteristics are an important component of the General Building Stock. This section provides information regarding building characteristics used in Hazus such as number of buildings and other building attributes such as area, height and age.

5.2.1 Housing Units

The NSI 2022 dataset was used to populate housing unit values in Hazus 6.0. Information regarding the methodology and assumptions used by USACE in creating the NSI 2022 data can be found in the *NSI 2022 Technical Documentation* (USACE, 2022).

The evaluation of NSI 2022 showed notably high values for RES3F residential units in 13 states. To mitigate these erroneous values, a calibration factor derived from 2020 U.S. Census block data was developed and applied to each structure in all states in order to correct even small over or under assignments of units. The calibration factor was calculated for each Census block by first identifying the difference between the sum of the NSI 2022 residential units (RES1-RES3F) and the Census residential units, then subtracting this value from the sum of the NSI 2022 RES3 units (RES3A-F) and then dividing that total by the sum of the NSI residential units (RES1-RES3F). This calibration factor was then multiplied by the sum of the NSI 2022 residential units (RES1-RES3F) to calculate the new RES3 residential values rounded to the nearest whole number.

RES3 structures were then reclassified to ensure that the number of residential units matched their RES3A-F designation. Finally, the square footage of all RES3 units was compared to their corresponding values in the Hazus Study Region SQL table hzSqftFactors. If the square footage exceeded 3 times the hzSqftFactor value, then it was reassigned the maximum value of 3 times the hzSqftFactor value.

Likewise, if the value was less than 3 times less than the average value, it was assigned the minimum value to reduce anomalies. Table 5-3 summarizes the values used for RES3 calibrations.

Table 5-3 hzSqftFactor Values used for RES3 Calibrations

Occupancy	Square Footage	3x Minimum Value	3x Maximum Value
RES3A	2,200	733	6,600
RES3B	4,400	1,467	13,200
RES3C	8,000	2,667	24,000
RES3D	15,000	5,000	45,000
RES3E	40,000	13,333	120,000
RES3F	80,000	26,667	240,000

5.2.2 Building Counts

Building counts were taken directly from NSI 2022 data where available, and from equivalent data in other areas (e.g., District of Columbia, Puerto Rico, U.S. Virgin Islands), then aggregated to the Census block-level. Information regarding the methodology and assumptions used by USACE in creating the NSI 2022 data can be found in the *NSI 2022 Technical Documentation* (USACE, 2022).

5.2.3 Building Area

For Hazus, building areas were taken directly from NSI 2022 data where available, and from equivalent data in other areas (e.g., District of Columbia, Puerto Rico, U.S. Virgin Islands), as noted in Table 3-19. The NSI 2022 method used parcel data records of square feet whenever available[1]. In the absence of this data, square footage was assigned from regional distributions that vary by occupancy type.

NSI 2022 estimates of square footage were based on building footprints when available. In the absence of parcel data and footprint data, square footage was estimated solely using the generic assumption regarding average square feet per employee. Square footage was kept between an established minimum and maximum range shown in Table 5-4. Information regarding the methodology and assumptions used by USACE in creating the NSI 2022 data can be found in the *NSI 2022 Technical Documentation* (USACE, 2022).

[1] There was one anomalous RES1 square footage value for a single structure in Cherokee County, SC that was removed to reduce the overall RES1 Census Block square footage to a reasonable value. For more information and frequently asked questions regarding the NSI database, please visit https://www.hec.usace.army.mil/confluence/nsi/technicalreferences/latest/frequently-asked-questions.

Table 5-4 NSI 2022 Occupancy Type Areas

Occupancy Type	Average SqFt Per Unit or Employee[1]	Average SqFt Per Floor	Minimum SqFt	Maximum SqFt
RES1	1,500	1,500	500	5,000
RES2	1,000	1,500	500	2,000
RES3A	1,500	1,500	500	1,161,500
RES3B	750	1,500	500	1,161,500
RES3C	800	3,000	500	1,161,500
RES3D	750	5,000	500	1,161,500
RES3E	700	5,600	1,500	1,161,500
RES3F	650	5,200	1,500	1,161,500
RES4	825	12,000	1,100	1,161,500
RES5	825	69,000	6,900	183,300
RES6	300	30,000	1,500	242,600
COM1	400	9,200	1,100	61,000
COM2	500	33,000	1,100	61,000
COM3	300	12,000	1,100	61,000
COM4	250	13,000	1,100	930,000
COM5	300	7,000	1,100	38,100
COM6	300	14,000	2,600	410,300
COM7	300	15,000	2,600	327,000
COM8	200	11,000	1,100	223,800
COM9	825	16,000	1,100	223,800
COM10	900	46,000	1,100	287,000
IND1	550	51,000	2,300	200,600
IND2	590	17,000	2,300	200,600
IND3	540	31,000	2,300	200,600
IND4	730	31,000	2,300	200,600
IND5	300	21,000	2,300	200,600
IND6	250	10,000	2,300	200,600
AGR1	250	10,000	1,100	200,600
REL1	300	10,000	1,100	235,300
GOV1	250	19,000	1,100	930,000
GOV2	250	7,000	1,100	31,600
EDU1	150	61,000	1,100	410,800
EDU2	300	66,000	1,100	196,200
NoMatch	500	20,000	1,100	930,000

[1]*Note: The methodology for average square foot per unit or employee includes the summation of the number of employees, students, and institutionalized and nursing home population for the non-residential population.*

5.2.4 Building Height

The NSI 2022 dataset was used to populate building height values in Hazus 6.0. Information regarding the methodology and assumptions used by USACE in creating the NSI 2022 data can be found in the *NSI 2022 Technical Documentation* (USACE, 2022).

5.2.5 Building Age

The age of a building is important because the building codes (and the expected building performance) change over time. For example, with flooding hazards, development regulations change when a community enters the NFIP. The Census building age data are used to determine the percent of structures that were built before the community entered the NFIP and adopted the Flood Insurance Rate Map (FIRM). These initial maps, denoted as pre-FIRM data, with those issued afterwards being denoted as post-FIRM data. Building age data is used for all hazards to assist in establishing the hazard-specific mapping schemes as described later in this section.

At the block group level, Census data provides household counts by a range of years, typically decades, for construction. In assigning the age of buildings, the Hazus Methodology assumes that typical development practices result in the homogenous development of all blocks within a single block group. The median year of construction is used in the preparation of several key inventory attributes; however, during analysis, it is only used for flood depreciation losses.

Hazus assumes the same distribution of building age for all specific occupancies. In other words, the commercial/industrial development and the residential development throughout the block group are assumed to occur concurrently. Based on this assumption, the Census block group age is distributed throughout the constituent Census blocks relating to both residential and non-residential development. After completing this based on the most recent U.S. Census American Community Survey (ACS) 2020 data, a significant number of blocks and tracts with zero or unusual median year-built dates were identified that also had construction dates recorded by decade. In those cases, the construction dates by decade were used to compute a median year-built date.

The NSI 2022 dataset, which includes construction years obtained from parcel information, was used to update the NSI tsunami inventories as discussed in Section 5.8.

5.3 Garages

The NSI 2022 garage data were only sparsely populated, predominantly for non-residential structures. Table 5-5 shows the RES1 default percentages of garage type distributions.

Table 5-5 Distribution of Garage Types for Single-Family Residential Structures (% of total)

Census Region[1]	One-Car[2]	Two-Car	Three-Car	Carport	None
Northeast	29%	31%	5%	2%	33%
Midwest	21%	51%	9%	2%	17%
South[3]	14%	39%	4%	8%	35%

Census Region[1]	One-Car[2]	Two-Car	Three-Car	Carport	None
West	16%	51%	11%	6%	16%

[1]Census region list of states and territories provided in Table 3-1.

[2]Based on EIA, 2009 Residential Energy Consumption Survey, Final Release April 2013, Structural and Geographic Characteristics of U.S. Homes, by Census region.

[3]Updates in 2019 for Puerto Rico and U.S. Virgin Islands were based on individual structure data and did not use this approach, see detailed methods provided in FEMA (2021a).

5.4 All Hazards Mapping Scheme

As noted in Table 5-1 at the beginning of the section, all hazards use the same mapping scheme to link specific occupancy to general building type. The term "mapping scheme" in Hazus relates to the use of one or multiple lookup tables to link related data elements, such as specific occupancy with general building type. Mapping schemes for the Western U.S. buildings (pre-1950, 1950-1970, and post-1970) are based on information provided in the Earthquake Damage Evaluation Data for California publication by the Applied Technology Council (ATC-13, 1985). The mapping schemes for the rest of the U.S. are based on proprietary insurance data, knowledge of a limited number of experts, and inferences drawn from tax assessor's records.

For detailed tables with the general mapping scheme for all hazards, from specific occupancy to general building types, and the mapping schemes for earthquake specific building types, see Appendix A.

5.5 Other Earthquake Building Characteristics

The only other mapping scheme for the Earthquake Model used in Hazus is earthquake specific building type to foundation type. Hazus assumes a shallow foundation as the default value for structures. More details on this assumption can be found in the *Hazus Earthquake Model Technical Manual* (FEMA, 2022a).

5.6 Other Flood Building Characteristics

In Hazus, the only flood specific mapping scheme included is flood specific occupancy to foundation type, which ultimately leads to FFHAG based on foundation type. It is important to note that FFHAG is not synonymous with first floor elevation or lowest floor elevation. FFHAG is the assumed number of feet above the ground surface to the top of the finished floor. Flood General Building Stock data requires information on year built relative to the NFIP community Entry Year to infer pre-FIRM and post-FIRM construction, which impacts FFHAG assumptions and, in conjunction with the number of stories, the selection of damage function used to estimate flood damages. For more information, see the *Hazus Flood Model Technical Manual* (FEMA, 2022d).

5.6.1 Block Type Designation

Within the Flood Model, each Census block is designated as being subject to either Coastal ("C"), Riverine ("R") or Great Lakes-type flooding ("L"). States with the potential for coastal flooding include Alabama, Alaska, California, Connecticut, Delaware, Florida, Georgia, Hawaii, Louisiana, Maine,

Maryland, Massachusetts, Mississippi, New Hampshire, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Virginia and Washington. States with the potential for Great Lakes-type flooding include Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin. The assignment of Block Type, and the associated assignment of NFIP entry date is used in the flSchemeMapping table in Hazus.

Table 5-6 describes input data and data source information used to create the Flood Model's Block Type, stored in the Hazus flSchemeMapping table.

Table 5-6 Block Type Designation Input Data

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
hzCommunity_ Block	2022	Hazus Program Generated	Hazus Community Boundary Layer in Census blocks (see Section 3.4).	All U.S.	NFIP CIS data
National Flood Hazard Layer (NFHL)	2022	FEMA	NFHL dataset available for download from FEMA.	Coastal states, Great Lakes, PR and VI	Q3 data
Hazus Dasymetric and TIGER Census Blocks	2022	Hazus Program Generated	Hazus Census block feature class modified through processing as identified in Section 3.2.	Coastal states, Great Lakes, PR and VI	Census block feature class
Hazus Shoreline	2022	Hazus Program Generated	Shoreline feature class provided in Hazus 5.1 for coastal flood analysis.	Coastal states, Great Lakes, PR and VI	Hazus shoreline
USGS HUC-8	May 2022	USGS	Watershed Boundary Dataset contains the Hydrologic Units by Hydrologic Unit Code.	All U.S.	National Hydrography Dataset 2014
NFIP Community Status Information	2022	FEMA	NFIP Community Status Book.	All U.S.	NFIP Community Status Book 2014

The methodology to identify and attribute the coastal Census Block Type field selected any Census block (dasymetric from Hazus) that intersects any of the following areas:

- Buffered coastal flood zones from the NFHL (buffer distances and flood zones identified in Table 5-7).
- Buffered Hazus coastline (buffer = 0.5 miles).
- Buffered areas of NFHL flood zones designated "OPEN WATER" (buffer=0.5 miles).

Within the NFHL there are several combinations of the flood zone with flood zone subtype. The various combinations, including the buffer distance, are listed in Table 5-7.

Table 5-7 Combinations of NFHL Flood Zone and Flood Zone Subtype Considered Coastal

Coastal V (Buffer = 2,000 feet)
V
V, COASTAL FLOODPLAIN
VE
VE, COASTAL FLOODPLAIN
VE, RIVERINE FLOODWAY SHOWN IN COASTAL ZONE
Coastal A (Buffer = 500 feet)
A, COASTAL FLOODPLAIN
AE, COASTAL FLOODPLAIN
AE, COMBINED RIVERINE AND COASTAL FLOODPLAIN
AE, RIVERINE FLOODWAY IN COMBINED RIVERINE AND COASTAL ZONE
AE, RIVERINE FLOODWAY SHOWN IN COASTAL ZONE
AO, COASTAL FLOODPLAIN

The methodology used to identify and attribute Great Lakes shoreline Census Block Type was as follows:

- The HUC-8 watershed boundaries for each of the five Great Lakes was used as the coastal designator with a 0.5-mile buffer applied to that shoreline. The HUC-8 boundaries were used because the Hazus shoreline was not isolated to the lakes themselves and also included the rivers that connected each Great Lake. Since these rivers were not a part of the Great Lakes, and therefore would not produce Great Lake type coastal flooding events, it was determined that the analysis should only focus on the Great Lakes shoreline instead.

- As with the coastal blocks, two NFHL buffers was added to better encompass the shoreline blocks. The NFHL areas used were selected by intersecting the NFHL polygons and the HUC-8 Great Lakes polygons, then removing all polygons within the NFHL that were not located within the Special Flood Hazard Area (SFHA), limiting areas to within the regulatory floodplain. This process also removed polygons not associated with stillwater areas. A buffer was then applied to the Zone A's and Zone V's as described in Table 5-7.

The coastal and Great Lake shoreline approach required several manual exceptions as listed in Table 5-8.

Table 5-8 Coastal and Great Lake Shoreline Approach - Manual Exceptions

State	Manual Exception
California	Selection of coastal blocks in California included an additional 500-foot buffer on AE zones with a Static Base Flood Elevation (BFE) greater than -5 feet and less than or equal to 8 feet. The 8 feet criteria was used primarily to deal with stillwater areas at the confluence of the Sacramento and San Joaquin Rivers.
Florida	▪ Lake Okeechobee in FL was manually reset to "R" because it's not a Great Lake, and while there are waves on Lake Okeechobee, it is surrounded by dikes which are not expected to be developed. Because it has been assumed that the "Lakes" designation is intended to apply specifically to the Great Lakes, Lake Okeechobee was reset to "R". ▪ Monroe County, FL used a 1-mile coastline buffer because the Hazus shoreline is generalized and does not adequately delineate the island boundaries.
Georgia	Islands statewide in Georgia are wide (front to back), not typical barrier islands – these are sea islands. For selected Counties (Bryan County, Camden County, Chatham County, Glynn County, Liberty County, and McIntosh County), the 1-mile coastline buffer was used.
Michigan	▪ The AE Zone for Lake Charlevoix was offset from the Lake HUC-8, missing the selection criteria, so the lake Zone AE with a buffer of 500 feet was added in manually. ▪ The coastline for Lake St. Clair was added and buffered by 0.5-miles. The coastline used was the Hazus coastline since the HUC-8 extended too far outside the lake boundary.
New Jersey	In Middlesex County, the "Open Water" buffer includes an erroneous land-locked sliver; the Census blocks comprising the sliver were manually reset to "R."
South Carolina	Islands in southern South Carolina are wide (front to back), not typical barrier islands – these are sea islands. For selected Counties in South Carolina (Beaufort County, Charleston County, Colleton County, and Jasper County), the 1-mile coastline buffer was used.
Virginia	In the Virginia tidewater areas, the 0.5-mile coastline buffer is insufficient because the area is very flat; selected Counties (Hampton County, Newport News County, Poquoson County, and York County) used the 1-mile coastline buffer.

The identification of the coastal or lake Block Type had several limitations due to coastline or flood data limitations as described in Table 5-9.

Table 5-9 Census Block Type Data Limitations

State	Limitations
Alaska	There are no flood hazard maps in Ketchikan, and the coastline doesn't adequately capture the associated waterway, so coastal blocks are not identified in the vicinity of the unmapped waterway.

State	Limitations
Delaware/ Maryland	The NFHL flood zones were used to identify coastal blocks since the Hazus coastline does not always directly follow the coast. While improving the analysis a few gaps were still identified due to an imprecise shoreline and a lack of mapped flood hazard zones. The including the following areas: Cape Windsor, inland of Fenwick Island, in the unincorporated areas of Sussex Co, DE and Worchester, MD where the coastline does not follow the bay behind Ocean City. In Worchester the addition of the open water buffer did improve the coastal identification.
Illinois	With the addition of the flood zones along the lake shore, the lake coastal designation extends further inland within Chicago than in the previous version.
Minnesota	There is a gap in the NFHL data within the city of Duluth on the MN side of the WI/MN county line, however the WI flood zones do capture part of the lake coast blocks along the St. Louis River.
New York/New Jersey	On the inland side of Staten Island, neither the coastal flood data nor the coastline picked up the Arthur Kill waterway. On the east side of Manhattan, the coastline does not follow the East River, and there is no coastal flood data. These areas are not identified as coastal.
Oregon	Siletz Bay, Yaquina Bay in Lincoln County, and Coos Bay in Coos County are not represented in the NFHL as having Open Water areas, but are mapped as AE, where a portion is a static BFE and a portion is not. Since the flood hazard maps do not have Open Water or V zones, these areas are not flagged as coastal blocks.
Puerto Rico	The two bays to the east of San Juan (Laguna San Jose and Laguna La Torrecilla) are not labeled as coastal since they are A Zones with low static BFE. Some of these flood zones are not labeled with a coastal label and would likely be coastal using a manual setting.
South Carolina	The coastline near Charleston does not capture the Mt. Pleasant area east of Charleston (the mainland) because the coastline follows the barrier island coast only. As noted in Table 5-8, an exception to the processing rule (1-mile coastline buffer instead of 0.5-mile) is applied to help address this issue.
Texas	▪ Port Arthur and Beaumont, Jefferson County, TX, were not identified to have Coastal Census blocks because of the lack of NFHL data. Also, the shoreline does not follow the Sabine River, so a coastline buffer was not able to identify it either. ▪ Within Corpus Christi, TX there is no NFHL data and the coastline does not follow Corpus Christi Bay.
Virginia/DC/ Maryland	A limit of V zones differs from limit of tidal influence in City of Alexandria, VA; County of Arlington, VA; Fairfax County, VA; Prince George's County, MD and Washington, DC. This means that there are no coastal blocks in these areas, despite being tidally influenced. Coastal Census blocks are therefore only identified in areas in the vicinity of the Hazus shoreline. A similar issue occurred in Baltimore MD, where the coastline does not adequately reflect the boundaries of the inner harbor, effectively missing several backwater areas. The addition of the open water buffer improved this.

The flSchemeMapping layer was developed by starting with the hzCommunity_Block layer (Section 3.4) comprised of duplicate blocks (if the blocks were located within a Tribal or SLUA boundary) and

attributing the blocks with percentages based on how much of the block resided within each jurisdiction. The Census block was assigned the CID of the jurisdiction with the largest percentage of Census block's geographic area. However, along the outer edges of the Tribal and SLUA communities, where there were no other neighboring communities, the percentages of the Tribal or SLUA communities within each Census block was generally low, catching only slivers. The flSchemeMapping layer was created using the fields described in Table 5-10.

Table 5-10 flSchemeMapping Layer Field Descriptions

Field Name	Description
CensusBloc	The Census blocks used were the same ones used while compiling the hzCommunity_Block layer. However, since the hzCommunity_Block layer contains duplications where Tribal lands and SLUAs overlap, they were reduced to single instances of each block.
SchemeId	Scheme ID is a concatenation of State Abbreviation, BlockType and "0001". The State Abbreviation is derived from the first two digits of the Census block number. The Block Type is R, C, or L and is described previously in this section.
EntryDate	The Entry Date is taken from the NFIP Community Status Information. The Entry Date was assigned by selecting the earliest of the three tabulated dates: Emergency Program Start Date, Flood Hazard Boundary Map (FHBM) Start Date, or Regular Program Entry Date. This means a community, for the purpose of applying post-FIRM Hazus riverine and coastal mapping schemes, begins to see a potential reduction in losses based on the earliest date rather than the final regular program Entry Date. Communities that have not yet entered the regular program also may have post-FIRM schemes applied. The approach reflects the assumption that activities to help mitigate flood losses in the flood hazard areas are occurring before the regular program Entry Date. These Entry Dates were then combined with the Area_ID numbers in the hzCommunty_Block layer to attach an Entry Date for each community within the hzCommunity_Block layer. Since a Census block could fall within both a Jurisdiction and Tribal area, or within a Jurisdiction and a SLUA, the process of determining which Entry Date was assigned included: ▪ For non-overlapping Census blocks, the Jurisdiction Entry Date was chosen. If the date was NULL or 0, a "0" was input into the EntryDate Column. ▪ For overlapping Census blocks, if the percentage of the Tribal or SLUA blocks was <50%, then the Jurisdiction Entry Date was chosen. ▪ If the Tribal or SLUA was ≥ 50%, but did not have a CID, then the Jurisdiction was chosen. ▪ If the Tribal or SLUA was ≥ 50%, and did have a CID, then the Tribal or SLUA date was chosen.

5.6.2 Building Year Built and Pre-FIRM/Post-FIRM Designation

The U.S. Congress established the NFIP with the passage of the National Flood Insurance Act of 1968. Therefore, all buildings built before the community entered the NFIP are designated as pre-FIRM. Post-FIRM designations are based on the year the community (viewed by Census block in the Flood Specific Occupancy Mapping) started participating in the NFIP. Users can edit the entry date and modify pre-FIRM/post-FIRM designations.

In the baseline General Building Stock, the percent of pre-FIRM and post-FIRM buildings in each Census block is estimated during the flood loss analysis using household counts built by decade (pre-1940, 1940-1949, 1950-1959, 1960-1969, 1970-1979, 1980-1989, 1990-1999, 2000-2009, 2010-2013, post-2013) from Census data and the date of community entry into the NFIP. For the decade in which the community entered the NFIP, buildings are entirely distributed to post-FIRM. Non-residential buildings were not included in the previously described counts. An NFIP entry date after 2013 will result in a post-FIRM percentage based on the households in the post-2013 range.

Additionally, users should note that customizations of pre and post-FIRM distributions will not result in a substantial change in losses in riverine flood zones due to a lack of substantive differences between default pre-FIRM and post-FIRM mapping schemes as shown in Table 5-11. Customization of pre- and post-FIRM mapping schemes can be completed by users, however, due to current limitations in the graphical user interface it is recommended that interested users contact the Hazus Help Desk (see Section 1.5).

5.6.3 Flood Foundation Types

The distribution of Flood Specific Occupancy Mapping foundations, the associated FFHAGs, and the pre/post-FIRM relationships are the controlling parameters affecting flood damage within the model. The Flood Model allows the user to define or control these parameters in the Flood Specific Occupancy Mapping dialogs. The FFHAG dialogs are not functional in Hazus 6.0. This section will focus on the process by which the foundation distributions and the first-floor heights above grade are defined.

To optimize processing, General Building Stock distribution tables that contain the percentages of both pre- and post-FIRM foundation type distributions are incorporated into Study Regions during aggregation. These are provided for Riverine, Coastal and Lake distribution schemes for every State. The distributions include Block Type (Riverine, Coastal, or Lake), specific occupancy, number of stories or split level, pre- or post-FIRM, Foundation Types, and, in the case of Coastal schemes, the distributions within Coastal A and V zones are provided. Also, for non-residential specific occupancies, the building age data is a data field used to assign unique values as provided in the precompiled flood mapping schemes (see Table 5-11).

Some additional considerations for these assignments:

- Mapping schemes are provided for pre- and post-FIRM development and applied at the Census block based on the community's entry date into the NFIP as reported in the Community Status Book (see Section 5.6.1). With the pre- and post-FIRM assignments, Hazus treats the entire Study Region as if SFHA regulations are in effect, not just areas designated on a community's FIRM.

- Block Type assignments (see Section 5.6.1) assume "R" riverine unless within a "C" coastal region or "L" Great Lakes, for Census blocks that are immediately adjacent to the Great Lakes. For those Census blocks with both riverine and coastal hazards, it is assumed that the coastal foundation practices will dominate, since the building codes for coastal hazards are more stringent, so these blocks are coded as "C" (coastal) or "L" (lake). This Block Type assignment determines the foundation types and FFHAG described in this section.

To develop a distribution of foundation types, the following foundation definitions are used:

- *Pile:* An open foundation, composed of tall and slender members, embedded deeply into the ground. A pile is a single element, not built-up on site like a pier. Cast-in-place columns supported by a deep foundation (pile cap, mat, or raft below the anticipated scour depth) are classified as a pile foundation. In some pile-supported buildings, shear walls may be used to transfer shear from the upper building to the embedded foundation elements.

- *Pier:* An open foundation (no load-bearing perimeter walls) usually built of masonry units and supported by shallow footings. Piers usually range from approximately 2 feet to 8 feet in height.

- *Solid Wall:* Load-bearing perimeter walls greater than 4 feet in height, usually supported by shallow footings. Floor beams or joists usually rest atop the walls and may or may not be supported by interior piers or columns.

- *Basement or Garden-Level Basement:* Any level or story with its floor subgrade on all sides. Usually load bearing, masonry or concrete walls around the perimeter of the building, supported on shallow footings. Floor beams or joists rest atop the walls. Shallow basements with windows slightly above grade are defined as a garden level basement.

- *Crawlspace:* Usually short (less than 4 feet high), load bearing, masonry or concrete walls around the perimeter of the building footprint, supported on shallow footings. Floor beams or joists rest atop the walls and may also rest on interior piers.

- *Fill:* Soil built up above the natural ground elevation and used to support a slab or shallow footings.

- *Slab-on-Grade:* Concrete slab resting on the ground. It may have its edges thickened or turned down but does not rely on other walls or footings for support.

The Hazus Flood Model further classifies RES3 and non-residential categories into types by NUM_STORIES, however, there are not unique flood depth damage functions for those types. Rules can be developed to help reduce anomalies potentially based on other data sources such as land use, Census urban areas, or limits that can be established based on occupancy type.

Contact the Hazus Help Desk (see Section 1.5) for guidance on best practices to customize General Building Stock source data related to mapping schemes within a Study Region.

5.6.3.1 FIRST FLOOR HEIGHT ABOVE GRADE

Figure 5-1 shows two examples: FFHAG for a structure with basement, and FFHAG for a structure with a slab foundation. The default FFHAG values set for the entire United States are shown in Table 5-11. The default FFHAG values are read-only in Hazus 6.0. There are 168 combinations that yield 56 unique FFHAG IDs. Contact the Hazus Help Desk (see Section 1.5) for guidance on best practices to customize specific variables related to FFHAG values.

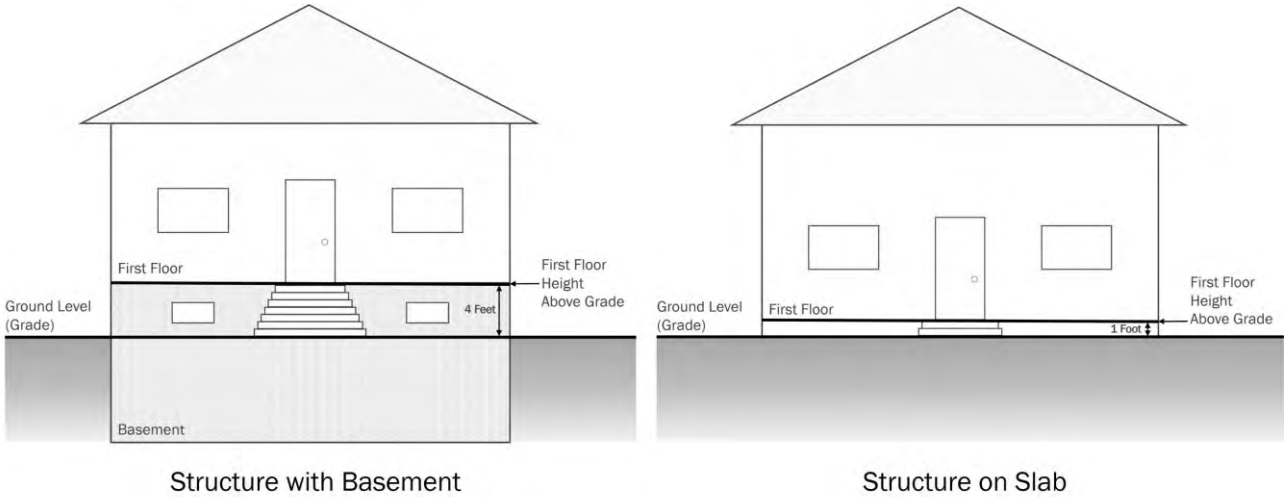

Figure 5-1 First Floor Height Above Grade for Structure with Basement and Structure on Slab

Table 5-11 Default First Floor Height Above Grade Set

ID	FIRM	Block Type	Zone	Foundation	Basement	First Floor Height (ft.)
1	Pre-	Riverine[1]	Zone A Coastal	Pile	N	7
1	Pre-	Riverine[1]	Zone CA Coastal	Pile	N	7
1	Pre-	Riverine[1]	Riverine	Pile	N	7
1	Pre-	Riverine[1]	Zone V Coastal	Pile	N	7
2	Pre-	Riverine[1]	Zone A Coastal	Pier	N	5
2	Pre-	Riverine[1]	Zone CA Coastal	Pier	N	5
2	Pre-	Riverine[1]	Riverine	Pier	N	5
2	Pre-	Riverine[1]	Zone V Coastal	Pier	N	5
3	Pre-	Riverine[1]	Zone A Coastal	Solid Wall	N	7
3	Pre-	Riverine[1]	Zone CA Coastal	Solid Wall	N	7
3	Pre-	Riverine[1]	Riverine	Solid Wall	N	7
3	Pre-	Riverine[1]	Zone V Coastal	Solid Wall	N	7
4	Pre-	Riverine[1]	Zone A Coastal	Basement/Garden	B	4
4	Pre-	Riverine[1]	Zone CA Coastal	Basement/Garden	B	4
4	Pre-	Riverine[1]	Riverine	Basement/Garden	B	4
4	Pre-	Riverine[1]	Zone V Coastal	Basement/Garden	B	4
5	Pre-	Riverine[1]	Zone A Coastal	Crawl Space	N	3
5	Pre-	Riverine[1]	Zone CA Coastal	Crawl Space	N	3
5	Pre-	Riverine[1]	Riverine	Crawl Space	N	3
5	Pre-	Riverine[1]	Zone V Coastal	Crawl Space	N	3

ID	FIRM	Block Type	Zone	Foundation	Basement	First Floor Height (ft.)
6	Pre-	Riverine[1]	Zone A Coastal	Fill	N	2
6	Pre-	Riverine[1]	Zone CA Coastal	Fill	N	2
6	Pre-	Riverine[1]	Riverine	Fill	N	2
6	Pre-	Riverine[1]	Zone V Coastal	Fill	N	2
7	Pre-	Riverine[1]	Zone A Coastal	Slab on Grade	N	1
7	Pre-	Riverine[1]	Zone CA Coastal	Slab on Grade	N	1
7	Pre-	Riverine[1]	Riverine	Slab on Grade	N	1
7	Pre-	Riverine[1]	Zone V Coastal	Slab on Grade	N	1
8	Post-	Riverine[2]	Zone A Coastal	Pile	N	8
8	Post-	Riverine[2]	Zone CA Coastal	Pile	N	8
8	Post-	Riverine[2]	Riverine	Pile	N	8
8	Post-	Riverine[2]	Zone V Coastal	Pile	N	8
9	Post-	Riverine[2]	Zone A Coastal	Pier	N	6
9	Post-	Riverine[2]	Zone CA Coastal	Pier	N	6
9	Post-	Riverine[2]	Riverine	Pier	N	6
9	Post-	Riverine[2]	Zone V Coastal	Pier	N	6
10	Post-	Riverine[2]	Zone A Coastal	Solid Wall	N	8
10	Post-	Riverine[2]	Zone CA Coastal	Solid Wall	N	8
10	Post-	Riverine[2]	Riverine	Solid Wall	N	8
10	Post-	Riverine[2]	Zone V Coastal	Solid Wall	N	8
11	Post-	Riverine[2]	Zone A Coastal	Basement/Garden	B	4
11	Post-	Riverine[2]	Zone CA Coastal	Basement/Garden	B	4
11	Post-	Riverine[2]	Riverine	Basement/Garden	B	4
11	Post-	Riverine[2]	Zone V Coastal	Basement/Garden	B	4
12	Post-	Riverine[2]	Zone A Coastal	Crawl Space	N	4
12	Post-	Riverine[2]	Zone CA Coastal	Crawl Space	N	4
12	Post-	Riverine[2]	Riverine	Crawl Space	N	4
12	Post-	Riverine[2]	Zone V Coastal	Crawl Space	N	4
13	Post-	Riverine[2]	Zone A Coastal	Fill	N	2
13	Post-	Riverine[2]	Zone CA Coastal	Fill	N	2
13	Post-	Riverine[2]	Riverine	Fill	N	2
13	Post-	Riverine[2]	Zone V Coastal	Fill	N	2
14	Post-	Riverine[2]	Zone A Coastal	Slab on Grade	N	1
14	Post-	Riverine[2]	Zone CA Coastal	Slab on Grade	N	1
14	Post-	Riverine[2]	Riverine	Slab on Grade	N	1

ID	FIRM	Block Type	Zone	Foundation	Basement	First Floor Height (ft.)
14	Post-	Riverine[2]	Zone V Coastal	Slab on Grade	N	1
15	Pre-	Coastal[3]	Zone A Coastal	Pile	N	7
15	Pre-	Coastal[3]	Zone CA Coastal	Pile	N	7
15	Pre-	Coastal[3]	Riverine	Pile	N	7
15	Pre-	Coastal[3]	Zone V Coastal	Pile	N	7
16	Pre-	Coastal[3]	Zone A Coastal	Pier	N	5
16	Pre-	Coastal[3]	Zone CA Coastal	Pier	N	5
16	Pre-	Coastal[3]	Riverine	Pier	N	5
16	Pre-	Coastal[3]	Zone V Coastal	Pier	N	5
17	Pre-	Coastal[3]	Zone A Coastal	Solid Wall	N	7
17	Pre-	Coastal[3]	Zone CA Coastal	Solid Wall	N	7
17	Pre-	Coastal[3]	Riverine	Solid Wall	N	7
17	Pre-	Coastal[3]	Zone V Coastal	Solid Wall	N	7
18	Pre-	Coastal[3]	Zone A Coastal	Basement/Garden	B	4
18	Pre-	Coastal[3]	Zone CA Coastal	Basement/Garden	B	4
18	Pre-	Coastal[3]	Riverine	Basement/Garden	B	4
18	Pre-	Coastal[3]	Zone V Coastal	Basement/Garden	B	4
19	Pre-	Coastal[3]	Zone A Coastal	Crawl Space	N	3
19	Pre-	Coastal[3]	Zone CA Coastal	Crawl Space	N	3
19	Pre-	Coastal[3]	Riverine	Crawl Space	N	3
19	Pre-	Coastal[3]	Zone V Coastal	Crawl Space	N	3
20	Pre-	Coastal[3]	Zone A Coastal	Fill	N	2
20	Pre-	Coastal[3]	Zone CA Coastal	Fill	N	2
20	Pre-	Coastal[3]	Riverine	Fill	N	2
20	Pre-	Coastal[3]	Zone V Coastal	Fill	N	2
21	Pre-	Coastal[3]	Zone A Coastal	Slab on Grade	N	1
21	Pre-	Coastal[3]	Zone CA Coastal	Slab on Grade	N	1
21	Pre-	Coastal[3]	Riverine	Slab on Grade	N	1
21	Pre-	Coastal[3]	Zone V Coastal	Slab on Grade	N	1
22	Post-	Coastal[4]	Zone A Coastal	Pile	N	8
22	Post-	Coastal[4]	Zone CA Coastal	Pile	N	8
22	Post-	Coastal[4]	Riverine	Pile	N	8
22	Post-	Coastal[4]	Zone A Coastal	Pier	N	6
23	Post-	Coastal[4]	Zone CA Coastal	Pier	N	6
23	Post-	Coastal[4]	Riverine	Pier	N	6

ID	FIRM	Block Type	Zone	Foundation	Basement	First Floor Height (ft.)
23	Post-	Coastal[4]	Zone A Coastal	Solid Wall	N	8
23	Post-	Coastal[4]	Zone CA Coastal	Solid Wall	N	8
24	Post-	Coastal[4]	Riverine	Solid Wall	N	8
24	Post-	Coastal[4]	Zone A Coastal	Basement/Garden	B	4
24	Post-	Coastal[4]	Zone CA Coastal	Basement/Garden	B	4
24	Post-	Coastal[4]	Riverine	Basement/Garden	B	4
25	Post-	Coastal[4]	Zone A Coastal	Crawl Space	N	4
25	Post-	Coastal[4]	Zone CA Coastal	Crawl Space	N	4
25	Post-	Coastal[4]	Riverine	Crawl Space	N	4
25	Post-	Coastal[4]	Zone A Coastal	Fill	N	2
26	Post-	Coastal[4]	Zone CA Coastal	Fill	N	2
26	Post-	Coastal[4]	Riverine	Fill	N	2
26	Post-	Coastal[4]	Zone A Coastal	Slab on Grade	N	1
26	Post-	Coastal[4]	Zone CA Coastal	Slab on Grade	N	1
27	Post-	Coastal[4]	Riverine	Slab on Grade	N	1
27	Post-	Coastal[4]	Zone A Coastal	Pile	N	8
27	Post-	Coastal[4]	Zone CA Coastal	Pile	N	8
27	Post-	Coastal[4]	Riverine	Pile	N	8
28	Post-	Coastal[4]	Zone A Coastal	Pier	N	6
28	Post-	Coastal[4]	Zone CA Coastal	Pier	N	6
28	Post-	Coastal[4]	Riverine	Pier	N	6
28	Post-	Coastal[4]	Zone A Coastal	Solid Wall	N	8
29	Post-	Coastal[5]	Zone V Coastal	Pile	N	8
30	Post-	Coastal[5]	Zone V Coastal	Pier	N	8
31	Post-	Coastal[5]	Zone V Coastal	Solid Wall	N	8
32	Post-	Coastal[5]	Zone V Coastal	Basement/Garden	B	4
33	Post-	Coastal[5]	Zone V Coastal	Crawl Space	N	4
34	Post-	Coastal[5]	Zone V Coastal	Fill	N	2
35	Post-	Coastal[5]	Zone V Coastal	Slab on Grade	N	1
36	Pre-	Lake[6]	Zone A Coastal	Pile	N	7
36	Pre-	Lake[6]	Zone CA Coastal	Pile	N	7
36	Pre-	Lake[6]	Riverine	Pile	N	7
36	Pre-	Lake[6]	Zone V Coastal	Pile	N	7
37	Pre-	Lake[6]	Zone A Coastal	Pier	N	5
37	Pre-	Lake[6]	Zone CA Coastal	Pier	N	5

ID	FIRM	Block Type	Zone	Foundation	Basement	First Floor Height (ft.)
37	Pre-	Lake[6]	Riverine	Pier	N	5
37	Pre-	Lake[6]	Zone V Coastal	Pier	N	5
38	Pre-	Lake[6]	Zone A Coastal	Solid Wall	N	7
38	Pre-	Lake[6]	Zone CA Coastal	Solid Wall	N	7
38	Pre-	Lake[6]	Riverine	Solid Wall	N	7
38	Pre-	Lake[6]	Zone V Coastal	Solid Wall	N	7
39	Pre-	Lake[6]	Zone A Coastal	Basement/Garden	B	4
39	Pre-	Lake[6]	Zone CA Coastal	Basement/Garden	B	4
39	Pre-	Lake[6]	Riverine	Basement/Garden	B	4
39	Pre-	Lake[6]	Zone V Coastal	Basement/Garden	B	4
40	Pre-	Lake[6]	Zone A Coastal	Crawl Space	N	3
40	Pre-	Lake[6]	Zone CA Coastal	Crawl Space	N	3
40	Pre-	Lake[6]	Riverine	Crawl Space	N	3
40	Pre-	Lake[6]	Zone V Coastal	Crawl Space	N	3
41	Pre-	Lake[6]	Zone A Coastal	Fill	N	2
41	Pre-	Lake[6]	Zone CA Coastal	Fill	N	2
41	Pre-	Lake[6]	Riverine	Fill	N	2
41	Pre-	Lake[6]	Zone V Coastal	Fill	N	2
42	Pre-	Lake[6]	Zone A Coastal	Slab on Grade	N	1
42	Pre-	Lake[6]	Zone CA Coastal	Slab on Grade	N	1
42	Pre-	Lake[6]	Riverine	Slab on Grade	N	1
42	Pre-	Lake[6]	Zone V Coastal	Slab on Grade	N	1
43	Post-	Lake[7]	Zone A Coastal	Pile	N	8
43	Post-	Lake[7]	Zone CA Coastal	Pile	N	8
43	Post-	Lake[7]	Riverine	Pile	N	8
44	Post-	Lake[7]	Zone A Coastal	Pier	N	6
44	Post-	Lake[7]	Zone CA Coastal	Pier	N	6
44	Post-	Lake[7]	Riverine	Pier	N	6
45	Post-	Lake[7]	Zone A Coastal	Solid Wall	N	8
45	Post-	Lake[7]	Zone CA Coastal	Solid Wall	N	8
45	Post-	Lake[7]	Riverine	Solid Wall	N	8
46	Post-	Lake[7]	Zone A Coastal	Basement/Garden	B	4
46	Post-	Lake[7]	Zone CA Coastal	Basement/Garden	B	4
46	Post-	Lake[7]	Riverine	Basement/Garden	B	4
47	Post-	Lake[7]	Zone A Coastal	Crawl Space	N	4

ID	FIRM	Block Type	Zone	Foundation	Basement	First Floor Height (ft.)
47	Post-	Lake[7]	Zone CA Coastal	Crawl Space	N	4
47	Post-	Lake[7]	Riverine	Crawl Space	N	4
48	Post-	Lake[7]	Zone A Coastal	Fill	N	2
48	Post-	Lake[7]	Zone CA Coastal	Fill	N	2
48	Post-	Lake[7]	Riverine	Fill	N	2
49	Post-	Lake[7]	Zone A Coastal	Slab on Grade	N	1
49	Post-	Lake[7]	Zone CA Coastal	Slab on Grade	N	1
49	Post-	Lake[7]	Riverine	Slab on Grade	N	1
50	Post-	Lake[8]	Zone V Coastal	Pile	N	8
51	Post-	Lake[8]	Zone V Coastal	Pier	N	8
52	Post-	Lake[8]	Zone V Coastal	Solid Wall	N	8
53	Post-	Lake[8]	Zone V Coastal	Basement/Garden	B	4
54	Post-	Lake[8]	Zone V Coastal	Crawl Space	N	4
55	Post-	Lake[8]	Zone V Coastal	Fill	N	2
56	Post-	Lake[8]	Zone V Coastal	Slab on Grade	N	1

[1]Pre-FIRM construction in Census blocks with Riverine construction (e.g., Hazard Type = R).

[2]Post-FIRM construction in Census blocks with Riverine construction (e.g., HazardType = R).

[3]Pre-FIRM construction in Census blocks with Coastal construction (e.g., HazardType = C).

[4]Post-FIRM construction in Census blocks with Coastal construction (e.g., HazardType = C), subjected to A-Zone type flooding, including both Riverine and Coastal A-Zones (e.g., ZoneTypeID = 1).

[5]Post-FIRM construction in Census blocks with Coastal construction (e.g., HazardType = C), subjected to V-Zone type flooding (e.g., ZoneTypeID = 2).

[6]Pre-FIRM construction in Census blocks with Lakes construction (e.g., HazardType = L).

[7]Post-FIRM construction in Census blocks with Lakes construction (e.g., HazardType = L), subjected to A-Zone type flooding, including both Riverine and Coastal A-Zones (e.g., ZoneTypeID = 1).

[8]Post-FIRM construction in Census blocks with Lakes construction (e.g., HazardType = L), subjected to V-Zone type flooding (e.g., ZoneTypeID = 2).

5.6.3.2 RIVERINE BUILDING FOUNDATION TYPES

Foundation types were determined from either the Housing Characteristics report (DOE, 1993) or the Residential Energy Consumption report (EIA, 1997), with the exception of areas subjected to coastal flood hazards. Foundation types like pilings were not considered or mentioned in either report, but this information can be derived from the H. John Heinz III Center data collected for their report “The Hidden Cost of Coastal Hazards” (Heinz Center, 2000). Coastal hazard areas will be discussed later in this section.

When the two reports were compared, there were only moderate differences in the total percentages. For this reason, the Residential Energy Consumption (1997) Census division reporting was used to enhance accuracy of the foundation distributions available to the user. While the Residential Energy Consumption report does not consider multi-family residences of five units or less, it is assumed this distribution can be applied to these structures, since the numbers are so similar to the distributions found in the Housing Characteristics report.

For non-coastal development, Table 5-12 provides the recommended distribution of foundation types (basement, crawlspace, or slab on grade) for single- and multi-family residences of less than five units. Riverine foundation distributions do not vary by pre-FIRM or post-FIRM.

Table 5-12 Distribution of Foundation Types for Riverine Single-Family and Multi-Family Residences (% of total)

Census Division[1]	Pile[2]	Pier / Post	Solid Wall	Basement/ Garden Level	Crawl Space	Fill	Slab-on-Grade
New England	0%	0%	0%	81%	10%	0%	9%
Mid Atlantic	0%	0%	0%	76%	10%	0%	14%
East North Central	0%	0%	0%	68%	21%	0%	11%
West North Central	0%	0%	0%	75%	13%	0%	12%
South Atlantic[3]	0%	0%	0%	23%	35%	0%	42%
East South Central	0%	0%	0%	25%	49%	0%	26%
West South Central	0%	0%	0%	5%	38%	0%	57%
Mountain	0%	0%	0%	32%	29%	0%	39%
Pacific	0%	0%	0%	13%	45%	0%	42%

[1]*Census Division list of states provided in Table 3-1.*

[2]*Based on A Look at Residential Energy Consumption in 1997 (Nov 1999) Table HC1-9b through HC1-12b as a percent of single-family housing units.*

[3]*Puerto Rico and U.S. Virgin Islands use South Atlantic values.*

For the Tsunami states, foundation type data is taken directly from NSI 2022 according to the categories listed in Table 5-13. For the U.S. Virgin Islands, values provided in the VI dataset were used. For Puerto Rico, Guam, American Samoa and Northern Mariana Islands, a default value of slab was applied.

Table 5-13 Foundation Type Value Description

NSI Designation	Description	Hazus Foundation Type
I	Pile	1
P	Pier	2
W	Solid Wall	3
B	Basement	4
C	Crawl	5
F	Fill	6
S	Slab	7

5.6.3.3 RIVERINE BUILDING FIRST FLOOR HEIGHT ABOVE GRADE

For the sake of consistency, it was determined that the measurement of floor height from grade to the top of the finished floor for both pre-FIRM and post-FIRM would be a good basis for default values. When detailed local data is available, users may decide to compare local data with Hazus data and update values for variables such as pre-FIRM and post-FIRM foundation distributions and their associated FFHAG. Contact the Hazus Help Desk (see Section 1.5) for guidance on best practices to customize specific variables within a Study Region. Table 5-14 provides the default pre-FIRM or post-FIRM elevations for each foundation type in riverine flood hazard areas.

Table 5-14 Default First Floor Heights Above Grade to Top of Finished Floor (Riverine)

ID	Foundation Type	Pre-FIRM	Post-FIRM
1	Pile	7 feet	8 feet
2	Pier (or post and beam)	5 feet	6 feet
3	Solid Wall	7 feet	8 feet
4	Basement (or Garden Level)	4 feet	4 feet[1]
5	Crawlspace	3 feet	4 feet
6	Fill	2 feet	2 feet
7	Slab	1 foot	1 foot[1]

Source Data: Expert Opinion

[1]Typically not allowed in SFHA post-FIRM but may exist.

Note that the heights shown here are default values. In some cases, regulations are written to include freeboard above the BFE. Additionally, typical engineering design will shift from one foundation type to another, depending on the height necessary to elevate the structure above BFE. Therefore, it is recommended to use the following guidelines for post-FIRM foundation distributions:

- *Piles*: Used when the BFE plus freeboard is 8 feet or greater.
- *Piers:* Used when the BFE plus freeboard is less than 6 feet. If BFE plus freeboard is greater than 6 feet, typical construction practice is to use other foundation types such as solid walls or piles.
- *Solid Walls:* Used when the BFE plus freeboard is less than 8 feet. If the BFE plus freeboard is greater than 8 feet, typical construction practice is to use piles.
- *Basements:* Typically, not allowed in post-FIRM development in the SFHA. The user should establish the post-FIRM distribution to match what is occurring in the regulated areas.
- *Crawlspaces:* Used when the BFE plus freeboard is less than 4 feet. If BFE plus freeboard is greater than 4 feet, typical construction practice is to use other foundation types such as piers, solid walls, or piles.
- *Fill:* Used when the BFE plus freeboard is less than 2 feet. If the BFE plus freeboard is greater than 2 feet, typical construction practice is to use other foundation types such as crawlspace, piers, solid walls, or piles.

- *Slab-on-Grade:* Typically not allowed in post-FIRM development within the SFHA since fill is typically required to reach BFE. The user should establish the post-FIRM distribution to match what is occurring in the regulated areas.

5.6.3.4 COASTAL BUILDING FOUNDATION TYPES

The H. John Heinz III Center for Science, Economics and the Environment has developed a report discussing coastal erosion along the U.S. coastline. Part of this effort entailed collecting data from several coastal communities in areas along coastlines. Their study included site visits to survey the areas of interest. While the data they developed was collected for a different task, it contained detailed information on the structures along U.S. coastlines. For additional information regarding the methodology of data collection and the complete metadata discussion, please refer to the Heinz Center's report (Heinz Center, 2000).

The Heinz Center's data was supplied with the necessary metadata allowing analysis to identify potential usefulness for the Flood Model. The data contained information regarding foundation types and the structures flood zone (i.e., Zone A, Zone V, etc.). The data was graphically plotted in order to find distinct construction features by geographic region and appropriate flood zone for the development of a modifier table. Table 5-15 shows the table for pre-FIRM structures that is applied to those Census blocks that are within or intersect the coastal FIRM zones data from the Heinz Center report. The Coastline areas are defined in Table 5-16.

Table 5-15 Distribution of Coastal Pre-FIRM Foundation Types (% of Total)

Coastline	Pile	Pier	Solid Wall	Basement	Crawl Space	Fill	Slab
Pacific	7%	7%	1%	2%	46%	0%	37%
Great Lakes	0%	1%	0%	0%	29%	0%	70%
North Atlantic	47%	7%	2%	0%	34%	0%	10%
South Atlantic[1]	34%	7%	2%	0%	20%	0%	37%
Gulf of Mexico	34%	7%	1%	1%	21%	0%	36%

Source Data: The H. John Heinz III Center for Science, Economics and the Environment study data 2000, and expert opinion.

[1]Puerto Rico and U.S. Virgin Islands use South Atlantic values.

Table 5-16 Coastline Definitions

Coastline	States and Territories
Pacific	AK, CA, HI, OR, WA
Great Lakes	IL, IN, MI, MN, NY[1], OH, PA[1], WI
North Atlantic	CT, MA, ME, NH, NJ, NY[1], PA[1], RI
South Atlantic	DC, DE, FL, GA, MD, NC, PR, SC, VA, VI
Gulf of Mexico	AL, LA, MS, TX

[1]States with both Coastal and Great Lakes areas utilize both foundation distributions.

Table 5-15 shows that the Heinz Center did not find any structures located on elevated fill in any of their sample communities. The field for elevated fill was kept so users could modify the foundation types to

include this classification if it exists within their community. The communities investigated by the Heinz Center had an unusually high number of pile foundations due to modern hurricane experiences. To accommodate this, the North Atlantic, South Atlantic and Gulf Coast Zones V were modified slightly to increase the use of pier foundations and reduce the pile foundations. The team also reduced the slab-on-grade foundations and increased the use of the crawlspace foundations for the Great Lake Zone A.

For post-FIRM structures, Table 5-17 provides the default distribution for the Flood Model. It should be noted that the Heinz Center data includes some foundation types that should not have been utilized within the flood zones indicated. For example, the North Atlantic Zone V (Coastal) data includes some slab-on-grade structures. This may be an indication that some of the structures were built just before or were under construction while the ordinances were being put in place.

Table 5-17 Percent Distribution of Coastal Post-FIRM Foundation Types by Coastal Zones

Zone	Coastline	Pile	Pier	Solid Wall	Basement	Crawlspace	Fill	Slab-on-Grade
Zone V	Pacific	60%	25%	0%	0%	10%	0%	5%
Zone V	Great Lakes	5%	0%	10%	0%	30%	0%	55%
Zone V	North Atlantic	75%	15%	5%	0%	0%	0%	5%
Zone V	South Atlantic[1]	80%	15%	2%	0%	1%	0%	2%
Zone V	Gulf of Mexico	85%	10%	2%	0%	1%	0%	2%
Zone A	Pacific	20%	5%	0%	0%	55%	0%	20%
Zone A	Great Lakes	5%	0%	10%	0%	30%	0%	55%
Zone A	North Atlantic	40%	10%	5%	0%	30%	0%	15%
Zone A	South Atlantic[1]	50%	15%	2%	0%	20%	0%	13%
Zone A	Gulf of Mexico	50%	15%	2%	0%	20%	0%	13%

Source Data: The H. John Heinz III Center for Science, Economics and the Environment study data 2000 and expert opinion

[1]Puerto Rico and U.S. Virgin Islands use South Atlantic values.

For the Tsunami states, foundation type data is taken directly from NSI 2022 according to the categories listed in Table 5-13. For the U.S. Virgin Islands, values provided in the VI dataset were used. For Puerto Rico, Guam, American Samoa and Northern Mariana Islands, a default value of slab was applied.

5.6.3.5 COASTAL BUILDING FLOOR HEIGHT ABOVE GRADE

For coastal flood areas, a consistent measure of floor height from grade to the top of the finished floor was selected for both Zone A and Zone V heights. Within the Flood Model, the floor height was adjusted to reference the top of the lowest finished floor to allow a height consistent with the coastal damage curves.

Table 5-18 provides the default first floor height above grade for each foundation type in coastal flood hazard areas. This table also shows the changes in foundation type and height by flood hazard zone and pre-FIRM or post-FIRM. Typically, foundations like slab-on-grade, fill, and crawlspaces are not allowed in Zone V construction, but there will be occasional communities where these foundations exist in some

numbers, due to map revisions or delays in compliance enforcement. For this reason, Zone V elevations are provided for these foundation types. Also note that for pier foundation types there are different values for Post-FIRM Zone A as compared to Post-FIRM Zone V.

Table 5-18 Default First Floor Height Above Grade to Top of Finished Floor (Coastal)

ID	Foundation Type	Pre-FIRM	Post-FIRM Zone A	Post-FIRM Zone V
1	Pile (or column)	7 feet	8 feet	8 feet
2	Pier (or post and beam)	5 feet	6 feet	8 feet
3	Solid Wall	7 feet	8 feet	8 feet
4	Basement (or Garden Level)	4 feet	4 feet[1]	4 feet[1]
5	Crawlspace	3 feet	4 feet	4 feet[1]
6	Fill	2 feet	2 feet	2 feet[1]
7	Slab	1 foot	1 foot[1]	1 foot[1]

Source Data: Expert Opinion

[1] Typically not allowed but may exist.

The heights shown here are default values for coastal areas. In some cases, regulations are written to include a freeboard above the BFE. Additionally, typical engineering design will shift from one foundation type to another depending on the height requirements to elevate the structure above BFE. It is recommended to use the following guidelines for post-FIRM foundation distributions:

- *Pile*: This foundation is typically utilized when the BFE plus freeboard is 8 feet or greater.
- *Pier:* This foundation is typically utilized when the BFE plus freeboard is less than 6 feet (Zone A) and 8 feet (Zone V). If BFE plus freeboard is greater than these heights, typical construction practice is to use other foundation types, such as solid walls or piles.
- *Solid Wall:* This foundation is typically utilized when the BFE plus freeboard is less than 8 feet. If the BFE plus freeboard is greater than 8 feet, general construction practice is to use piles.
- *Basement:* This is typically not allowed in post-FIRM development. The user should establish the post-FIRM distribution to match what is actually occurring in the regulated areas.
- *Crawlspace*: This foundation is typically utilized when the BFE plus freeboard is less than 4 feet. If BFE plus freeboard is greater than 4 feet, typical construction practice is to use other foundation types such as piers, solid walls, or piles. This foundation type is typically not allowed in areas identified as Zone V.
- *Fill:* This foundation is typically utilized when the BFE plus freeboard is less than 2 feet. If the BFE plus freeboard is greater than 2 feet, typical construction practice is to use other foundation types such as crawlspace, piers, solid walls, or piles. This foundation type is typically not allowed in areas identified as Zone V.
- *Slab-on-Grade:* This is typically not allowed in post-FIRM development. The user should establish the post-FIRM distribution to match what is actually occurring in the regulated areas.

As with the values in Table 5-14, the foundation results in Table 5-18 were slightly modified to account for the unusually high percentage of pile foundations (see Section 5.6.3.4).

5.7 Other Hurricane Building Characteristics

For the hurricane general building type to hurricane specific building type mapping scheme, as shown in Table 4-4, aerial photographs were used to estimate the percentage of one and two-story houses in PR and VI. Data from the RCMP was used to identify the number of stories, shape, and specific occupancy. Historic building codes were used to determine building types in different parts of the country (National Building Code vs. International Building Code, etc.).

For the hurricane specific building type to hurricane wind building characteristics (WBCs) mapping scheme, the following sections provide an overview of each of these characteristics.

5.7.1 Roof Shape

Roof shape can have three values in Hazus: Hip, Gable, and Flat. The shape of a roof, siting, fastening, and composition will determine the structure's resilience during a hurricane. Coastal areas especially require corrosion-resistant structural connectors. A hip roof is a type of roof where all sides slope downwards to the walls, usually with a gentle slope. Hipped roofs have no gables or other vertical sides to the roof. A gable roof is a classic, most commonly occurring roof shape in temperate climate areas. It consists of two roof sections sloping opposite directions and placed so the highest, horizontal edges meet to form the roof ridge. A flat roof is almost level in contrast with sloped roofs. They are mostly used in arid climates and allow the roof space to be used for living space or a living roof. Flat roofs are often used for commercial buildings throughout the world.

5.7.2 Roof Cover Type

Roof cover refers to the layers of materials that make up the roof above roof deck. Built-up roof (BUR) covers are composed of multiple plies of roofing felts adhered to each other and to the insulation substrate with a full mop of hot asphalt, coal tar, or cold adhesive. The number of plies of roofing felt ranges from three to five. Roofing felts are commonly made of polyester, organic or glass-based materials. The surfacing on BUR covers is most often gravel or slag.

Single-ply Membrane (SPM) covers are normally attached to the insulation substrate by adhesives (hot asphalt or cold applied materials) or by mechanical fasteners. Adhered SPM covers can be fully adhered or partially adhered. The adhesive in partially adhered SPM covers will typically have 50% coverage in the central portions of the roof and greater coverage at or near the edges and corners of the roof. Common membranes are thermoplastic membranes, thermoset membranes, modified bitumen membranes, and liquid applied membranes.

For Puerto Rico and the U.S. Virgin Islands, four additional roof cover types are modeled: Reinforced Concrete (rccnt), Corrugated Steel (rccor), Elastomeric Paint (rcpnt): and Standing Seam Metal (rcssm). More information about these roof cover types can be found in *Hazus Hurricane Wind for Puerto Rico and the U.S. Virgin Islands* (FEMA, 2021a).

Hazus WBCs include roof covering conditions with values of New, Good, and Poor, and secondary water resistance with values of Yes and No.

5.7.3 Roof Deck Attachment

Roof deck is defined as boards or plywood nailed to the roof rafters or trusses. It is also called roof sheathing and can fail during a high-wind event if not properly installed or insufficiently fastened. Sheathing loss is one of the most common structural failures in hurricanes. Fastener spacing and size requirements for coastal constructions are typically different than for non-coastal areas.

For all roof shapes, Hazus uses two roof fastener conditions of 6-penny and 8-penny nails, different spacing options of 6x12 inches or 6x6 inches, and deck age categories of New/Average or Old.

5.7.4 Roof Frame and Wall Connections

Framing the roof properly is important for the stability of the entire building envelope. The frame of the roof needs to be tied down appropriately, especially in high-wind situations. Hazus WBCs include Strapped and Toe-Nailed roof-wall connection conditions and joist spacing of 4 or 6 feet.

5.7.5 Fenestrations

Fenestration is the design, construction, or presence of openings in a building. Openings need to be designed to be water and wind resistant. A successful moisture barrier system will limit water infiltration into unwanted areas and allow drainage and drying of wetted building materials.

Two types of windows are used for single-family homes (WSF1, WSF2, MSF1, MSF2): regular and jalousie. A regular window (wtnor) is a typical single pane glass window. A jalousie window (wtjal) consists of angled glass louvers and are widely used in tropical climates. The louvers can be tilted open and closed by turning a crank to control airflow.

Hazus WBCs include Window Area of Low, Medium or High and Shutters as Yes or No. For unshuttered houses with garages, WBCs for garage doors include None, Weak, or Standard Door. For shuttered houses with garages, the WBCs for garage doors are None or meet the South Florida Building Code 1994 standards.

5.7.6 Other Characteristics

Other WBCs consider other structure characteristics that influence building performance during wind events. For example, Hazus uses a WBC for Wind Debris to include Residential, Residential and Commercial Mix, Varies by Direction, and None. Units per floor of single unit versus multi-unit is another WBC. For masonry structures, there is a WBC for with and without reinforcing. Finally, there is a Tie Down WBC with Yes and No values.

5.7.7 Wind Building Characteristic Mapping Schemes

Like the development of the specific building types, surveys were used to develop the additional WBCs, focusing primarily on roof types. Aerial and/or street level photographs were used to estimate roof shape and roof cover type across the U.S. In cases where the homes had a roof, which was a combination of a hip section and a flat section, it was classified as a hip roof building. The same classification scheme was used for homes with combined flat and gable roofs. In cases where the roof was a hip/gable combination, the building was classified by the dominant roof style. Roof cover data was also collected from the Florida RCMP. Other characteristic data were collected using a survey sent to contractors familiar with construction practices for hurricane-prone regions.

More details on these mapping schemes can be found in the *Hazus Hurricane Model Technical Manual* (FEMA, 2022b).

5.8 Other Tsunami Building Characteristics

When FEMA developed the Tsunami Methodology, the existing Earthquake and Flood Model-specific inventory attributes were leveraged, rather than requiring the development of new tsunami-specific vulnerability attributes. The Tsunami building damage functions in Hazus are based entirely on specific earthquake building types and seismic design levels used by the Earthquake Model. The estimate of finished floor height required to estimate the depth of tsunami within structures is based on the Flood Model foundation types and finished floor height relationships.

Because the Tsunami Methodology uses these other existing Hazus tables for certain building characteristics, only one new unique Tsunami inventory table was required for modeling. The required attributes for tsNsiGbs are summarized later in this section and it is the only inventory dataset required to produce Tsunami General Building Stock losses and casualties.

To leverage the General Building Stock valuation python script which was used to update the General Building Stock valuations for the U.S., Puerto Rico and U.S. Virgin Islands for Hazus 6.0, the Hazus 5.1 data for American Samoa, Guam and Northern Mariana Islands was first improved with new footprint data and then restructured into the NSI 2022 schema.

As discussed in Section 3.7, the Pacific Territories were improved by adding new structures and consolidating duplications within the Hazus 5.1 tsNsiGbs table. For American Samoa, Guam and Northern Mariana Islands, new structures that were created from footprint data did not have an occupancy type; therefore, this information was estimated using Hazus 5.1 data. Thiessen polygons were created from the existing Hazus 5.1 structures. A default occupancy type column was added to the Thiessen polygons and populated based on the general occupancy type associated with the specific occupancy type of the point (e.g., RES3A is Residential). Table 5-19 shows the crosswalk of specific occupancy type to the associated default occupancy type that was assigned to these new structures.

Table 5-19 Crosswalk of Specific Occupancy Type/ID to Default Occupancy Type/ID

Specific Occupancy Type	Specific Occupancy Type ID	Default Occupancy Type	Default Occupancy Type ID
RES1	1	RES1	1
RES2	2	RES1	1
RES3A	3	RES1	1
RES3B	4	RES1	1
RES3C	5	RES1	1
RES3D	6	RES1	1
RES3E	7	RES1	1
RES3F	8	RES1	1
RES4	9	RES1	1
RES5	10	RES1	1
RES6	11	RES1	1
COM1	12	COM1	12
COM2	13	COM1	12
COM3	14	COM1	12
COM4	15	COM1	12
COM5	16	COM1	12
COM6	17	COM1	12
COM7	18	COM1	12
COM8	19	COM1	12
COM9	20	COM1	12
COM10	21	COM1	12
IND1	22	IND1	22
IND2	23	IND1	22
IND3	24	IND1	22
IND4	25	IND1	22
IND5	26	IND1	22
IND6	27	IND1	22
AGR1	28	AGR1	28
REL1	29	REL1	29
GOV1	30	GOV1	30
GOV2	31	GOV2	31
EDU1	32	EDU1	32
EDU2	33	EDU2	33

These polygons were then spatially joined to the point footprint data. The new structure data was assigned the Thiessen polygon's default occupancy type. Area square footage was assigned the

footprints square footage. New structures in American Samoa, Guam and Northern Mariana Islands also received the following default values, depicted in Table 5-20.

Table 5-20 Additional Default Values for American Samoa, Guam and Northern Mariana Islands

Attribute	Default Value
Foundation Type ID	7 (slab on grade)
First Floor Height	1 foot
Number of Stories	1

The consolidation process impacted the characteristic assignment for American Samoa, Guam and Northern Mariana Islands. When points were consolidated, the single representative point for the structure was assigned the most occurring values for occupancy type (SOccTypeID field) and foundation type (FoundTypeId field) in the group of structures. In cases where the most common value was tied between multiple values, these structures were spatially joined to the Thiessen polygon and assign the attributes of the polygon. The attributes number of stories (NStories field) and first floor height (FirstFloorHt field) were assigned the mean value of the grouped structures, which were then rounded to the nearest whole number. The building's area was calculated by multiplying the footprint area by the number of stories.

The improved data for American Samoa, Guam and Northern Mariana Islands were spatially joined to the 2020 Census blocks to assign each building the updated Census block identification information. Finally, each dataset was converted to the NSI 2022 data schema and ran through the General Building Stock valuation python script.

With all the data in a common format, a second python script was used to update the tsNsiGbs attributes for the Tsunami states and territories (California, Oregon, Washington, Alaska, Hawaii, Puerto Rico, U.S. Virgin Islands, Guam and Northern Mariana Islands). In the script, data source (reformatted to the NSI schema) was updated using the following methods to create the tsNsiGbs table. Each attribute was updated using the methods described in Table 5-21.

Table 5-21 Tsunami Model National Structure Inventory Field Descriptions and Data Types

Field Name	Description	Data Type
NsiID	A unique ID derived from the concatenation of the specific occupancy type, the Census Block 2020 ID and ObjectID from the reformatted data source.	String Data: Max 30 characters
EqBldgTypeId	The index value based on the specific earthquake building type. For data supplied from the NSI 2022 data source (AK, CA, HI, OR and WA), this data was based on the implementation of NSI 2022 exterior wall types from Lightbox parcel data, number of stories when defined as a Census Urban area, and Year Built. For VI this was already defined in the data source (FEMA, 2020). PR, AS, GU and MP values were identified using the tsSOccupSBTPct table within the Hazus 5.1 State databases.	Integer Data: Small integer type used for ID fields

Field Name	Description	Data Type
EqDesignLevelId	The index value based on seismic design level. This value is based on the implementation of benchmark years by state and year built (see Table 5-23). For Tsunami states, if the year built was available from parcel data, this value was used. If data was unavailable, median year built from Census data was used. The median year built from Census data was used for all territories. Note that in the case of AS, MP, GU and VI, the Median Years are still based on the Hazus 5.1 data as the ACS has not been updated for those areas.	Integer Data: Small integer type used for ID fields
SOccTypeId	An index value based on the Hazus Specific Occupancy type. This value was mapped from the data source specific occupancy type.	Integer Data: Small integer type used for ID fields
FoundTypeId	An index value based on the Hazus Specific Flood Foundation Type.	Integer Data: Small integer type used for ID fields
CBFips	The Census block identification number, which was obtained by spatially joining the structure point data to the 2020 Census block data.	String Data: Max 15 characters
NStories	The number of stories. The updated NSI 2022 NUM_Story Field was mapped to NStories. This was used in the Earthquake Specific Building Type assignments when points were located in Urban areas defined by the Census. Due to anomalies in the NSI data, number of stories in Urban Clusters and Rural areas was not used. Because NSI 2022 data was not available for AS, MP and GU, a default value of 1 story was applied for new structures in those territories.	Integer Data: Regular integer type used for data fields
AreaSqft	The building areas in square feet. For structures from the NSI 2022 data source, these values were mapped from the SQFT field. Because NSI 2022 data was not available for AS, GU, and MP, AreaSqft was derived from other building footprint data. See Section 5.2 for additional information.	Decimal Data: Numeric type with 38 digits and 8 decimal places
PerSqftAvgVal	The per square foot average value. This value is calculated by dividing the ValStruct by the AreaSqft.	Decimal Data: Numeric type with 38 digits and 20 decimal places
FirstFloorHt	FirstFloorHt is an estimate of the FFHAG in feet that is related to foundation type. For NSI 2022 data for AK, CA, HI, OR, and WA and the FEMA NHRAP VI data, the foundation type field was cross walked to the respective index value as shown in Table 5-10 and the FirstFloorHt values were directly used. For PR, AS, GU and MP, the default value 7 (slab foundation type) and FirstFloorHt of 1 was applied.	Decimal Data: Numeric type with 38 digits and 8 decimal places

Field Name	Description	Data Type
ValStruct	The replacement values of structures in U.S. dollars. These values were calculated using the valuation script developed for the General Building Stock updates and mapped to the appropriate field in the tsNsiGbs table. Since 2020 ACS data were not yet available for AS, MP, GU and VI prior to Hazus 6.0 development, the existing 2019 Income Ratios for VI were used in estimating the RES1 replacement costs and for AS, GU and MP the average RES1 replacement cost values were used with no adjustment based on median income or construction class weights. See Section 6 for additional information regarding valuation and cost models.	Decimal Data: Numeric type with 38 digits and 8 decimal places
ValCont	The replacement values of contents in U.S. dollars. These values were calculated using the valuation script developed for the General Building Stock updates and mapped to the appropriate field in the tsNsiGbs table. See Section 6 for additional information regarding valuation and cost models.	Decimal Data: Numeric type with 38 digits and 8 decimal places
ValOther	The replacement values of items categorized as “other” in U.S. dollars.	Decimal Data: Numeric type with 38 digits and 8 decimal places
ValVehic	The replacement values of vehicles in U.S. dollars. If the vehicle values were present in the NSI 2022 source data, these values were used for ValVehic, otherwise these fields were left blank.	Decimal Data: Numeric type with 38 digits and 8 decimal places
MedYrBlt	The MedYrBlt represents the median year built for all structures within the Census block. For structures from the NSI 2022 where the year built was provided by parcel data, this value was used. If unavailable, the median year built was pulled from Census 2020 data. For PR, GU, AS and MP the median year data was pulled from the existing Census 2010 data as the ACS data was not yet available.	Integer Data: Regular integer type used for data fields
Pop2pmU65	The value of the under the age of 65 daytime population. This data was present in the NSI 2022 data source based on the Longitudinal Household Employer Dynamic Database (LEHD) and used directly. For PR, VI, AS, GU and MP this population value was not present in the data source. To calculate this value, the under 65 day population was distributed to buildings based on area and occupancy type in accordance with the Hazus CDMS tool for preparing inventories for the Advanced Earthquake Building Model (AEBM) (Table 5-23) and the under 65 ratio was determined from hzDemographics table (see Section 5.9). For EDU2[1], the Pop2pmU65 was calculated by taking the sum of employees and students and multiply it by 0.995 (99.5%).	Integer Data: Regular integer type used for data fields

Field Name	Description	Data Type
Pop2pm065	The value of the over the age of 65 daytime population. This data was present in the NSI 2022 data source based on the LEHD and used directly. For PR, VI, AS, GU and MP these population values were not present in the data source. To calculate these values, the over 65 day population was distributed to buildings based on area and occupancy type in accordance with the Hazus CDMS tool for preparing inventories for the AEBM (Table 5-23) and the over 65 ratio was determined from hzDemographics table (see Section 5.9). For EDU2[1], the Pop2pm065 was calculated by taking the sum of employees and students and multiplying it by 0.005 (0.5%).	Integer Data: Regular integer type used for data fields
Pop2amU65	The value of the under the age of 65 nighttime population. This data was present in the NSI 2022 data source based on the LEHD and used directly. For PR, VI, AS, GU and MP this population value was not present in the data source. To calculate this value, the under 65 night population was distributed to buildings based on area and occupancy type in accordance with the Hazus CDMS tool for preparing inventories for the AEBM (Table 5-23) and the under 65 ratio was determined from hzDemographics table (see Section 5.9). For EDU2[1], Pop2amU65 were calculated by multiplying the Pop2pmU65 by 0.005 (0.5%).	Integer Data: Regular integer type used for data fields
Pop2am065	The value of the over the age of 65 nighttime population. This data was present in the NSI 2022 data source based on the LEHD and used directly. For PR, VI, AS, GU and MP this population value was not present in the data source. To calculate this value, the over 65 night population was distributed to buildings based on area and occupancy type in accordance with the Hazus CDMS tool for preparing inventories for the AEBM (Table 5-23) and the over 65 ratio was determined from hzDemographics table (see Section 5.9). For EDU2[1], Pop2am065 were calculated by multiplying the Pop2pm065 by 0.005 (0.5%).	Integer Data: Regular integer type used for data fields

[1]This method was developed to emulate the USACE LEHD education ratios for EDU2 that used HIFLD Open Data: A statewide sample of all Colorado education occupancy types was utilized to derive the ratio since Colorado had a large sample available in both HIFLD and NSI 2022 Open Data that included both EDU1 and EDU2. These values reflected a 0.5% over 65 population compared to a 99.5% under 65 population and that nighttime occupancy was approximately 0.5% of daytime.

All structure locations were anonymized by randomly generating points for the number of structures within a given Census block and placing those points within the Census block's dasymetric boundary (see Section 3.2). For each structure, a random latitude and longitude were generated within a bounding box that represents the extent of the Census block's dasymetric geometry. Since this method only allows random points to be placed within a rectangular shape an additional process was added. This process checks to see whether the new latitude and longitude was generated within the Census block's dasymetric geometry. If so, then the new latitude and longitude was assigned to the structure. If the latitude and longitude fell within the bounding extent but outside of the dasymetric area, then a new random latitude and longitude were generated. This process will repeat up to 100 times as it attempts to place the structures randomly within the Census block's dasymetric geometry. If after 100 attempts, it still has not created a passable random latitude and longitude, then the centroid within the polygon

boundary is assigned. The latitude and longitude values that were randomized were used to replace the original tsNsiGbs Latitude and Longitude attributes. Latitude and Longitude are in WGS 1984 coordinate system.

The following sections provide details on how particular fields were derived for Tsunami NSI data.

5.8.1 Earthquake-Derived Characteristics

For data supplied from the NSI 2022 data source (Alaska, California, Hawaii, Oregon and Washington), this data was based on the implementation of NSI 2022 exterior wall types from Lightbox parcel data, number of stories when defined as a Census Urban area, and Year Built. For U.S. Virgin Islands, this was already defined in the data source (FEMA, 2020). Values for Puerto Rico, American Samoa, Guam and Northern Mariana Islands were identified using the tsSOccupSBTPct table within the existing Hazus 5.1 State databases.

The Tsunami Model also has a field called EqDesignLevelId that represents the Earthquake Model seismic design level of the structure, as shown in Table 5-22.

Table 5-22 Hazus Tsunami Seismic Design Levels by Field Name

DesignLevelID	EqDesignLevelId	DesignLevelDesc
1	PC	Pre-Code
2	LC	Low Code
3	MC	Moderate Code
4	HC	High Code
5	LS	Low-Code - Special
6	MS	Moderate-Code - Special
7	HS	High-Code - Special

The Earthquake Model uses a statewide default mapping scheme to assign seismic design level. For the Tsunami states and territories, an approach utilizing the construction year based on NSI 2022 parcel data when available or the estimated Median Year Built from Census when not available, and typical benchmark code adoption years for each State and Territory was used to assign a seismic design level for structures within the Census block. Note that in the case of American Samoa, Guam and Northern Mariana Islands and U.S. Virgin Islands, the Median Years are still based on the Hazus 5.1 data since the ACS 2020 data was not yet available for those areas.

The benchmark years are based on a review of online resources, including information from the International Code Council's Building Code Assessment Project, as well as the Earthquake Engineering Research Institute and the Western States Seismic Policy Council. Since benchmark years represent a combination of considerations regarding adoption, implementation and enforcement were also used in selecting the default design levels summarized in Table 5-23. This approach better distributes structures in older areas to lower seismic designs rather than randomly assigning seismic design levels across the state regardless of when the structures were built. Also, the vertical Occupancy to EQ Specific Building Type mapping scheme was previously adopted from the Hazus 4.0 Puerto Rico

Earthquake Building Type Mapping Scheme and provided as a new State Database table (*tsSOccupSBTPct*) for each Pacific Territory.

Table 5-23 Estimated Benchmark Year Tsunami Seismic Design Levels for States and Territories

State/Territory	Pre-Code[1] (PC)	Low Code (LC)	Moderate Code (MC)	High Code (HC)	Special High-Code (HS)
Alaska	≤ 1964	1965-1994	1995-2000	≥ 2001	NA
California	≤ 1940	1941-1975	1976-1994	1995-2000	≥ 2001
Hawaii	≤ 1974	1975-1994	1995-2000	≥ 2001	NA
Oregon	≤ 1974	1975-1994	1995-2000	≥ 2001	NA
Washington	≤ 1955	1956-1974	1975-2003	≥ 2004	NA
Puerto Rico	≤ 1974	1975-1994	1995-2005	≥ 2006	NA
U.S. Virgin Islands	≤ 1974	1975-2005	≥ 2006	NA	NA
Northern Mariana Islands	≤ 1974	1975-2005	≥ 2006	NA	NA
Guam	≤ 1974	1975-2005	≥ 2006	NA	NA
American Samoa	≤ 1974	1975-2005	≥ 2006	NA	NA

[1]W1 in California coastal counties will be at least Moderate Code (no Pre-Code or Low Code W1, per Hazus Earthquake Model Technical Guidance) and Low Code (no Pre-Code W1) in other states.

Several reclassifications from the original USACE NSI 2022 data for the Exterior Wall Type field were completed to better align with the Hazus General and Earthquake Specific Building Types, based on seismic design and common approaches in the earthquake engineering community:

- Parcel Exterior Wall Value block (D) and concrete block (G) (P_EXTWALL = D or G) are reclassified to Masonry (M) since block and concrete block are considered masonry and not concrete for the purpose of seismic design.
- Since unreinforced masonry is not allowed in high seismic areas, Parcel Exterior Wall Value B (Brick) will be assumed to be veneers over wood frame post-1940 in California and post-1974 for all other Tsunami states. Where P_EXTWALL = 'B' AND EXTWALL = 'M' AND YRBUILT >1974 the EXTWALL types was reclassified to W. SQFT > 5,000 was used to assign W2 vs W1 when smaller.
- All RES2 occupancy types were reclassified to EXTWALL = H (manufactured housing)

5.8.2 Flood-Derived Characteristics

Tsunami Model data include fields related to First Floor Height (FirstFloorHt), which is equivalent to FFHAG in the Flood Model, and Foundation Type (FoundTypeId). These attributes are interrelated since the First Floor Height is directly related to the Flood Foundation Type. It includes a Foundation Type ID and the corresponding First Floor Height based on the Flood Model for evaluation of tsunami inundation depth in the structure.

5.9 Demographics

The demographic data in Hazus is developed from the 2020 Decennial and ACS Census data, with day and night, education K-12, commercial and industrial occupancy estimates from NSI 2022, and college populations from the HIFLD Open Data (2022). The population Census data describes the characteristics of the population and households, including age, income, housing, and ethnic origin among others. The population information is aggregated to a Census block- and tract-level. The Census data are used to estimate direct social loss including displaced households, public shelter needs to estimate casualties due to earthquakes and tsunamis. Table 5-24 describes the input data used.

Table 5-24 Demographics Input Data

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
Decennial Data	2020	U.S. Census Bureau	Census block TIGER Data: Population, Households, Race, Group Quarters, Vacancy	CONUS, AK, HI, PR	U.S. Census 2010 Decennial Data
ACS Data	2020	U.S. Census Bureau	Census block Group TIGER Data: Age and Sex, Income, Ownership, Year Built, Average Value	CONUS, AK, HI, PR	U.S. Census 2010 ACS Data
Decennial Island Data	2020	U.S. Census Bureau	Census Village TIGER Data: Population, Households, Race, Group Quarters, Vacancy	AS, GU, MP, VI	U.S. Census 2010 (Tracts), 2014 gridded Landscan population data.
NSI 2022	June 2022	USACE	Points: Population Locations, Employees, School Enrollment K-12	AK, HI, CONUS except DC	NSI 1.0
DC Data	June 2022	FEMA NHRAP	Dataset developed from Open Data DC due to the lack of Lightbox Parcel Data for DC.	DC	2010 Census and 2006 Dun & Bradstreet
Hazus College & University (EDU2) database	May 2022	Hazus Program Generated	Points: EDU2 Enrollment. Generated from 2022 HIFLD Open data and 2019 hzTract	All U.S.	U.S. Census Bureau
PDC grids (Landscan)	2014	PDC	Census blocks TIGER Data converted from grids: Age and Sex, Income, Ownership, Year Built, Average Value	AS, GU, MP, VI	PDC grids 2014 (Landscan)

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
VI Data	July 2019	FEMA NHRAP	Polygon and point data of VI structures, Income Ratios, and additional attributes	VI	PDC grids 2014 (Landscan)
AS, GU and MP PDC Point Data	2014	PDC grids 2014 (Landscan)	Points: Population Locations, Employees, School Enrollment K-12	AS, GU, MP	PDC grids 2014 (Landscan)
NSI 1.0	2017	USACE	Points: Population Locations	AS, GU, MP	U.S. Census 2010 and NSI 1.0

The Census data were processed for all Census blocks and 62 fields of direct importance to the methodology were extracted and integrated into Hazus. These relevant fields are shown in Table 5-25 and are used as part of the modeling for the modules listed in the columns. For example, many of the household unit sub-counts are used as part of the calculations for General Building Stock data by specific occupancy types. For the EQ, HU and FL shelter modules it should be noted that by default race is no longer considered and only the income categories are utilized.

Table 5-25 Demographics Data and Module Utilization Within Hazus

Description of Field	Shelter	Casualty	Occupancy Types	Transportation and Utility Systems
Total Population in Census Block	*	*		*
Total Household in Census Block	*			*
Total # of Males and Females < 18 years old	*	*		
Total # of Males and Females 18-64 years old	*	*		
Total # of Males and Females > 64 years old	*	*		
Total # of People – White	*			
Total # of People – Black	*			
Total # of People – Native American	*			
Total # of People – Asian	*			
Total # of People – Hispanic	*			
Total # of Households with Income < $10,000	*			
Total # of Households with Income $10 - $20k	*			
Total # of Households with Income $20 - $30k	*			
Total # of Households with Income $30 - $40k	*			
Total # of Households with Income $40 - $50k	*			
Total # of Households with Income $50 - $60k	*			
Total # of Households with Income $60 - $75k	*			
Total # of Households with Income $75 - $100k	*			

Description of Field	Shelter	Casualty	Occupancy Types	Transportation and Utility Systems
Total # of Households with Income > $100,000	*			
Total in Residential Population during Day		*		
Total in Residential Population at Night		*		
Hotel Population		*		
Visitor Population		*		
Total Working Population in Commercial Industry		*		
Total Working Population in Industrial Industry		*		
Total Commuting at 5 PM		*		
Total Owner Occupied - Single Household Units	*		*	
Total Owner Occupied - Multi-Household Units	*		*	
Total Owner Occupied - Multi-Household Structure	*		*	
Total Owner Occupied - Mobile Homes	*		*	
Total Renter Occupied - Single Household Units	*		*	
Total Renter Occupied - Multi-Household Units	*		*	
Total Renter Occupied - Multi-Household Structure	*		*	
Total Renter Occupied - Mobile Homes	*		*	
Total Vacant - Single Household Units			*	
Total Vacant - Multi-Household Units			*	
Total Vacant - Multi-Household Structure			*	
Total Vacant - Mobile Homes			*	
School Enrollment K to 12		*		
School Enrollment College		*		

The only Census data available for most of the U.S. Territories was the village-level population and household data. Since the detailed Census data was not yet available for most of the U.S. Territories, a different methodology was required.

For the states, District of Columbia, and Puerto Rico, the formatted 2020 Census data was downloaded with permission from the Integrated Public Use Series (IPUMS) National Historical Geographic Information System (NHGIS) website to aid in the conversion from tabular data to GIS data. The U.S. Census Decennial data was downloaded for the population, households, racial and ethnicity categories, and number of vacant buildings. This data was provided at the Census block level. The U.S. Census ACS data was downloaded for the income levels, owner and renter occupied categories, commuting numbers, year-built categories, median year built, average rent, and average value. This data was provided at the Census-block group level and had to be downscaled to the block level using the block population/block group population and the block households/block group households. Tracts and Blocks with missing median year-built values that had households in year-built categories typically by

decade was updated based on the year-built distribution. In some cases, if data from both sources are missing, a block may have a Median year Built date of 0. For example, if there was a Census block with a median year-built of zero and it had three households in it, one built between 1970-1979, one built between 1980 and 1989, and one built between 1990 and 1999, the median year built would be 1985.

The median income data were developed from ACS data at the block group level and downscaled to Census blocks. An additional step was performed to estimate an Income Ratio for each block by dividing the block-level median income by the median income for each state in 2020 inflation adjusted dollars (Table 5-26). These Income Ratios are used in the RES1 replacement cost model.

Table 5-26 Median Household Income by State and Territory

State/Territory	Median Household Income
Alabama	$52,035
Alaska	$77,790
Arizona	$61,529
Arkansas	$49,475
California	$78,672
Colorado	$75,231
Connecticut	$79,855
Delaware	$69,110
District of Columbia	$90,842
Florida	$57,703
Georgia	$61,224
Hawaii	$83,173
Idaho	$58,915
Illinois	$68,428
Indiana	$58,235
Iowa	$61,836
Kansas	$61,091
Kentucky	$52,238
Louisiana	$50,800
Maine	$59,489
Maryland	$87,063
Massachusetts	$84,385
Michigan	$59,234
Minnesota	$73,382
Mississippi	$46,511
Missouri	$57,290
Montana	$56,539
Nebraska	$63,015

State/Territory	Median Household Income
Nevada	$62,043
New Hampshire	$77,923
New Jersey	$85,245
New Mexico	$51,243
New York	$71,117
North Carolina	$56,642
North Dakota	$65,315
Ohio	$58,116
Oklahoma	$53,840
Oregon	$65,667
Pennsylvania	$63,627
Rhode Island	$70,305
South Carolina	$54,864
South Dakota	$59,896
Tennessee	$54,833
Texas	$63,826
Utah	$74,197
Vermont	$63,477
Virginia	$76,398
Washington	$77,006
West Virginia	$48,037
Wisconsin	$63,293
Wyoming	$65,304
Puerto Rico	$21,058

The NSI 2022 dataset was used to populate the estimates of residential and nighttime population, commercial and industrial working employees, hotel population, and K through 12 school population. The HIFLD Open dataset was used to estimate the college/university population. The site-specific data were aggregated to the Census block- and tract-levels.

For American Samoa, Northern Mariana Islands, Guam, and the U.S. Virgin Islands, the village-level Census population and household data was downscaled to the Census block-level using the NSI data (NSI 1.0 for American Samoa, Northern Mariana Islands, and Guam and NSI 2022 for U.S. Virgin Islands), specifically the residential square footage was used to downscale the village-level data. In areas where there was a population and no residential square footage, the total building square footage was used. HIFLD Open data was used for college/university enrollment for all four territories. NSI 1.0 (FEMA, 2021b), a site-specific dataset, was used to populate the residential and nighttime population numbers, commercial and industrial working employee numbers, hotel population, and K through 12 school enrollment numbers for American Samoa, Northern Mariana Islands, and Guam. These numbers were scaled using the new population and household values at the Census block level. U.S. Virgin

Islands used the NSI 2022 except for enrollment which was scaled using the 2010 data and new population numbers due to a limitation in the 2022 data. For the other demographic fields, the 2010 data was scaled using the 2020 Census population and household numbers.

For the NSI 2022 data, the population estimates for each NSI structure were developed by USACE from the U.S. Census Bureau's LEHD data. The LEHD program produces several datasets, including Quarterly Workforce Indicators and the LEHD Origin-Destination Employment Statistics. These statistics, which can be useful for consequence modeling, provides employment statistics, including worker counts, linking residence and work locations at the Census block level. The LEHD method of population assignment uses four population pools: working population and residential population, day, and night. Census 2020 population data are used to approximate the total residential population of a Census block. The LEHD dataset is then used to identify the nonresidential population of the block, as well as model the movement of population from residential structures into nonresidential. Section 5.8 provides more information about estimation of these values.

5.10 Flood-Specific Inventory Data for Vehicles

Vehicles are no longer available for analysis in the Hazus Flood Model; however, they can be modeled in the Flood Model when data is provided by the user. Significant customization is required to update parameters to account for these changes, so it is recommended that interested users contact the Hazus Help Desk (see Section 1.5).

Section 6. General Building Stock: Baseline Database for Economic Values

The final all hazard General Building Stock data type covered in this manual are economic values, which are used for loss calculations in Hazus. The specific economic data types to be covered include Structure Replacement Value, Contents Replacement Value, and Other Economic Values, such as other primary economic values used by more than one hazard, including business inventory value, and disruption impacts to individuals and businesses from relocation, and losses of different types of income.

Table 6-1 summarizes these major General Building Stock economic values by data type, hazard, sources and geographic coverage.

Table 6-1 General Building Stock Economic Data Summary

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
NSI 2022	June 2022	USACE	Point-based structure inventories. Developed from Lightbox Parcel, NGA lidar, USA Structures and Bing footprints.	AK, HI, CONUS except DC	2010 Census and 2006 Dun & Bradstreet
DC Data	June 2022	FEMA NHRAP	Dataset developed from Open Data DC due to the lack of Lightbox Parcel Data for DC.	DC	NSI 1.0
Hazus College & University (EDU2) database	May 2022	Hazus Program Generated	Created from: 2022 HIFLD Open data, 2019 hzTract, 2022 hzMeansCountyLocationFactor (see Section 6.3) and 2022 College and University Replacement Cost Model (see Section 7.2.5.3.) Provides structure level EDU2 data. The number of students field to use is 'NumStudents. This file is used to replace the NSI 2022 EDU2 data.	All U.S.	2010 Census, 2006 Dun & Bradstreet, and NSI 1.0 (for Tsunami GBS only)
Income Ratios	June 2022	Hazus Program Generated	Income ratios developed from Census data. Calculated using the block group median income divided by state median income.	CONUS, AK, HI, PR[1]	U.S. Census Bureau

Hazus 6.0 Dataset Name	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Description of Hazus 6.0 Dataset	Geographic Coverage	Previous Data Source (Hazus 5.1)
PR Data	2019	FEMA NHRAP	Polygon and point data of PR structures, occupancy types.	PR	U.S. Census Bureau
VI Data	July 2019	FEMA NHRAP	Polygon and point data of VI structures, Income Ratios, and additional attributes.	VI	U.S. Census Bureau and Landscan
Hazus Replacement Cost Model and other Economic Models	2022[2]	Hazus Program Generated	RSMeans derived values to calculate the valuation of structures and content, models for commercial inventory value and business interruption loss parameters (rent, relocation, income and wages). Derived from RSMeans (RSMeans, 2022a); also uses data from U.S. Census 2020 Manufactured Housing Survey Annual Data (for RES2), BEA (2022a and b) and BLS (2022).	CONUS, AK, HI, U.S. Territories	2018 RSMeans derived

[1]No income ratio data were available for the Pacific Territories (AS, GU, MP).

[2]All structure replacement values based on 2022 replacement value model except RES2 (2020 Manufactured Housing Survey Annual Data).

6.1 Structure Replacement Value

Structure replacement cost models within Hazus are derived from industry-standard cost-estimation models published in RSMeans Square Foot Costs (RSMeans, 2022a). The valuation also included an adjustment to the square footage value based on RSMeans-derived county adjustment factors from hzMeansCountyLocationFactor using MeansAdjRes for all RES1 and MeansAdjNonRes for all other occupancy types including RES3-5. For manufactured housing (RES2) regional Census RSMeans-derived valuations are used.

Replacement cost data are stored within Hazus at the Census tract and Census block level for each occupancy class. For each Hazus occupancy class, a default structure full replacement cost model (cost per square foot) has been determined and is provided in Table 6-2. It should be noted that the replacement costs provided in Table 6-2 are an average replacement cost by occupancy. Commercial and industrial occupancies have a typical building replacement cost model associated with each occupancy class (e.g., COM4, Professional/Technical/Business Services, is represented by a typical, 80,000 square feet, 5 to 10 story office building). Building area (given as square footage) costs presented in the table represent an average from the various alternatives for exterior wall construction

(wood siding over wood frame, brick veneer over wood frame, concrete block over wood joists, etc.). For non-residential structures, the default configuration assumes structures without basements.

Table 6-2 Default Full Structure Replacement Cost

Specific Occupancy	Model Description	Structure Replacement Cost/ft² (2022)
RES1	See Table 6-3	See Table 6-3
RES2	U.S. Census Bureau 2020 Manufactured Housing Survey Annual Data, see Table 6-6	See Table 6-6
RES3A	Modified Single Family Home, 2,200 ft²	$134.57
RES3B	Modified Single Family Home, 4,400 ft²	$118.30
RES3C	Apartment, low-rise, 8,000 ft²	$250.19
RES3D	Apartment, low-rise, 15,000 ft²	$232.69
RES3E	Apartment, mid-rise, 40,000 ft²	$217.05
RES3F	Apartment, mid-rise, 80,000 ft²	$198.83
RES4	Hotel, mid-rise, 135,000 ft²	$204.58
RES5	College Dorm, low-rise, 25,000 ft²	$225.12
RES6	Nursing Home, low-rise, 25,000 ft²	$261.45
COM1	Store, Dept., 110,000 ft²	$133.61
COM2	Warehouse, 30,000 ft²	$135.47
COM3	Garage, Repair, 10,000 ft²	$162.58
COM4	Office, mid- to high-rise, 80,000 ft²	$204.43
COM5	Bank, 4,100 ft²	$303.88
COM6	Hospital, low-rise, 55,000 ft²	$392.76
COM7	Medical office, low-rise, 7,000 ft²	$279.38
COM8	Restaurant, 5,000 ft²	$259.48
COM9	Movie Theatre, 12,000 ft²	$213.33
COM10	Parking Garage, mid-rise, 145,000 ft²	$93.88
IND1	Factory, 30,000 ft²	$162.65
IND2	Warehouse, 30,000 ft²	$135.47
IND3	College Lab, 45,000 ft²	$230.43
IND4	College Lab, 45,000 ft²	$230.43
IND5	College Lab, 45,000 ft²	$230.43
IND6	Warehouse, 30,000 ft²	$135.47
AGR1	Warehouse, 30,000 ft²	$135.47
REL1	Church, 17,000 ft²	$222.10
GOV1	Town Hall, 11,000 ft²	$174.35
GOV2	Police Station, low-rise 11,000 ft²	$284.46
EDU1	High School, 130,000 ft²	$237.73
EDU2	College Classroom, low-rise, 50,000 ft²	$197.10

The RES1 (single-family residential) replacement cost model considers the cost of the main structure, as well as additional costs associated with basements and garages. The adjustments for basements consider construction classes (Economy, Average, Custom, and Luxury) and number of stories. Table 6-3 provides replacement costs for the various single-family dwelling configurations available in the baseline building inventory (One-, Two-, and Three-story and split level), assuming a typical size of 1,800 square feet. The 1,800 square foot value was selected during Hazus Flood Model development as a representative national value, based on available data. Costs represent an average for the various alternatives for exterior wall construction.

Table 6-3 Replacement Costs for RES1 Structures

Construction Class	Height Class	2022 Average cost per ft² for RES1 with No Basement	2022 Average cost per ft² for RES1 with Finished Basement	2022 Average cost per ft² for RES1 with Unfinished Basement
Economy	One-story	$114.63	$148.48	$125.03
Economy	Two-story	$121.00	$139.95	$127.75
Economy	Three-story	$121.00	$139.95	$127.75
Economy	Split level	$111.49	$130.44	$118.24
Average	One-story	$128.20	$168.75	$140.95
Average	Two-story	$132.88	$158.08	$140.98
Average	Three-story	$137.43	$156.88	$143.73
Average	Split level	$122.86	$148.06	$130.96
Custom	One-story	$172.73	$234.63	$196.98
Custom	Two-story	$174.96	$210.21	$189.21
Custom	Three-story	$179.34	$204.94	$189.84
Custom	Split level	$162.83	$198.08	$177.08
Luxury	One-story	$209.44	$274.34	$234.29
Luxury	Two-story	$212.86	$250.56	$227.86
Luxury	Three-story	$218.28	$245.93	$229.53
Luxury	Split level	$197.95	$235.65	$212.95

Because the Flood Model default single-family residential (SFR) damage model is based on past FEMA damage functions, whose coverage extends to garages, the replacement cost of garages is included in the basic replacement cost. Relevant models for SFR garages include costs by construction class (Economy, Average, Custom, and Luxury), for detached and attached one-car, two-car and three-car garages, constructed of wood or masonry. For incorporation into Hazus, costs by size and construction class have been averaged for attached/detached and various materials. Average costs associated with garage types included in the default inventory for single-family residential structures (one-car, two-car, and three-car) are provided in Table 6-4.

Table 6-4 Single-Family Residential Garage Adjustment

Construction Class	Garage Type	Average Additional Garage Cost per Residence (2022)
Economy	One-car	$19,394
Economy	Two-car	$30,397
Economy	Three-car	$41,125
Average	One-car	$20,313
Average	Two-car	$31,600
Average	Three-car	$42,613
Custom	One-car	$22,377
Custom	Two-car	$35,519
Custom	Three-car	$48,307
Luxury	One-car	$28,233
Luxury	Two-car	$44,515
Luxury	Three-car	$60,444

Weighting factors for the construction class for the given Census block (also used in the replacement value calculations) are shown in Table 6-5.

Table 6-5 RES1 Construction Class Weights Relative to Income Ratio

Income Ratio[1], [2]	Luxury	Custom	Average	Economy
IR < 0.5	-	-	-	100
0.5 <= IR < 0.85	-	-	25	75
0.85 <= IR < 1.25	-	25	75	-
1.25 <= IR < 2.0	-	100	-	-
IR <= 2.0	100	-	-	-

[1]Income Ratio (IR) is calculated as the Census block group median household income divided by the state median household income.

[2]No Income Ratio data were available for the Pacific Territories (AS, GU, and MP); the Average construction class has been assumed.

RES2 specific occupancy is designated for manufactured housing, which represents mobile homes, but not single-family pre-manufactured housing. Structure replacement values for RES2 structures, based on U.S. Census 2020 Manufactured Housing Survey Annual Data, are provided in Table 6-6.

Table 6-6 Manufactured Housing Replacement Cost Model

Census Region[1]	Cost per Square Foot (2020)[2]
Northeast	$68.65
Midwest	$59.14
South	$55.97
West	$73.92

[1]Census region list of states and territories provided in Table 3-1.

[2]All replacement cost values based on U.S. Census Bureau 2020 Manufactured Housing Survey Annual Data.

For the Hurricane Model, specifically related to surge modeling, Hazus further subdivides the overall building replacement value into individual subassemblies such as foundation or roof. This supports the ability of the model to properly account for damages from both flood and wind damages from hurricane events. See the *Hazus Hurricane Model Technical Manual* (FEMA, 2022b) for more details on subassembly replacement values.

6.1.1 RES1 Valuation Equation

Equation 6-1 is used to develop the valuation for individual single-family residential buildings, aggregated at the Census block level for the Flood model and to the Census tract level for the Earthquake and Hurricane models. Where available, NSI 2022 data on basements (including whether basements are finished or unfinished) and number of stories are used directly to estimate associated replacement costs for individual buildings[2]. When NSI 2022 or similar data are not available, the original Hazus distributions by Census Region and Division are utilized. None of the available data sources provided sufficient information on garage type, so the original Hazus garage distributions by Census Region (Table 5-5) were used.

The source data for the U.S. Virgin Islands included the number of stories and basement information, however, in the U.S. Virgin Islands the basement attribution often represents cisterns, so while the number of stories data could be used directly, the regional basement factors were applied.

The District of Columbia and Puerto Rico source data were missing key attributes. The DC data did not contain basement attributes but did contain number of stories and were all 3 or above. The PR data had neither basement nor number of stories attributes. In these cases, the regional Census distributions available for all Hazus states were used.

Data availability is summarized in Table 6-7, and the RES1 regional basement and number of stories distributions are provided in Table 6-8 and Table 6-9, respectively.

[2] There was one anomalous RES1 replacement cost value for a single structure in Cherokee County, SC that was removed to reduce the overall RES1 Census Block replacement cost to a reasonable value. For more information and frequently asked questions regarding the NSI database, please visit https://www.hec.usace.army.mil/confluence/nsi/technicalreferences/latest/frequently-asked-questions.

Table 6-7 RES1 Valuation Model Data Sources

Geographic Area	Number of Stories	Basement	Garage
CONUS (except District of Columbia), Alaska, Hawaii	NSI 2022	NSI 2022	Distribution by Census Region[2]
U.S. Virgin Islands	VI Data[3]	VI Data[3]	Distribution by Census Region[2]
American Samoa, Guam, Northern Mariana Islands	AS, GU, MP Data[4]	AS, GU, MP Data[4]	Distribution by Census Region[2]
District of Columbia	Open Data DC[5]	Distribution by Census Division[6]	Distribution by Census Region[2]
Puerto Rico	Distribution by Census Region[7]	Distribution by Census Division[6]	Distribution by Census Region[2]

[1]All RES1 in AS, GU and MP assumed to have no basement

[2]Table 5-5

[3]FEMA NHRAP, 2019

[4]FEMA NHRAP, 2022 see Section 3.7 and 5.8

[5]FEMA NHRAP, 2022 see Section 3.6

[6]Table 6-8

[7]Table 6-9

Table 6-8 Basement Distribution by Census Division

Census Division[1]	Percent with Basement[2]	Percent without Basement
New England	72%	28%
Middle Atlantic	58%	42%
East North Central	57%	42%
West North Central	56%	44%
South Atlantic	19%	81%
East South Central	18%	82%
West South Central	2%	98%
Mountain	26%	74%
Pacific	8%	92%

[1]Census Division list of states provided in Table 3-1.

[2]Based on U.S. Energy Information Administration (EIA), 2009 Residential Energy Consumption Survey, Final Release April 2013, Structural and Geographic Characteristics of U.S. Homes, by Census Region, and Division.

Table 6-9 Percent Distribution of Number of Stories for Single-family Residences by Census Region

Census Region[1]	One-Story[2]	Two-Story	Three-Story	Split Level
Northeast	25%	68%	5%	2%
Midwest	50%	46%	2%	2%
South	66%	32%	1%	1%
West	66%	30%	2%	2%

[1]Census Region list of states provided in Table 3-1.

[2]Based on EIA, 2009 Residential Energy Consumption Survey, Final Release April 2013, Structural and Geographic Characteristics of U.S. Homes, by Census region.

The RES1 valuation can be summarized mathematically in Equation 6-1:

Equation 6-1 RES1 Valuation Equation

$$V_{RES1,k} = (A_{RES1,k}) * \left[\sum_{i=1}^{4} \sum_{j=1}^{4} \sum_{l=1}^{3} w_{i,k} * w_{j,k} * w_{l,k} * C_{i,j,l}\right] + \left[\sum_{i=1}^{4} \sum_{m=1}^{4} w_{i,k} * w_{m,k} * C_{i,m}\right]$$

Where:

k	Census block in which the RES1 building is located.
$V_{RES1,k}$	the estimated valuation for the single-family residences (RES1) being evaluated, located in Census block (k) prior to the application of location factors.
$A_{RES1,k}$	the single-family residential (RES1) building area (square feet) taken from the NSI 2022 (or equivalent) data set, for the building located in Census block k.
i	the construction class or classes (1 = Economy, 2 = Average, 3 = Custom, 4 = Luxury) of the building being evaluated, determined from the Census block's income ratio relative to the ranges provided in Table 6-5.
$w_{i,k}$	the weighting factor for the construction class or classes (i) for the building's Census block (k) provided in Table 6-5.
j	the number of stories class for the single-family (RES1) structure being evaluated (1 = One-story, 2 = Two-story, 3 = Three-story, and 4 = split level).
$w_{j,k}$	the weighting factor for the number of stories class (j) for the building located in Census block (k), depending on the Census region of that block (by state FIPS). Weighting factors were developed from regional construction distributions as provided in Table 6-9.
l	the basement status for the single-family residence being evaluated (1 = no basement, 2 = unfinished basement, 3 = finished basement).

$w_{l,k}$ the weighting factor for basements in the building's Census block (k) depending on the Census Division of that block (by state FIPS). When this weighting factor is used, l varies from 1 (no basement) to 2 (basement assumed unfinished); l=3 (finished basement) is not considered. Weighting factors were developed from regional foundation type distributions provided in Table 6-8.

$C_{i,j,l}$ the cost per square foot of the structure, for the given RSMeans construction class (i), number of stories class (j), and basement type (l), as provided in Table 6-3.

m the garage type for the single-family residence being evaluated (1 = 1-car, 2 = 2-car, 3 = 3-car, 4 = carport, and 5 = none).

$w_{m,k}$ the weighting factor for the garage type (m) for the building's Census block (k) depending on the Census region of that block (by state FIPS). Weighting factors were developed from regional garage distributions provided in Table 5-5.

$C_{i,m}$ the additional replacement cost for a given garage type (m), for the given construction class (i) as shown in Table 6-4. Note: $C_{i,m}$ = 0 when m = 4 (carport) or m = 5 (none).

As Equation 6-1 shows, the basic replacement cost per square foot is a function of the construction class, the number of stories, and the presence and type of basement and garage.

6.1.2 RES2 Valuation Equation

RES2 square footage is taken directly from NSI building data, aggregated to the Census block and tract. Unlike RES1 occupancy classifications, there are no allowances for variation of floor heights (number of stories) or other valuation parameters. The valuation of manufactured housing is the straight multiplication of each building's floor area by the default replacement cost per square foot, which varies by Census region rather than state or county. The cost per square foot for each Census region is developed from the U.S. Census 2020 Manufactured Housing Survey Annual Data (latest available) on average square feet of floor area is provided in Table 6-6.

The calculation for manufactured housing is defined in Equation 6-2:

Equation 6-2 RES2 Valuation Equation

$$V_{RES2,k} = A_{RES2,k} * C_{RES2}$$

Where:

k Census block in which the RES2 building is located.

$V_{RES2,k}$ the estimated valuation for the Manufactured Housing (RES2) being evaluated, located in Census block (k).

$A_{RES2,k}$ the Manufactured Housing (RES2) floor area (square feet) taken from the NSI 2022 (or equivalent) data set, for the building located in Census block (k).

C_{RES2} the Manufactured Housing (RES2) cost per square foot. RES2 replacement costs by Census region area provided in Table 6-6.

6.1.3 Other Occupancies Valuation Equation

The equation for the remaining residential occupancies (RES3-RES6) and all non-residential (COM, IND, EDU, REL, GOV, and AGR) occupancies is not as complex as the single-family model. The replacement cost is averaged across structure types, stories, and construction classes.

Equation 6-3 applies to the remaining residential occupancies and non-residential occupancies.

Equation 6-3 Other Occupancies Valuation Equation

$$V_{x.k} = A_{x,k} * C_x$$

Where:

k Census block in which the building is located.

x defines the remaining occupancy classifications for the remaining occupancies (i.e., RES5, COM1, REL1, etc.) for which the cost is being calculated.

$V_{x,k}$ the estimated valuation for the specific occupancy (x) (such as RES4, COM3, or IND6) being evaluated, located in Census block (k), prior to application of location factors.

$A_{x,k}$ the floor area (square feet) for a specific occupancy (x) (such as RES3, COM8, IND4, GOV1, etc.) taken from the NSI 2022 (or equivalent) data set, for the building located in Census block (k).

C_x the cost per square foot for the specific occupancy (x). The replacement costs are provided in Table 6-2 by specific occupancy.

6.2 Contents Replacement Value

Contents replacement value was estimated as a percent of structure replacement value as part of the original development of Hazus by the National Institute of Building Sciences (NIBS) in 1999. Table 6-10 summarizes these values for all Hazus specific occupancies.

Table 6-10 Baseline Hazus Contents Value as Percent of Structure Value

Label	Contents Value (%)
RES1	50%
RES2	50%
RES3A-F	50%
RES4	50%
RES5	50%
RES6	50%
COM1	100%
COM2	100%
COM3	100%
COM4	100%
COM5	100%
COM6	150%
COM7	150%
COM8	100%
COM9	100%
COM10	50%
IND1	150%
IND2	150%
IND3	150%
IND4	150%
IND5	150%
IND6	100%
AGR1	100%
REL1	100%
GOV1	100%
GOV2	150%
EDU1	100%
EDU2	150%

6.3 County Modification Factors

The replacement value model tables provide average national costs. With the exception of costs for manufactured housing (RES2), the national costs are localized by application of population-weighted residential and non-residential location factors that are provided with Hazus for counties and states throughout the U.S., as well as for the U.S. Territories. The residential modification factor is applied to RES1 only, and the non-residential county modification factors are applied to all other Occupancies including RES3-6. These factors were applied in the development of General Building Stock data for structure replacement values that are tabulated in the Hazus databases (i.e., SQL tables

hzExposureOccupB and hzExposureOccupT). The modification factors by County are available in each inventory database in the SQL table hzMeansCountyLocationFactor.

6.4 Depreciated Building Replacement Values

The depreciation models utilized in the Flood Model were based on industry-standard depreciation methods presented in RSMeans (2006). The depreciation age in Hazus is estimated based on the computer clock minus the Median Year Built as developed in the Demographic block data. The depreciation models relate building age to expected percent decrease in structure value over time; the RSMeans depreciation models have not changed significantly since their initial evaluation for use in the Hazus Flood Model. Within RSMeans, two depreciation cost models are available and have been adapted for use in Hazus: one for single-family residential structures and one for commercial/industrial /institutional structures.

6.4.1 Single-Family Residential Occupancy Depreciation Model

RSMeans (2006) includes three tabular depreciation models for residential structures based on actual structure age and general condition (Good, Average, and Poor). Best-fit lines through the various models are shown graphically in Figure 6-1.

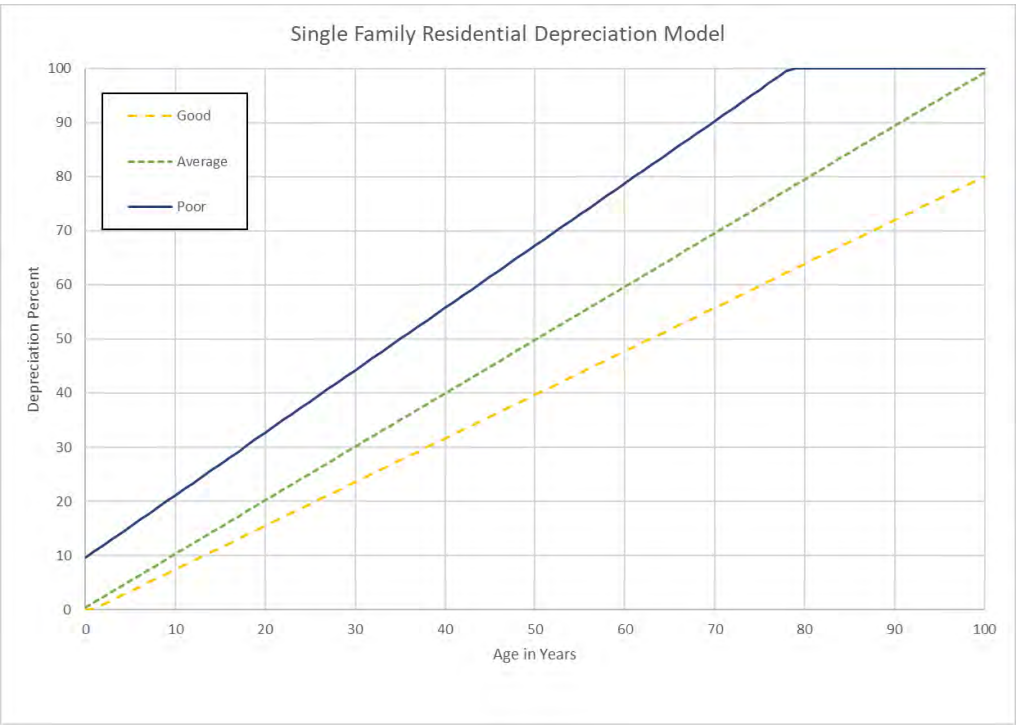

Figure 6-1 Single-Family Residential Depreciation Models

The underlying assumption in the General Building Stock Methodology used in the Flood Model is that for any community, some combination of the full replacement cost models (Economy, Average, Custom, or Luxury), and depreciation models (Good, Average, or Poor) will best represent the true depreciated value. This basic premise was tested during the initial Hazus Flood Model development process on more than 8,000 homes in Grand Forks, ND, more than 160,000 homes in Mecklenburg County, NC, and

more than 60,000 homes in Fort Collins, CO. Results indicated that good agreement with assessed (depreciated) value could be attained from the models.

6.4.2 Other Residential and Non-Residential Occupancies Depreciation Model

Unlike the residential depreciation model, the RSMeans commercial/industrial/institutional depreciation is determined from "observed age" and building framing material (frame, masonry on wood, and masonry on masonry or steel). An average depreciation function has been derived for use in Hazus, as shown in Figure 6-2. The non-residential structure's "observed age" was assumed to reflect the structure's condition (e.g., the observed age should reflect any remodeling or renovation that would reduce deterioration, and therefore decrease the observed age).

It was assumed that chronological age is approximately equivalent to observed age for the non-residential structures, primarily because these structures are less likely to be used far beyond their typical life expectancy. For example, in Grand Forks, ND, many homes are significantly older than the typical life expectancy of about 50 to 60 years, whereas commercial and industrial structures did not demonstrate the same widespread longevity.

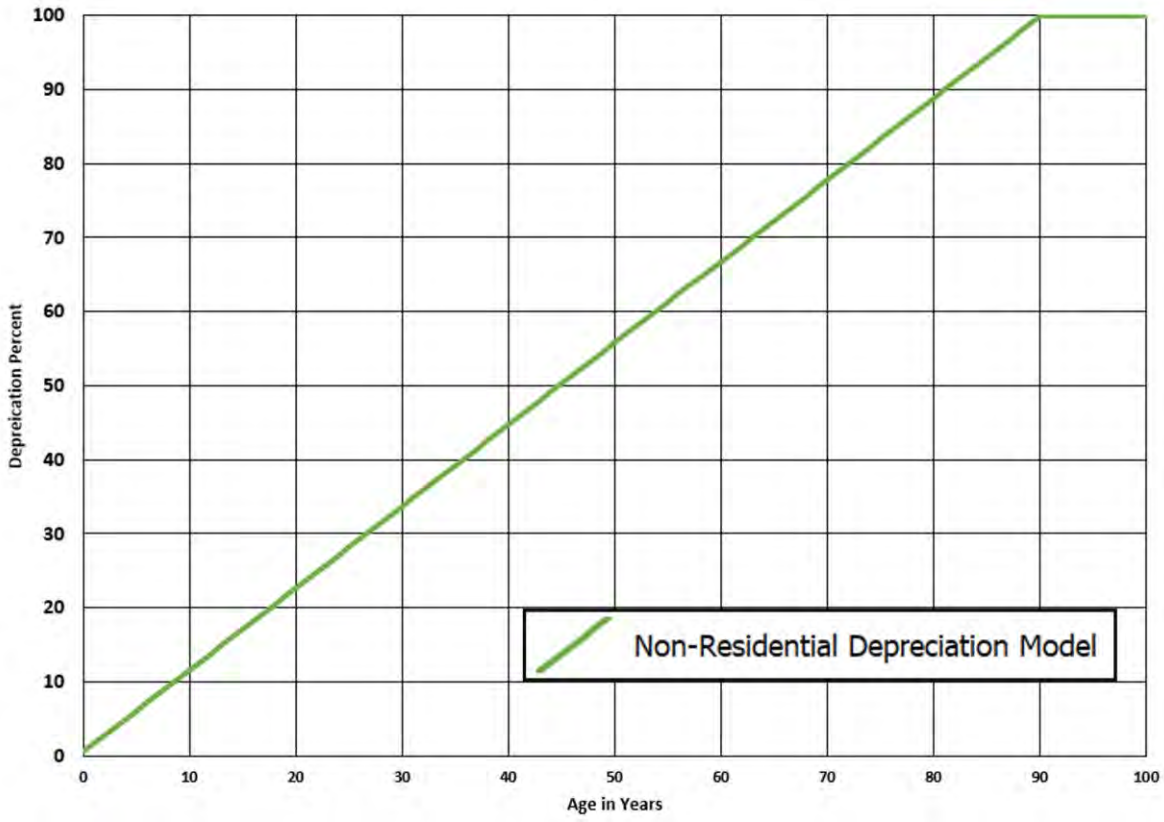

Figure 6-2 Non-Residential Depreciation Model

6.5 Other Economic Values

6.5.1 Business Inventory

For occupancies with inventory considerations (COM1, COM2, IND1 - IND6, and AGR1), inventory losses are estimated using Hazus baseline inventory values. Inventory values are estimated by first estimating annual sales (shown in Table 6-11) and then applying a value from Table 6-12 that represents inventory values as a percentage of annual sales.

Previous updates to the original Hazus annual sales data employed Consumer Price Index (CPI) ratios to update annual sales directly, with output/employment updated from various BLS and BEA data (e.g., BLS "Industry Productivity & Cost" data on Output per Worker by Industry for COM1/COM2, BLS "Major Sector Productivity & Costs" data on Output per Job by Industry for IND1-IND5, and BEA "Output by Industry" data combined with BLS or BEA data on employment for IND6 and AGR1, respectively). Unfortunately, this update approach severed the intended relationship between sales and output per employee (Sales = Output/Employment divided by Square Foot/Employee), and only the CPI update of annual sales was relevant, as this is the only data actually used in Hazus.

For Hazus 6.0, a more comprehensive approach has been applied. A single, consistent source of data is now used; 2020 (latest available) BEA data on employment by industry (BEA, 2020a) and output by industry BEA (2020b) have been individually mapped to Hazus occupancy classes using the original Hazus Standard Industrial Classification (SIC) code mapping to develop occupancy specific estimates of Output per Employee. These are then divided by the original Hazus estimates of Square Feet per Employee to arrive at Annual Sales (dollars per square foot). The resulting values are, for several of the occupancies (e.g., COM1, AGR1), much larger than the values that would result from the prior update approach but are sourced more consistently and better reflect changes in output and employment over time at the industry level. Table 6-11 reflects the updated 2020 economic values.

Table 6-11 Annual Gross Sales or Production

Hazus Specific Occupancy Class	Class Description	Output/ Employment (2020)	Square Feet Floor Space (ft^2/Employee)[1]	Annual Sales (2020, $/$ft^2$)
COM1	Retail Trade	$603,863	825	$732
COM2	Wholesale Trade	$367,681	900	$409
IND1	Heavy	$390,894	550	$711
IND2	Light	$286,005	590	$485
IND3	Food/Drugs/Chemicals	$752,420	540	$1,393
IND4	Metals/Minerals Processing	$707,640	730	$969
IND5	High Technology	$357,170	300	$1,191
IND6	Construction	$240,994	250	$964
AGR1	Agriculture	$327,606	250	$1,310

[1] *Values from original development of Hazus by NIBS in 1999.*

Table 6-12 Business Inventory (Percent of Gross Annual Sales)

Label	Occupancy Class	Business Inventory (%)[1]
COM1	Retail Trade	13%
COM2	Wholesale Trade	10%
IND1	Heavy	5%
IND2	Light	4%
IND3	Food/Drugs/Chemicals	5%
IND4	Metals/Minerals Processing	3%
IND5	High Technology	4%
IND6	Construction	2%
AGR1	Agriculture	8%

[1]*Values from original development of Hazus by NIBS in 1999.*

6.5.2 Relocation Expenses (Rental and Disruption Costs)

Relocation expenses represent disruption costs to building owners for selected occupancies. These include all occupancies except entertainment (COM8), theaters (COM9), parking facilities (COM10), and heavy industry (IND1). Expenses contain disruption costs that include the cost of shifting and transferring, and the rental of temporary space. These costs are incurred once the building reaches a damage state of "Slight" or greater. By default, no threshold is applied in the Flood Model.

Table 6-13 shows the 2021 values for rental and disruption costs. It should be noted the default values for rental costs and disruption costs provided in Table 6-13 have been updated from the original development year of 1994 to the year 2021 using a ratio of the annual CPI. The original dollar value was multiplied by the ratio of the CPI value for the current year to the CPI value for the year the data were developed. Annual CPI data for the years 1990 through 2021 are provided in Table 6-14. The rental costs in Table 6-13 are also used in Hazus loss calculations where rent is considered a source of business income, relying on information on the percent of owner occupation as shown in Table 6-15.

Table 6-13 Rental Costs and Disruption Costs

Label	Occupancy Class	Rental Cost (2021) ($/ft² /month) [1]	Rental Cost (2021) ($/ft² /day)	Disruption Costs (2021) ($/ft²) [1]
RES1	Single-family Dwelling	0.91	0.030	1.10
RES2	Mobile Home	0.64	0.021	1.10
RES3A	Multi-family Dwelling; Duplex	0.82	0.027	1.10
RES3B	Multi-family Dwelling; Triplex/Quad	0.82	0.027	1.10
RES3C	Multi-family Dwelling; 5–9 units	0.82	0.027	1.10
RES3D	Multi-family Dwelling; 10–19 units	0.82	0.027	1.10
RES3E	Multi-family Dwelling; 20–49 units	0.82	0.027	1.10
RES3F	Multi-family Dwelling; 50+ units	0.82	0.027	1.10

Label	Occupancy Class	Rental Cost (2021) ($/ft² /month) [1]	Rental Cost (2021) ($/ft² /day)	Disruption Costs (2021) ($/ft²) [1]
RES4	Temporary Lodging	2.74	0.091	1.10
RES5	Institutional Dormitory	0.55	0.018	1.10
RES6	Nursing Home	1.01	0.034	1.10
COM1	Retail Trade	1.55	0.052	1.46
COM2	Wholesale Trade	0.64	0.021	1.28
COM3	Personal and Repair Services	1.83	0.061	1.28
COM4	Professional/Technical/ Business Services	1.83	0.061	1.28
COM5	Banks	2.29	0.076	1.28
COM6	Hospital	1.83	0.061	1.83
COM7	Medical Office/Clinic	1.83	0.061	1.83
COM8	Entertainment & Recreation	2.29	0.076	0.00
COM9	Theaters	2.29	0.076	0.00
COM10	Parking	0.46	0.015	0.00
IND1	Heavy	0.27	0.009	0.00
IND2	Light	0.37	0.012	1.28
IND3	Food/Drugs/Chemicals	0.37	0.012	1.28
IND4	Metals/Minerals Processing	0.27	0.009	1.28
IND5	High Technology	0.46	0.015	1.28
IND6	Construction	0.18	0.006	1.28
AGR1	Agriculture	0.91	0.030	0.91
REL1	Church/Membership Organization	1.37	0.046	1.28
GOV1	General Services	1.83	0.061	1.28
GOV2	Emergency Response	1.83	0.061	1.28
EDU1	Schools/Libraries	1.37	0.046	1.28
EDU2	Colleges/Universities	1.83	0.061	1.28

[1]Values adjusted using CPI to 2021 from original values from development of Hazus by NIBS in 1999.

Table 6-14 Consumer Price Index 1990–2021

Year	Annual CPI[1]
1990	130.7
1991	136.2
1992	140.3
1993	144.5
1994	148.2
1995	152.4
1996	156.9

Year	Annual CPI[1]
1997	160.5
1998	163.0
1999	166.6
2000	172.2
2001	177.1
2002	179.9
2003	184.0
2004	188.9
2005	195.3
2006	201.6
2007	207.3
2008	215.3
2009	214.5
2010	218.1
2011	224.9
2012	229.6
2013	233.0
2014	236.7
2015	237.0
2016	240.0
2017	245.1
2018	251.1
2019	255.7
2020	258.8
2021	271.0

[1]*Note: As of March 2022. Source is U.S. Bureau of Labor Statistics.*

Table 6-15 Percent Owner Occupied by Occupancy Class

Label	Occupancy Class	Percent Owner Occupied[1]
RES1	Single-family Dwelling	75%
RES2	Mobile Home	85%
RES3A	Multi-family Dwelling; Duplex	35%
RES3B	Multi-family Dwelling; Triplex/Quad	35%
RES3C	Multi-family Dwelling; 5–9 units	35%
RES3D	Multi-family Dwelling; 10–19 units	35%
RES3E	Multi-family Dwelling; 20–49 units	35%
RES3F	Multi-family Dwelling; 50+ units	35%
RES4	Temporary Lodging	0%

Label	Occupancy Class	Percent Owner Occupied[1]
RES5	Institutional Dormitory	0%
RES6	Nursing Home	0%
COM1	Retail Trade	55%
COM2	Wholesale Trade	55%
COM3	Personal and Repair Services	55%
COM4	Professional/Technical/Business Services	55%
COM5	Banks	75%
COM6	Hospital	95%
COM7	Medical Office/Clinic	65%
COM8	Entertainment & Recreation	55%
COM9	Theaters	45%
COM10	Parking	25%
IND1	Heavy	75%
IND2	Light	75%
IND3	Food/Drugs/Chemicals	75%
IND4	Metals/Minerals Processing	75%
IND5	High Technology	55%
IND6	Construction	85%
AGR1	Agriculture	95%
REL1	Church/Membership Organization	90%
GOV1	General Services	70%
GOV2	Emergency Response	95%
EDU1	Schools/Libraries	95%
EDU2	Colleges/Universities	90%

[1]*Values from original development of Hazus by NIBS in 1999.*

6.5.3 Loss of Income

Business activity generates several types of income. First, there is income associated with capital, or property ownership. Business generates profits, and a portion of this is paid out to individuals (as well as to pension funds and other businesses) as dividends, while another portion (retained earnings) is returned to the enterprise. Businesses also make interest payments to banks and bondholders for loans. They pay rent on property and make royalty payments for the use of tangible assets. Those in business for themselves, or in partnerships, generate a category called proprietary income, one portion of which reflects their profits and the other reflects a salary (e.g., the case of lawyers or dentists). Finally, the biggest category of income generated/paid is associated with labor. In most urban regions of the U.S., wage and salary income comprises more than 75% of total personal income payments.

It is possible to link income payments to various physical damage measures, including sales, property values, or building area. Income losses occur when building damage disrupts economic activity. Hazard

specific equations for income losses in Hazus include variables for loss of income over time (Table 6-16), and the potential to recapture income (Table 6-17).

Business-related losses from disaster events can be recouped, to some extent, by working overtime after the event. For example, a factory closed for six weeks due to directly caused structural damage or indirectly caused shortage of supplies may work extra shifts in the weeks or months following its reopening.

This ability to recapture production will differ across industries. It will be higher for those who produce durable output and lower for those who produce perishables or spot products (i.e., utility sales to residential customers, hotel services, and entertainment). Even some durable manufacturing enterprises would seem to have severe recapture limits because they already work three shifts per day. However, work on weekends, excess capacity, and temporary production facilities all can be used to make up lost revenue.

Table 6-16 Proprietor's Income (2021)

Label	Occupancy Class	Income (2021) / ft² / year[1]	Income (2021) / ft² / day[1]	Wages (2021) / ft² / day[1]	Employees / ft²[2]	Output (2021) / ft² / day[1]
RES1	Single-family Dwelling	0.000	0.000	0.000	0.000	0.000
RES2	Mobile Home	0.000	0.000	0.000	0.000	0.000
RES3A	Multi-family Dwelling; Duplex	0.000	0.000	0.000	0.000	0.000
RES3B	Multi-family Dwelling; Triplex/Quad	0.000	0.000	0.000	0.000	0.000
RES3C	Multi-family Dwelling; 5–9 units	0.000	0.000	0.000	0.000	0.000
RES3D	Multi-family Dwelling; 10–19 units	0.000	0.000	0.000	0.000	0.000
RES3E	Multi-family Dwelling; 20–49 units	0.000	0.000	0.000	0.000	0.000
RES3F	Multi-family Dwelling; 50+ units	0.000	0.000	0.000	0.000	0.000
RES4	Temporary Lodging	48.303	0.132	0.311	0.003	0.693
RES5	Institutional Dormitory	0.000	0.000	0.000	0.000	0.000
RES6	Nursing Home	80.505	0.221	0.519	0.005	1.156
COM1	Retail Trade	29.805	0.082	0.285	0.004	0.603

Label	Occupancy Class	Income (2021) / ft² / year[1]	Income (2021) / ft² / day[1]	Wages (2021) / ft² / day[1]	Employees / ft²[2]	Output (2021) / ft² / day[1]
COM2	Wholesale Trade	48.881	0.134	0.351	0.002	0.784
COM3	Personal and Repair Services	64.404	0.176	0.415	0.004	0.925
COM4	Professional/ Technical/ Business Services	507.476	1.390	0.494	0.004	1.351
COM5	Banks	579.090	1.587	0.805	0.006	4.387
COM6	Hospital	80.505	0.221	0.519	0.005	1.156
COM7	Medical Office/Clinic	161.009	0.441	1.039	0.010	2.311
COM8	Entertainment & Recreation	295.273	0.809	0.644	0.007	1.457
COM9	Theaters	96.605	0.265	0.624	0.006	1.388
COM10	Parking	0.000	0.000	0.000	0.000	0.000
IND1	Heavy	122.166	0.335	0.554	0.003	2.342
IND2	Light	122.166	0.335	0.554	0.003	2.342
IND3	Food/Drugs/ Chemicals	162.887	0.446	0.741	0.004	3.123
IND4	Metals/Minerals Processing	370.102	1.014	0.572	0.003	2.478
IND5	High Technology	244.332	0.669	1.110	0.006	4.683
IND6	Construction	119.103	0.326	0.600	0.005	2.321
AGR1	Agriculture	113.026	0.310	0.123	0.004	1.156
REL1	Church/ Membership Organization	64.404	0.176	0.415	0.004	2.311
GOV1	General Services	52.893	0.145	3.986	0.025	0.925
GOV2	Emergency Response	0.000	0.000	6.060	0.038	1.062
EDU1	Schools/ Libraries	80.505	0.221	0.519	0.005	4.478
EDU2	Colleges/ Universities	161.009	0.441	1.039	0.010	6.806

[1]Values adjusted using CPI to 2021 from original values from the development of Hazus by NIBS in 1999.

[2]Values from NSI 2022.

Table 6-17 provides the full set of recapture factors (wage, income, and output recapture factors) that are used with the hazard-specific equations to estimate the various types of income losses for the economic sectors used in the direct economic loss module for all hazards.

Table 6-17 Hazus Recapture Factors[1]

Specific Occupancy	Wage Recapture (%)	Employment Recapture (%)	Income Recapture (%)	Output Recapture (%)
RES1	0	0	0	0
RES2	0	0	0	0
RES3	0	0	0	0
RES4	0.60	0.60	0.60	0.60
RES5	0.60	0.60	0.60	0.60
RES6	0.60	0.60	0.60	0.60
COM1	0.87	0.87	0.87	0.87
COM2	0.87	0.87	0.87	0.87
COM3	0.51	0.51	0.51	0.51
COM4	0.90	0.90	0.90	0.90
COM5	0.90	0.90	0.90	0.90
COM6	0.60	0.60	0.60	0.60
COM7	0.60	0.60	0.60	0.60
COM8	0.60	0.60	0.60	0.60
COM9	0.60	0.60	0.60	0.60
COM10	0.60	0.60	0.60	0.60
IND1	0.98	0.98	0.98	0.98
IND2	0.98	0.98	0.98	0.98
IND3	0.98	0.98	0.98	0.98
IND4	0.98	0.98	0.98	0.98
IND5	0.98	0.98	0.98	0.98
IND6	0.95	0.95	0.95	0.95
AGR1	0.75	0.75	0.75	0.75
REL1	0.60	0.60	0.60	0.60
GOV1	0.80	0.80	0.80	0.80
GOV2	0	0	0	0
EDU1	0.60	0.60	0.60	0.60
EDU2	0.60	0.60	0.60	0.60

[1]Values from the original development of Hazus by NIBS in 1999.

Section 7. Essential Facilities: Medical Care, Emergency Response, and Schools

Essential facilities (EF) are those facilities that provide services to the community and should be functional after an event. Essential facilities include medical care facilities, fire stations, police stations, EOCs, and schools. Damage to essential facilities is determined on a site-specific basis. The purpose of the essential facility modules for each hazard (currently only Earthquake, Flood, and Hurricane) is to determine the expected loss of functionality for these critical facilities. The data required for the analysis includes mapping of the essential facility occupancy class to a specific building type, or a combination of essential facility building type and design level.

Table 7-1 summarizes the spatial database elements for medical, emergency response, and schools by data type, sources and geographic coverage. Table 7-2 provides the tabular database elements for medical, emergency response, and schools by data type, hazard, and sources.

Table 7-1 Baseline Essential Facilities Spatial Database Elements for Medical Care, Emergency Response, and Schools

EF Data Type	Data Element	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Geographic Coverage
Medical Care Spatial Data	Hospital Geometries (Lat/Long)	June 2022	HIFLD Open: Hospitals. Hospital records with STATUS = "Closed" have been omitted.	All U.S.
Medical Care Spatial Data	Hospital Geometries (Lat/Long)	Oct. 2022	HIFLD Open: Veteran's Health Administration Medical Facilities (VHAMF). Records in the VHAMF layer co-located with records determined to be duplicates in the Hospitals layer have been omitted.	All U.S.
Emergency Response: Fire Station Spatial Data	Fire Geometries (Lat/Long)	Sept. 2020	HIFLD Open: Fire Stations	CONUS, AK, PR
Emergency Response: Fire Station Spatial Data	Fire Geometries (Lat/Long)	2018	State of Hawaii (2018)	HI
Emergency Response: Fire Station Spatial Data	Fire Geometries (Lat/Long)	2019	City and County of Honolulu	HI
Emergency Response: Fire Station Spatial Data	Fire Geometries (Lat/Long)	2017[1]	Global Hazards Information Network (GHIN) for U.S. Territories of AS, GU, and MP	AS, GU and MP

EF Data Type	Data Element	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Geographic Coverage
Emergency Response: Fire Station Spatial Data	Fire Geometries (Lat/Long)	2019[2]	Best available local data for VI	VI
Emergency Response: Police Station Spatial Data	Police Geometries (Lat/Long)	Feb. 2021	HIFLD Open: Local Law Enforcement Locations	CONUS, AK, PR
Emergency Response: Police Station Spatial Data	Police Geometries (Lat/Long)	2018	State of Hawaii	HI
Emergency Response: Police Station Spatial Data	Police Geometries (Lat/Long)	2019	City and County of Honolulu	HI
Emergency Response: Police Station Spatial Data	Police Geometries (Lat/Long)	2017[1]	GHIN for U.S. Territories of AS, GU, and MP	AS, GU and MP
Emergency Response: Police Station Spatial Data	Police Geometries (Lat/Long)	2019[2]	Best available local data for VI	VI
Emergency Response: EOC Spatial Data	EOC Geometries (Lat/Long)	Apr. 2018	HIFLD Open: Local EOC. Local EOCs identified as mobile units (NAME includes “mobile”) have been omitted (except for the Mobile County EOC in AL).	All U.S.
Emergency Response: EOC Spatial Data	EOC Geometries (Lat/Long)	Jan. 2022	HIFLD Open: State EOC	All U.S.
Emergency Response: EOC Spatial Data	EOC Geometries (Lat/Long)	Jan. 2022	HIFLD Open: FEMA Regional Offices	All U.S.
Emergency Response: EOC Spatial Data	EOC Geometries (Lat/Long)	2018	State of Hawaii	HI
Emergency Response: EOC Spatial Data	EOC Geometries (Lat/Long)	2019	City and County of Honolulu	HI

EF Data Type	Data Element	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Geographic Coverage
Schools Spatial Data	School Geometries (Lat/Long)	May 2022	HIFLD Open: Public Schools Public Schools with Status = 2 (Closed), 6 (Inactive), or 7 (Future School) have been omitted. Schools other than in-person (NAME includes “online”, “on-line”, “virtual”, “cyber” and “distance”) have been omitted.	All U.S.
Schools Spatial Data	School Geometries (Lat/Long)	May 2022	HIFLD Open: Private Schools. Schools other than in-person (NAME includes “online”, “on-line”, “virtual”, “cyber” and “distance”) have been omitted.	All U.S.
Schools Spatial Data	School Geometries (Lat/Long)	March 2022	HIFLD Open: Colleges and Universities. Colleges & Universities with Status = “C” (Combined), “D” (Delete), “G” (Child campus) and “M” (Closed) have been omitted. Schools other than in-person (NAME includes “online”, “on-line”, “virtual”, “cyber” and “distance”) have been omitted. For the Colleges and Universities database, additional filters were applied to identify and remove several very large distance learning institutions, e.g., 'UNIVERSITY OF PHOENIX-ARIZONA’.	All U.S.
Schools Spatial Data	School Geometries (Lat/Long)	May 2022	HIFLD Open: Supplemental Colleges. Supplemental Colleges with Status = “C” (Combined), “D” (Delete), “G” (Child campus) and “M” (Closed) have been omitted. Schools other than in-person (NAME includes “online”, “on-line”, “virtual”, “cyber” and “distance”) have been omitted.	All U.S.
Schools Spatial Data	School Geometries (Lat/Long)	2018	State of Hawaii	HI
Schools Spatial Data	School Geometries (Lat/Long)	2019	City and County of Honolulu (2019)	HI
Schools Spatial Data	School Geometries (Lat/Long)	2017[1]	GHIN for U.S. Territory of MP	MP

EF Data Type	Data Element	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source	Geographic Coverage
Schools Spatial Data	School Geometries (Lat/Long)	2019[2]	Best available local data for VI	VI

[1]U.S. Territory Essential Facilities (except Puerto Rico and U.S. Virgin Islands) were completed in 2017 and developed by the Pacific Disaster Center using public sources. The sources for these data varied depending on the territory, and the metadata for the layers can be found at the Global Hazards Information Network (GHIN) website.

[2]U.S. Virgin Islands data were added to Hazus databases in 2019 (FEMA, 2019).

[3]For more information, see Section 6.6 of the Hazus Earthquake Model User Guidance.

Table 7-2 Baseline Essential Facilities Tabular Database Elements for Medical Care, Emergency Response, and Schools

EF Data Type	Data Element	Hazards	Hazus 6.0 Dataset Source
EF Class Tabular Data	EF Usage Classification	All	Attributes established for each EF Class (see Table 7-3).
EQ and TS Bldg. Type for EF Class Tabular Data	Mapping Scheme: EQ Bldg. Type	EQ, TS	Regional or State Assumption aligned with benchmark year code dates, urban or rural designation and estimated year built. The state-by-state assignments are stored within the CDMS SQL database in the eqEFBldgType table.
FL Bldg. Type for EF Class Tabular Data	Mapping Scheme: FL Bldg. Type	FL	Assumed from EF Usage Class.
HU Bldg. Type for EF Class Tabular Data	Mapping Scheme: HU Bldg. Type	HU	Region, State or Sub-State Assumption.
EF Structure Replacement Value	Structure Value	All	2022 Replacement Value Model (see Section 7.2).
Foundation Type Tabular Data	Foundation Type	EQ, FL	Community Level (FL) or National (EQ) Assumption.
Design Level Tabular Data	Design Level	EQ	Regional Assumption aligned with benchmark year code dates, urban or rural designation and estimated year built.
Landslide Susceptibility Tabular Data	Landslide Susceptibility	EQ	National Default (0).[1]
Liquefaction Susceptibility Tabular Data	Liquefaction Susceptibility	EQ	National Default (0). [1]
Soil Type Tabular Data	Soil Type	EQ	National Default (D); USGS with site-soil amplification for Probabilistic and ShakeMaps.
Wind Building Characteristics Tabular Data	Wind Building Characteristics	HU	Region, State or Sub-State Assumption.

[1]For more information, see Section 6.6 of the Hazus Earthquake Model User Guidance.

7.1 Classification

Essential facilities are classified based on facility function and, in the case of hospitals, size. Table 7-3 lists the classes of essential facilities used in the Hazus Methodology. Hospitals are classified according to number of beds, since the structural and nonstructural systems of a hospital are related to the size of the hospital (i.e., to the number of beds it contains).

Table 7-3 Classification of Essential Facilities

Label	Occupancy Class	Description
Medical Care Facilities		
MDFLT	Default Hospital	Assigned features similar to EFHM
EFHS	Small Hospital	Hospital with fewer than 50 Beds
EFHM	Medium Hospital	Hospital with beds between 50 & 150
EFHL	Large Hospital	Hospital with more than 150 Beds
EFMC	Medical Clinics	Clinics, Labs, Blood Banks
Emergency Response		
FDFLT	Default Fire Station	
EFFS	Fire Station	
PDFLT	Default Police Station	
EFPS	Police Station	
EDFLT	Default EOC	
EFEO	Emergency Operation Centers	
Schools		
SDFLT	Default School	Assigned features similar to ESF1
EFS1	Schools	Primary/Secondary Schools (K-12)
EFS2	Colleges/Universities	Community and State Colleges, State and Private Universities

7.2 Replacement Cost Models

Replacement cost models for each type of essential facility developed are described below.

7.2.1 Medical Care

For the hospital replacement cost model, a generalized construction rule-of-thumb is used to estimate building square footage. Based on recent hospital construction projects and industry commentary, a value of 2,500 square feet per bed is utilized[3].

The majority of records in the HIFLD Open Hospitals data set include data on the number of beds, allowing for facility classification into Hazus classes of Small, Medium and Large Hospitals (see Table

[3] See, for example, https://healthcaredesignmagazine.com/trends/research-theory/8-considerations-benchmarking/

7-3), as well as estimation of building-specific square footage. Using the available bed data in the 2021 HIFLD Open Hospitals data set examined during replacement cost model development, the 2,500 square foot per bed rule-of-thumb was used to select a representative building size for each Hazus hospital class; 70,000, 225,000 and 300,000 square feet for Small, Medium and Large Hospitals, respectively. These building sizes were then used to derive an average cost per square foot from selected models in RSMeans Square Foot Costs (RSMeans, 2022a) applicable to each category, provided in Table 7-4. Replacement values are estimated from bed count (where available), the square footage rule-of-thumb, and the replacement model cost per square foot. When bed count data are not available, facilities in the HIFLD Open Hospitals database are assumed to be Medium Hospitals. Replacement costs are localized by the application of county-level non-residential construction cost multipliers utilized for the General Building Stock (see Section 6).

The HIFLD Open VHAMF data set does not include hospital bed data, so replacement cost models are selected based on the facility's NAICS category, as delineated in Table 7-4. Veterans Health Administration Hospitals are modeled as Medium Hospitals. Outpatient Clinics are modeled as medical offices, with a replacement cost model that is similar to but slightly larger than the model applied to COM7 facilities in the General Building Stock (see Table 6-2), based on available building size data specific to Veterans Health Administration outpatient clinics. Finally, the Nursing Home replacement cost model applied here is the same as the model applied to RES6 construction in the General Building Stock (see Table 6-2).

Table 7-4 Replacement Cost Models for Medical Care Facilities

Model Description	Assumed Building Size (ft^2), When Required	Replacement Cost/ft^2 (2022)	Application Criteria: HIFLD Hospitals – "BEDS" Value	Application Criteria: HIFLD VHAMF - NAICS Code Description
Small Hospital	N/A	$389.23	BEDS < 50	N/A
Medium Hospital	225,000 (for records without bed data only)	$327.63	50 ≥ BEDS ≤ 150, and records with no beds data available	"GENERAL MEDICAL AND SURGICAL HOSPITALS", and "SPECIALTY (EXCEPT PSYCHIATRIC AND SUBSTANCE ABUSE) HOSPITALS"
Large Hospital	N/A	$325.27	BEDS > 150	N/A
Medical Office	11,500	$260.93	N/A	"OTHER OUTPATIENT CARE CENTERS"[1]
Nursing Home (same as RES6)	25,000	$261.45	N/A	"NURSING HOMES (SKILLED NURSING FACILITIES)"

[1]*Also applied to records identified as "OTHER OUTPATIENTRANCE CARE CENTERS" (typo in HIFLD Open data).*

7.2.2 Fire Stations

For the fire station replacement cost model, typical fire station building sizes have been assumed for volunteer and traditional fire departments in urban and non-urban areas based on available data, including fire station configuration information assembled for three FEMA-sponsored county-wide Hazus

risk assessment studies in southern California (MapIX-Mainland et al., 2009a, 2009b, 2009c) and the results of a limited web search which identified 40 recent construction projects nationwide. Available data indicate that stations in urban areas are generally larger than their counterparts in non-urban areas. In addition, in the 2021 HIFLD Open Fire Station data examined during replacement cost model development, 30% of records represented volunteer fire departments, which are most common in the eastern and southern states. Fire stations for volunteer departments may not have sleeping quarters (FEMA, 1997), so these stations have been modeled as smaller facilities.

Four replacement cost models, reflecting the expected difference in size for urban and non-urban stations, and for Volunteer Fire Departments and traditional Fire Departments, have been derived as an average cost per square foot for the assumed building sizes for selected models from RSMeans Square Foot Costs (RSMeans, 2022a), as shown in Table 7-5. Replacement costs are localized by the application of county-level non-residential construction cost multipliers utilized for the General Building Stock (see Section 6.3).

Fire station location relative to urban areas has been determined based on the 2021 Census Urban Area National GIS data. The Urban Area data categorize areas as follows:

- Urbanized Areas (field "UATYPE10" = "U") contain 50,000 or more people
- Urban Clusters (field "UATYPE10" = "C") contain at least 2,500 people, but fewer than 50,000 people

Facilities falling outside the Urbanized Areas and Urban Clusters are considered rural. Based on available data, fire stations in Urban Cluster areas followed development trends most similar to rural areas, so these areas have been grouped together and are considered "Non-Urban" areas. The resulting urban area classifications are stored in HIFLD-derived SQL tables (e.g., SQL table hifld_FireStation), where applicable. Data are stored in the field "UATYP," where "U" is urban and "R" is rural or non-urban, and includes both the Urban Cluster areas as well as the rural areas.

Table 7-5 Replacement Cost Models for Fire Stations

Model Description	Assumed Building Size (ft^2)	Replacement Cost/ft^2 (2022)	Application Criteria: HIFLD Fire Stations
Non-Urban Fire Station for Volunteer Fire Department	4,000	$229.74	Volunteer[1] Fire Departments in non-Urban Areas
Non-Urban Fire Station for Traditional Fire Department	5,500	$216.16	All Other Fire Departments in non-Urban Areas
Urban Fire Station for Volunteer Fire Department	6,000	$211.94	Volunteer[1] Fire Departments in Urban Areas
Urban Fire Station for Traditional Fire Department	8,000	$203.84	All Other Fire Departments in Urban Areas

[1]Volunteer fire departments have been identified as facilities whose name contains "VFD," "Vol.," or "Volun."

7.2.3 Police Stations

Replacement cost models have been developed to reflect the variety of facility types included in the HIFLD Open Law Enforcement Locations database: police stations, state prisons, and local/county jails. Similar to the fire station replacement cost model development, typical police station and jail/prison building sizes have been assumed based on available data, information assembled for three county-wide Hazus risk assessment studies in southern California (MapIX-Mainland et al., 2009a, 2009b, 2009c) and the results of a limited web search. The web search identified 37 recent police station construction projects nationwide. Available data indicate that, like fire stations, police stations in urban areas are generally larger than their counterparts in non-urban areas. In addition, recent construction project data for 37 jail/prison facilities (30 county/local facilities and 7 state prisons) were reviewed. As most state prisons are expected to be located in non-urban areas and county/local facilities will be located within urban areas, differentiation of the jail and prison replacement cost model by urban/non-urban was not required.

Replacement cost models for the various law enforcement facility types have been derived as an average cost per square foot for the assumed building sizes for selected models from RSMeans Square Foot Costs (RSMeans, 2022a), as shown in Table 7-6. Replacement costs are localized by the application of the same county-level non-residential construction cost multipliers utilized for the General Building Stock. It should be noted that the non-urban police station model is the same as the GOV2 model applied to the General Building Stock (see Table 6-2).

Table 7-6 Replacement Cost Models for Police Stations and Other Law Enforcement Facilities

Model Description	Assumed Building Size (ft^2)	Replacement Cost/ft^2 (2022)	Application Criteria: HIFLD Local Law Enforcement Facilities
Non-Urban Police Station (same as GOV2)	11,000	$284.46	Police Stations (all non-Jail/Prison facilities) in non-Urban Areas
Urban Police Station	36,000	$237.06	Police Stations (all non-Jail/Prison facilities) in Urban Areas
State Prison	145,000	$330.09	Jail/Prison[1] Facilities with Facility Type "Primary State Agency"
County/Local Jail	100,000	$336.04	Jail/Prison[1] Facilities, all other Facility Types

[1]Jail/Prison facilities have been identified as facilities whose name contains "Jail," "Prison," "Correction," or "Detention."

7.2.4 Emergency Operations Centers

Replacement cost models have been developed to reflect the variety of facility types included in the three HIFLD Open Emergency Operations Center databases; local EOCs, State EOCs, and FEMA Regional offices. Similar to the fire station and police station replacement cost model development, typical state and local EOC building sizes have been assumed based on available data; information assembled for three county-wide Hazus risk assessment studies in southern California (MapIX-Mainland et al., 2009a, 2009b, 2009c) and the results of a limited web search that identified 33 recent EOC construction projects nationwide, including 26 city/county EOCs and 7 state EOCs.

EOCs are often co-located with other facilities, such as police stations or fire stations. Of the 72% of local EOC facilities in the 2021 HIFLD Open database where co-location could be readily identified, most (42%) were co-located with police and courthouse facilities, 16% with fire facilities, and 14% with other city municipal buildings. Similar percentages were observed in the recent construction project data collected. Given the frequency with which local EOCs are located with police facilities, the replacement cost models for local EOCs are derived from the police station models described above. In addition, the available data indicate that, like fire and police stations, local EOCs in urban areas are generally larger than their counterparts in non-urban areas.

Based on available data on state EOCs, these typically larger facilities are assumed to be multi-use, reasonably represented by an office replacement cost model. Similarly, office replacement cost models of varying size have been selected to represent the various FEMA Regional Office types.

Replacement cost models have been derived as an average cost per square foot for the assumed building sizes for selected models from RSMeans Square Foot Costs (RSMeans, 2022a), as shown in Table 7-7. Replacement costs are localized by the application of same county-level non-residential construction cost multipliers utilized for the General Building Stock. It should be noted that the non-urban local EOC model is the same as the non-urban police station model and the GOV2 model applied to the General Building Stock (see Table 6-2).

Table 7-7 Replacement Cost Models for Emergency Operations Centers

Model Description	Assumed Building Size (ft^2)	Structure Replacement Cost/ft^2 (2022)	Application Criteria: HIFLD Local and State EOCs and FEMA Regional Offices
Non-Urban Local EOC (same as GOV2)	11,000	$284.46	Non-Urban Local EOCs
Urban Local EOC	30,000	$242.56	Urban Local EOCs
State EOC	50,000	$185.69	State EOCs
FEMA Area Office	7,000	$215.88	FEMA Regional Offices, Type = “area”
FEMA Regional Office	20,000	$205.88	FEMA Regional Offices, Type = “regional”
FEMA National Office	80,000	$204.43	FEMA Regional Offices, Type = “national”

7.2.5 Schools

7.2.5.1 PUBLIC SCHOOLS

To support the development of public school replacement cost models, relationships between square footage and students at schools of varying levels were sought. The most relevant data found were a series of annual surveys, published by “School Planning & Management” (SPM) Magazine, tabulating data on school construction projects (SPM, 2007). These data included annual national median square feet per student for elementary, middle and high schools, along with counts of construction projects represented. For the eight available surveys (conducted between 2008 and 2015), a total of 5,052 construction projects are represented; this number represents approximately 5% of the more than 100,000 records in the 2021 version of the HIFLD Open Public Schools Database.

In addition to the construction surveys, available data on school type, size and enrollment have been collected and reviewed, examining the resultant square feet per student, including:

- Extensive building level school data derived from insurance appraisal reports assembled for the three FEMA-sponsored Hazus essential facilities risk assessment studies conducted in southern California in 2009 (MapIX-Mainland, 2009a, 2009b and 2009c), reflecting more than 25,000 public school buildings in Orange, Riverside and San Bernardino Counties.

- School construction project data assembled by the California Department of Education (CDE) for 60 school projects (27 elementary schools, 15 middle schools, and 18 high schools) in 2007 (CDE, 2007).

In addition to national median square feet per student, the SPM annual construction reports provide additional data by region. For most regions, the variation from the national median is modest, except for the Western region (Zone 11 including Arizona, California, Hawaii and Nevada); the reports note that climate in the West makes it possible to build schools without corridors, so square feet per student is generally lower than the national median. This conclusion is supported by the CDE data.

Further, the available survey data indicates that although there is significant year to year variation, all three school levels demonstrate a pattern of increasing square feet per student over time. It should be noted, however, that the HIFLD Open schools databases (and the resulting Hazus schools database) represent a wide range of construction vintages, which would not necessarily be well represented by applying models based on the most recent construction patterns. For example, in the 2009 schools data available for the three Southern California Counties, the average year built for all school buildings was 1987.

To best reflect the varying construction vintages present in the HIFLD Open Public Schools data, the available data (SPM survey data, California CDE construction project information, three county schools data) were combined to derive representative square footage allocations per student for Elementary, Middle and High Schools, provided in Table 7-8. Allocations are also provided for Adult Education facilities (assumed to have space requirements similar to high school facilities), Secondary schools (combined Middle and High schools, with their space allocation averaged accordingly), and Ungraded schools (with space allocations averaged for Elementary, Middle and High schools).

As with other essential facilities, it was observed that schools in urban areas were generally larger than their counterparts in non-urban areas. Average 2021 HIFLD Open Public Schools enrollments for urban and non-urban areas, for both the Western Region and the rest of the U.S., have been estimated for the various school levels, and are also provided in Table 7-8.

Table 7-8 Square Foot Allocations and Average Enrollments from the 2021 HIFLD Open Public Schools Database

HIFLD Open Public Schools, Field: "LEVEL_"	Square Feet per Student: Western[1] Region	Square Feet per Student: Other Regions	Average Enrollment (Number of Students): Western Region, Urban Areas[4]	Average Enrollment (Number of Students): Western Region, Non-Urban Areas[4]	Average Enrollment (Number of Students): Other Regions, Urban Areas[4]	Average Enrollment (Number of Students): Other Regions, Non-Urban Areas[4]
ELEMENTARY	71	96	554	348	502	366
MIDDLE	98	124	791	451	693	413
HIGH	129	155	1003	423	933	444
OTHER[2]	99	125	494	346	480	279
UNGRADED[2]	99	125	63	17	87	34
NOT APPLICABLE[2] and NOT REPORTED[2]	99	125	415	205	415	205
SECONDARY[3]	114	140	53	36	301	240
ADULT EDUCATION	129	155	553	553	553	553
PREKINDERGARTEN	35	35	68	75	202	102

[1]Western Region includes AZ, CA, HI, and NV.

[2]Square feet per student calculated as an average of Elementary, Middle and High school.

[3]Square feet per student calculated as an average of Middle and High school.

[4]Average enrollment values are applied when enrollment data are not available in the HIFLD Open database.

These average enrollment values are applied when enrollment data are not available in the HIFLD Open database. In addition, the square footage allocations and average enrollments have been used to estimate typical urban and non-urban facility sizes, for which average costs per square foot have been derived for selected models in RSMeans Square Foot Costs (RSMeans, 2022a). These replacement cost models are provided in Table 7-9.

As noted above, adult education facilities that are part of public school districts are assumed to have similar space requirements as high school facilities, so the square foot per student for high schools has been assumed. Adult education facility data are too sparse to differentiate typical enrollment by region or urban area, so the overall average enrollment is universally applied.

Finally, childcare/day care facilities (i.e., prekindergarten facilities) are generally state regulated, with a minimum of 35 square feet per child (examples include California, Arkansas, Arizona and Florida). No distinction has been made between urban and non-urban facilities.

It should be noted that prior to replacement cost estimation, the Public Schools database was filtered as described in Table 7-3. That is, school records with "Status" other than "Operational," "New," "Added," and "Changed Agency," and schools identified as virtual are omitted from the database such that default enrollments are only applied to operating and in-person schools.

Table 7-9 Replacement Cost Models for Public Schools

Model Description	Structure Replacement Cost/ft² (2022)	Application Criteria: HIFLD Public Schools – "Level"
Non-Urban Elementary School	$212.57	"ELEMENTARY"
Urban Elementary School	$209.53	"ELEMENTARY"
Non-Urban Middle School	$216.80	"MIDDLE"
Urban Middle School	$212.49	"MIDDLE"
Non-Urban High School	$244.97	"HIGH"
Urban High School	$237.73	"HIGH"
Other Non-Urban Public School	$224.78	"OTHER," "UNGRADED," "NOT APPLICABLE," "NOT REPORTED"
Other Urban Public School	$219.92	"OTHER," "UNGRADED," "NOT APPLICABLE," "NOT REPORTED"
Non-Urban Secondary School	$230.89	"SECONDARY"
Urban Secondary School	$225.11	"SECONDARY"
Adult Education School	$196.17	"ADULT EDUCATION"
Pre-Kindergarten	$247.00	"PREKINDERGARTEN"

7.2.5.2 PRIVATE SCHOOLS

Private school types in the HIFLD Open database are limited to elementary, secondary and combined (all grades, equivalent to the public school category of "UNGRADED"). Private schools are assumed to have fewer students per classroom than public schools, so the larger, non-Western public school square feet per student allocations have been assumed for the equivalent private schools, as provided in Table 7-10.

Similar to the Public Schools, it was observed that HIFLD Open Private Schools in urban areas were generally larger than their counterparts in non-urban areas. Further, a larger proportion of the Private Schools are located in urban areas (72% vs. 59% for Public Schools). Typical facility sizes for urban and non-urban areas were estimated from the 2021 HIFLD Open Private Schools data, and average costs per square foot were derived for the assumed building sizes for selected models in RSMeans Square Foot Costs (RSMeans, 2022). These replacement cost models are provided in Table 7-11. Finally, all schools in the HIFLD Open Private Schools database have, by definition, non-zero enrollment data (i.e., are operational), so average enrollments by level are not required for replacement cost model implementation. Similar to Public Schools, only in-person schools are included in the database, as described in Table 7-3.

Table 7-10 Private School Square Foot Allocations

HIFLD Private Schools, Field: "LEVEL_" (Description)	Square Feet per Student (ft²/Student) - All Regions
1 (Elementary (K-6))	96
2 (Secondary (7–12))	140
3 (Combined)	125

Table 7-11 Replacement Cost Models for Private Schools

Model Description	Structure Replacement Cost/ft² (2022)	Application Criteria: HIFLD Private Schools – "Level"
Non-Urban Private Elementary School	$238.49	1
Urban Private Elementary School	$214.50	1
Non-Urban Private Secondary/ Combined School	$210.92	2, 3
Urban Private Secondary School	$199.57	2
Urban Private Combined School	$204.42	3

7.2.5.3 COLLEGES & UNIVERSITIES AND SUPPLEMENTAL COLLEGES

To support the development of the college and university replacement cost models reflected in the Hazus College & University (EDU2) database, available data on college and university size and enrollment were collected and reviewed, examining the resultant square feet per student. Data for gross building square footage and enrollment was assembled for 52 individual College/University campuses from space inventory and other data nationwide and included comprehensive data from individual campus space management reports for each of the 23 schools in the California State University System, as well as square footage and enrollment by community college district for all 72 community college districts in California (CCCCO, 2016). The resulting average square feet per student for the assembled data by campus type are provided in Table 7-12.

As expected, the average square feet per student at junior colleges is smaller than that for colleges and universities, as the junior college campuses are less likely to include student housing. The average college and university square feet per student is significantly larger than the largest allocation for primary and secondary schools discussed above (see Table 7-8).

Though the junior college square feet per student allocation outside the Western Region is slightly larger than the high school allocation inside the Western Region, the estimated 64 square feet per student is well below the high school allocation. Nevertheless, because the data collected for California are a complete representation of the Community College District (CCD) facilities in that state, the allocation is believed to be reliable.

Since the HIFLD Open records identified as "Colleges, Universities, and Professional Schools" and "Junior Colleges" in both the Colleges & Universities and Supplemental College databases are mainly located in urban areas (74% of facilities are located in urban areas) no distinction is made between urban and non-urban facilities.

In addition, because colleges are expected to be multi-building campuses, one other metric has been taken from the assembled data; for the 61 campuses where building counts are available (5,568 building total), the average square footage per building has been estimated to be about 45,000 square feet. This data was used to inform the selection of the building size for the derivation of average cost per square foot for the selected model from RSMeans Square Foot Costs (RSMeans, 2022), as provided in Table 7-14. The same replacement cost model is applied to both "Colleges, Universities, and

Professional Schools" and "Junior Colleges." Note that this is also the current default EDU2 replacement cost model (see Table 6-2).

Enrollment for facilities in the HIFLD Open Colleges & Universities database lacking enrollment data has been estimated from average enrollments of facilities by size category, rather than using overall averages, i.e., using enrollment averages for field INST_SIZE, where class 1 is defined as "<1,000 students," and class 2 is defined as "1,000 to 4,999 students." It should be noted that prior to replacement cost estimation, both the Colleges & Universities and Supplemental College databases are filtered as described in Table 7-3. That is, records with "Status" other than "Active," "New," and "Restored," and schools identified as virtual are omitted from the database such that default enrollments are only applied to operating and in-person schools.

The HIFLD Open Supplemental Colleges database does not include data on institution size. Based on a comparison of available Supplemental College facility enrollment for "Colleges, Universities, and Professional Schools" and "Junior Colleges" to equivalent College & University enrollment by size category, the most appropriate average to apply when Supplemental College records lack enrollment data was determined to be an average of College & University Class 1 and 2 facilities.

For the remaining seven facility types (see Table 7-12, Table 7-13 and Table 7-14), the following assumptions have been made:

- These facilities are principally located in urban areas (85% are located in urban areas), so no distinction is made between urban and non-urban facilities.
- For flight training schools, facilities are assumed to be hangar facilities with built-in classrooms. Further, it is assumed that enrollment is not a good measure of facility size for flight training schools, as due to limitations on the number of aircraft, it is assumed that not all students will be in attendance at once. A typical building size of 20,000 square feet has been assumed.
- Educational support services facilities are college system or district offices and are assumed to be typical office facilities. A mid-size office of 50,000 square feet has been selected.
- For the other facility types (HIFLD Open field NAICS_DESC = "Business and Secretarial Schools," "Computer Training," "Cosmetology and Barber Schools," "Fine Arts Schools" and "Other Technical And Trade Schools"), the square footage allocation for non-Western Junior Colleges has been applied, assuming that these facilities are more likely to be housed in a single building, thereby negating the size reduction applied in the West for outdoor corridors. Representative building replacement cost models have been derived based on typical building sizes derived from average enrollment by facility type and the assumed square foot allocation.

Table 7-12 Square Foot Allocations from the 2021 HIFLD Open Colleges & Universities and Supplemental Colleges Data

HIFLD Open Colleges & Universities (C&U), Supplemental Colleges (SC), Field: "NAICS_DESC"	Square Feet per Student (ft^2/ Student): Western Region	Square Feet per Student (ft^2/ Student): Other Regions
Colleges, Universities, and Professional Schools	245	383
Junior Colleges	64	176
Cosmetology and Barber Schools	176	176
Business and Secretarial Schools	176	176
Other Technical and Trade Schools	176	176
Fine Arts Schools	176	176
Computer Training	176	176
Flight Training	N/A	N/A
Educational Support Services	N/A	N/A

Table 7-13 Average Enrollments from the 2021 HIFLD Open Colleges & Universities and Supplemental Colleges Data[1]

HIFLD Open Colleges & Universities (C&U), Supplemental Colleges (SC), Field: "NAICS_DESC"	Avg. Enroll., C&U "Inst_Size" = 1, Applied to C&U	Avg. Enroll., C&U "Inst_Size" = 2, Applied to C&U	Avg. Enroll., C&U "Inst_Size" = 1 & 2 Combined, Applied to SC	Avg. Enroll., C&U "Inst_Size" = 1, Applied to SC	Assumed Sq. Ft., where applicable
Colleges, Universities, and Professional Schools	362	N/A	1,352	N/A	N/A
Junior Colleges	363	2,651	1,458	N/A	N/A
Cosmetology and Barber Schools	110	N/A	N/A	110	N/A
Business and Secretarial Schools	226	N/A	N/A	226	N/A
Other Technical and Trade Schools	188	N/A	N/A	188	N/A
Fine Arts Schools	164	N/A	N/A	164	N/A
Computer Training	347	N/A	N/A	347	N/A
Flight Training	N/A	N/A	N/A	N/A	20,000
Educational Support Services	N/A	N/A	N/A	N/A	50,000

[1]*Average Enrollment (Number of Students) or Assumed Square Footage.*

Table 7-14 Replacement Cost Models for Colleges & Universities and Supplemental Colleges

Model Description	Structure Replacement Cost/ft² (2022)	Application Criteria: HIFLD Colleges & Universities and Supplemental Colleges– "NAICS_DESC"
College classroom (same as EDU2)	$197.10	"COLLEGES, UNIVERSITIES, AND PROFESSIONAL SCHOOLS," "JUNIOR COLLEGES"
Cosmetology school	$210.92	"COSMETOLOGY AND BARBER SCHOOLS"
Trade school	$201.15	"BUSINESS AND SECRETARIAL SCHOOLS," "OTHER TECHNICAL AND TRADE SCHOOLS"
Fine Arts school	$199.57	"FINE ARTS SCHOOLS"
Computer Training	$195.69	"COMPUTER TRAINING"
Flight Training	$172.19	"FLIGHT TRAINING"
Educational Support Services	$185.69	"EDUCATIONAL SUPPORT SERVICES"

7.3 Spatial and Tabular Data

Essential facility spatial data and certain tabular data are directly updated from the Homeland Infrastructure Foundation-Level Data (HIFLD) Open datasets. Table 7-1 and Table 7-2 summarized the specific HIFLD Open databases used to populate the Hazus EF data. The following sections provide some additional information on using HIFLD Open data.

7.3.1 Medical Care

The following attributes are required:

- Medical Care Facility Class (All Models)
- Number of Licensed Hospital Beds (All Models)
- Building Type (All Models)
- Replacement Cost (All Models)
- Backup Power (All Models)
- WBC Mapping Scheme Name (Hurricane Model)
- Landslide Susceptibility (Earthquake Model)
- Liquefaction Susceptibility (Earthquake Model)
- Soil Type (Earthquake Model)
- Water Depth (Earthquake Model)
- Earthquake Building Type (Earthquake Model)
- Design Level (Earthquake and Flood Models)
- FFHAG (Flood Model)
- Foundation Type (Flood Model)
- Flood Protection (Flood Model)
- Number of Stories (Flood Model)

7.3.2 Fire Stations

The following attributes are required:

- Fire Station Class (All Models)
- Number of Fire Engines (Earthquake Model)
- Building Type (All Models)
- Replacement Cost (All Models)
- Backup Power (All Models)
- WBC Mapping Scheme Name (Hurricane Model)
- Landslide Susceptibility (Earthquake Model)
- Liquefaction Susceptibility (Earthquake Model)
- Soil Type (Earthquake Model)
- Water Depth (Earthquake Model)
- Earthquake Building Type (Earthquake Model)
- Design Level (Earthquake and Flood Models)
- FFHAG (Flood Model)
- Foundation Type (Flood Model)
- Flood Protection (Flood Model)
- Number of Stories (Flood Model)

7.3.3 Police Stations

The following attributes are required:

- Police Station Class (All Models)
- Building Type (All Models)
- Replacement Cost (All Models)
- Backup Power (All Models)
- WBC Mapping Scheme Name (Hurricane Model)
- Landslide Susceptibility (Earthquake Model)
- Liquefaction Susceptibility (Earthquake Model)
- Soil Type (Earthquake Model)
- Water Depth (Earthquake Model)
- Earthquake Building Type (Earthquake Model)Design Level (Earthquake and Flood Models)
- FFHAG (Flood Model)
- Foundation Type (Flood Model)
- Flood Protection (Flood Model)
- Number of Stories (Flood Model)

7.3.4 Emergency Operations Center (EOC)

The following attributes are required:

- Emergency Center Class (All Models)
- Building Type (All Models)
- Replacement Cost (All Models)
- Backup Power (All Models)
- WBC Mapping Scheme Name (Hurricane Model)
- Landslide Susceptibility (Earthquake Model)
- Liquefaction Susceptibility (Earthquake Model)
- Soil Type (Earthquake Model)
- Water Depth (Earthquake Model)
- Earthquake Building Type (Earthquake Model)
- Design Level (Earthquake and Flood Models)
- FFHAG (Flood Model)
- Foundation Type (Flood Model)
- Flood Protection (Flood Model)
- Number of Stories (Flood Model)

7.3.5 Schools

The following attributes are required:

- School Class (All Models)
- Building Type (All Models)
- Replacement Cost (All Models)
- Backup Power (All Models)
- WBC Mapping Scheme Name (Hurricane Model)
- Landslide Susceptibility (Earthquake Model)
- Liquefaction Susceptibility (Earthquake Model)
- Soil Type (Earthquake Model)
- Water Depth (Earthquake Model)
- Earthquake Building Type (Earthquake Model)
- Design Level (Earthquake and Flood Models)
- FFHAG (Flood Model)
- Foundation Type (Flood Model)
- Flood Protection (Flood Model)
- Number of Stories (Flood Model)

For data items in Table 7-1 and Table 7-2 that show regional assumptions for designating values for a state, please see Appendix A.

For the Earthquake Model, the default mapping of essential facility occupancy classes to specific building type are also provided in Appendix B.

For the Flood Model, Table 7-15 includes additional default values used for certain structure data.

Table 7-15 Essential Facilities Inventory Occupancy Classification and Flood Model Default Parameters

Hazus Label	Occupancy Class	Default Building Type	Default Foundation Type	First Floor Height (ft)	No. of Stories	Damage Functions	Functional Depth (ft)
MDFLT	Default Hospital	Concrete	Basement	3	Mid	COM6	0.5
EFHS	Small Hospital	Concrete	Basement	3	Low	COM6	0.5
EFHM	Medium Hospital	Concrete	Basement	3	Mid	COM6	0.5
EFHL	Large Hospital	Concrete	Basement	3	Mid	COM6	0.5
EFMC	Medical Center	Concrete	Basement	3	Low	COM7	0.5
FDFLT	Default Fire Station	Concrete	Slab on Grade	0	Low	GOV2	2
EFFS	Fire Station	Concrete	Slab on Grade	0	Low	GOV2	2
PDFLT	Default Police Station	Concrete	Basement	0	Low	GOV2	1
EFPS	Police Station	Concrete	Basement	0	Low	GOV2	1
EDFLT	Default Emergency Center	Concrete	Basement	0	Low	GOV2	0.5
EFEO	Emergency Center	Concrete	Basement	0	Low	GOV2	1
SDFLT	Default School	Masonry	Slab on Grade	0	Low	EDU1	0.5
EFS1	School	Masonry	Slab on Grade	0	Low	EDU1	0.5
EFS2	University	Concrete	Slab on Grade	0	Low	EDU2	0.5

Some additional notes on the assumptions in Table 7-15:

- *Default Foundation Type:* The default values for EFFS, EFS1, EFS2, FDFLT, and SDFLT are Slab on Grade. All other essential facilities are assumed to have basements. The user can modify this field if their facility is represented incorrectly using the Hazus essential facility dialog.

- *First Floor Height Above Grade:* The default values for EFEO, EFFS, EFS1, and EFS2 are at grade. All other facilities are 3 feet above grade. The user can adjust this field using the Hazus essential facility dialog.

- *Number of Stories:* Default values for ESF1, EFHS, EFMC, EFFS, EFPS, and EFEO are all low-rise structures, and the EFHM, and EFHL are mid-rise. The user can adjust this field using the Hazus essential facility dialog.

- *Damage Functions:* Comparable damage functions from the General Building Stock are used to determine the estimated damage (percent) from which a loss of function for essential facilities can be developed. The user can change the damage functions in the analysis parameters dialog.

- *Functional Depth:* The general assumption is that when the depth of flooding reaches the functional depth, typically the facility is closed and people evacuated. In the case of some hospitals, this does not always mean the patients are evacuated, but the trauma center will typically refuse new patients.

7.3.6 Limitations

Essential facilities are represented by a single latitude/longitude point location, which may not fall precisely within the building's actual footprint. In addition, some essential facility records (e.g., hospitals, schools) may represent multiple buildings across a campus. Several defaults are provided in the data without verification: first floor heights, foundation types, building types, design levels, landslide, liquefaction, soil type, and water level are all values localized to the Study Region's county. Building types may not agree between models.

It should be noted that Hazus loads the national HIFLD Open data into individual inventory databases; differences between state abbreviation and spatial location can result in a small number of dropped records. Further, as noted above, multiple facilities may occur at the same building site for various essential facility types, such as when Elementary, Middle, and High Schools or Police Precincts share the same building, or when an EOC is co-located with a police or fire station. Each facility type may have its own HIFLD Open record and be present into multiple Hazus databases. This can result in an overestimate of exposure and subsequent losses. The use of number of students for estimating area and replacement value, when available for each school level, helps reduce the potential for overestimation in combined Elementary, Middle and High Schools. Some virtual schools may still make it into the dataset if "virtual" or a derivative is not used in the name; for these facilities, the area and replacement cost may not be accurate. If colleges or universities report virtual attendees only in their enrollment numbers, the area and replacement costs may also be overestimated.

Section 8. High Potential Loss Facilities

In Hazus, High Potential Loss (HPL) facilities are currently only considered in the Earthquake Model for hazard exposure only with the exception of military installations where loss methods are provided. HPL facilities include dams, nuclear power plants, and military installations. Only military facilities are currently modeled in Hazus for potential losses in the Earthquake Model, while other HPL facilities are assessed for exposure only to earthquake hazards. The inventory data required for HPL facilities include the geographical location of the facility.

Table 8-1 summarizes the status of the HPL facilities by data type, hazard, and sources in Hazus 6.0.

Table 8-1 Baseline High Potential Loss Database Summary

HPL Data Type	Data Element	Hazards	Hazus 6.0 Dataset Source	Geographic Coverage
Dams and Levees	Dams and Levees	Exposure Mapping Only	N/A	N/A
Nuclear Power Facility	Nuclear Power Facility	Exposure Mapping Only	N/A	N/A
Military Installations	Military Installations	EQ	N/A	N/A
Military Installations	Military Installations	EQ	Hazus Program Generated	PR
Military Installations	Military Installations	EQ	FEMA Advisory Base Flood Elevation Substantial Damage Estimation Mission from Hurricane's Irma/Maria	VI

The HPL classifications for dams, levees, nuclear power plants, and military installations are provided in Table 8-2. The dam classifications are based on the National Inventory of Dams database (FEMA, 1993). While dams, levees, and nuclear power facilities have no modeling capabilities in Hazus 6.0, military installations can be modeled in the Earthquake Model when additional data is provided, including location, classification, and replacement value. Currently, only Puerto Rico and the U.S. Virgin Islands have military installation data populated from previous updates. Each HPL facility should be treated on an individual basis by users who have sufficient expertise to evaluate the damage to such facilities. Required input to the damage evaluation module includes the following items:

- Earthquake capacity curves that represent median (typical) properties of the HPL facility structure, or a related set of engineering parameters, such as period, yield strength, and ultimate capacity, which may be used by seismic/structural engineering experts to select representative damage functions.

- Earthquake fragility curves for the HPL facility under consideration, or a related set of engineering parameters that can be used by seismic/structural engineering experts to select appropriate damage functions.

See the *Hazus Earthquake Model Technical Manual* (FEMA, 2022a) for more details.

Table 8-2 High Potential Loss Facilities Classifications

Hazus Label	General Classification	Specific Class
HPDA	Dams	Arch
HPDB	Dams	Buttress
HPDC	Dams	Concrete
HPDE	Dams	Earth
HPDG	Dams	Gravity
HPDM	Dams	Masonry
HPDR	Dams	Rock fill
HPDS	Dams	Stone
HPDT	Dams	Timber Crib
HPDU	Dams	Multi-Arch
HPDZ	Dams	Miscellaneous
HPLV	Levee	Levee
HPNP	Nuclear Power Facilities	Nuclear Power Facilities
HPMI1	Military Installations	Barracks/Group Quarters
HPMI2	Military Installations	Officer/Enlisted Quarters - Multi-Unit
HPMI3	Military Installations	Officer/Enlisted Quarters - Detached
HPMI4	Military Installations	Maintenance/Operations Shops
HPMI5	Military Installations	Administrative Offices
HPMI6	Military Installations	Mess Halls
HPMI7	Military Installations	Officer/Enlisted Clubs
HPMI8	Military Installations	Gymnasiums/Armory
HPMI9	Military Installations	Gas/Services Stations
HPMI10	Military Installations	PX/Retail Stores
HPMI11	Military Installations	Arsenals
HPMI12	Military Installations	Other
HPMI13	Military Installations	Barracks/Group Quarters

Section 9. Transportation Systems

Hazus includes modeling capabilities related to transportation systems. The Transportation Module and associated inventory data in Hazus includes the following: highways, railways, light rail, bus, ports, ferries, and airports. The transportation classification system used in the Hazus Methodology was developed to provide an ability to differentiate between different system components with substantially different damage and loss characteristics. All transportation system elements can be modeled by the Earthquake Model. In the Flood Model highway bridges are the only transportation system components analyzed by the software. Damage functions are included within the Hazus Flood Model for railway and light rail bridges; however, no analyses are performed in Hazus 6.0.

Table 9-1 summarizes the status of the transportation system spatial and tabular database elements by data type, hazard, and sources. Beginning in 2019, most of the transportation data were updated using datasets from HIFLD Open. Table 9-2 and Table 9-3 provide the valuation models used for the HIFLD-based Open datasets. Valuation models identified as "legacy" models are those developed during the original Hazus Earthquake or Flood Model development processes. The remaining discussion in this section provides more background into the different elements of each transportation system, Hazus classifications, and the Hazus valuation used for facility classes not currently modeled using HIFLD Open data.

Table 9-1 Baseline Transportation System Databases Summary

Transportation Data Type	Data Element	Hazards	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source
Highway Segment Data	Highway Segment	EQ	2005	National Highway Planning Network
Highway Bridge Data	Highway Bridge	EQ, FL	2021	FHWA National Bridge Inventory (NBI)
Highway Tunnel Data	Highway Tunnel	EQ	Sept. 2019	HIFLD Open: Road Tunnels
Railway Segment Data	Railway Segment	EQ	Jun. 2022	HIFLD Open: Railroads. Segments that are abandoned (Name includes "abandoned") have been omitted. The railway segment data set has been supplemented with data from HIFLD Open: Public Transit Routes, where Mode = "AR" (Alaska Railroad), "CR" (Commuter Rail), or "HR" (Heavy Rail), and Status is not "Closed."
Railway Bridge Data	Railway Bridge	EQ	Apr. 2018	HIFLD Open: Railroad Bridges
Railway Tunnel Data	Railway Tunnel	EQ	2001	FHWA NBI

Transportation Data Type	Data Element	Hazards	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source
Railway Facility Data	Railway Facility	EQ	2007	Bureau of Transportation Statistics
Light Rail Segment Data	Light Rail Segment	EQ	Sept. 2017	HIFLD Open: Public Transit Routes, where Mode = “LR” (Light Rail) or "SR” (Streetcar Rail). Segments that are abandoned (Name includes “abandoned”) have been omitted. The Public Transit Route data includes records for each named route; multiple routes may use the same segment of track, so track length and value may be over-estimated.
Light Rail Bridge Data	Light Rail Bridge	EQ, FL	2001	FHWA NBI
Light Rail Facility Data	Light Rail Facility	EQ	July 2020	HIFLD Open: Public Transit Stations, joined to HIFLD Open: Public Transit Routes, and where Mode = “LR” (Light Rail) or "SR” (Streetcar Rail). Records with Status = “Planned” have been omitted. Ground level streetcar rail facilities (GRD_EL = “GROUND"), assumed to be stops rather than stations, have been omitted.
Bus Data	Bus	EQ	Jan. 2022	HIFLD Open: Intermodal Passenger Connectivity Database where facility type = 2 and Modes Served = 1, or Modes Served = 2 where the second mode is Bike-Share. In order to exclude non-station bus stops, a list of key word exclusions has been developed reflecting common stop facility types, such as gas stations, lodging, retail, restaurants, and other non-station facilities (e.g., exclude if NAME includes “Chevron” or “Hilton”).
Port Data	Port	EQ	Jan. 2022	HIFLD Open: Port Facilities. Facility types other than "Dock" and "Marina" have been omitted.

Transportation Data Type	Data Element	Hazards	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source
Ferry Data	Ferry	EQ	2007	USACE Institute for Water Resources (CEIWR) Navigation Data Center
Airport Facility Data	Airport Facility	EQ	May 2022	HIFLD Open: Aircraft Landing Facility. Facilities with Owner_type = "PR" (Private) have been omitted.
Airport Facility Data	Airport Facility	EQ	Apr. 2022	US DOT T-100 Domestic Market and Segment Data for flight arrival, departure and passenger data.

Table 9-2 Valuation Data for Transportation Elements

Element	Geographic Coverage	Valuation Approach
Highway Segments	All states; territory coverage limited to Puerto Rico	Uses updated values for 2019 of $6.668M/km for four lane major road and $3.334M/km for two lane urban streets.
Highway Bridge	All states; territory coverage limited to Puerto Rico	The 2018 square-footage cost table for each bridge class provided by Caltrans was escalated to 2021 based on CPI and is provided in Table 9-3. Costs are also adjusted for other states relative to California based on the 2022 State non-residential location factors (derived from average of county factors in each state, see Section 6.3).
Highway Tunnel	All states; territory coverage limited to Puerto Rico	Tunnel replacement costs are represented by the cost of the tunnel liner, scaled by actual/assumed tunnel diameter from a baseline cost of $24,600 per meter (in 2022 dollars) for a 6 meter diameter tunnel, derived from RSMeans Heavy Construction Costs (RSMeans, 2022b). Typical highway tunnel diameter of 10.6 meters assumed when no diameter data are available.
Railway Segment	All states; territory coverage limited to Puerto Rico	Replacement costs for rail segments in urban areas are based on U.S. data for aboveground projects from the Eno Center for Transportation Transit Capital Construction Database (Eno Center, 2020), using the proportion of rail construction project cost allocated to Guideway and Track Elements, plus an allocation for professional services; $20 million per km (escalated to 2021 dollars). For non-urban areas, a cost of $1.42 million per km (in 2021 dollars) has been utilized (National Academy of Sciences, 2015). All costs are localized by Census division (see Table 3-1) using cost factors developed from the available Eno Center data. Rail segments are identified as urban or non-urban based on the location of their centroid (as discussed in Section 7.2.2).

Element	Geographic Coverage	Valuation Approach
Railway Bridge	All states, except Hawaii; territory coverage limited to Puerto Rico	Uses legacy value of $5M, adjusted by State non-residential location factors (see Section 6.3). Chose not to escalate to 2021 since the value is already well above the source (G&E, 1994b) report recommendation and with the new dataset, a large range of bridges, including more minor structures are included.
Railway Tunnel	All states; territory coverage limited to Puerto Rico	Data derived from 2001 NBI by the original Hazus development team in 2003; valuation based on expert opinion. Uses legacy value of $10M. Did not escalate to 2019 since there is uncertainty in base year and conversion issues in the legacy data.
Railway Facility	All states; territory coverage limited to Puerto Rico	Uses legacy value of $2M for railroad stations from original Hazus development (1998), escalated to $3.2M in 2019; this cost also applies to default railway facilities.
Light Rail Segment	All states except Hawaii and Alaska; no territory coverage	Replacement costs for light rail segments, which are generally limited to major metropolitan areas, are the same as the urban railway segment replacement cost model described above. The Public Transit Route data includes records for each named route; multiple routes may use the same segment of track, so track length and value may be over-estimated.
Light Rail Bridge	All states; territory coverage limited to Puerto Rico	Data derived from 2001 NBI by the original Hazus development team in 2003; valuation based on expert opinion. Uses legacy data and value of $5M. Did not escalate to 2019 since there is uncertainty in base year and conversion issues in the legacy data.
Light Rail Tunnel	All states; territory coverage limited to Puerto Rico	Uses legacy data and value of $10M. Did not escalate to 2019 since there is uncertainty in base year and conversion issues in the legacy data.
Light Rail Facility	All states except Alaska and Hawaii; no territory coverage	Replacement cost models have been developed from the Eno Center for Transportation Transit Capital Construction Database (Eno Center, 2020), considering their grade or elevation. Costs have been escalated to 2021 as follows: below grade/underground stations - $248.45M, above grade/elevated stations - $59.82M, at grade stations - $5.71M. Currently available data are insufficient to generate regional location factors, so none have been applied.
Bus	All states; no territory coverage	Typical bus stations assumed to be approximately 10,000 square feet based on available recent construction project data assembled from a limited web search. Baseline replacement cost model for this size facility derived from RSMeans Square Foot Costs (RSMeans, 2022a), and assumed to be $1.9715M per facility (in 2022 dollars), adjusted by county-level non-residential location factors (see Section 6.3).

Element	Geographic Coverage	Valuation Approach
Port	All states, except DC; territory coverage limited to Puerto Rico	Uses legacy value of $2M from original Hazus development (1998), escalated to $3.3496M in 2021, adjusted by county non-residential location factors (see Section 6.3).
Ferry	All states; territory coverage limited to Puerto Rico	Uses legacy value of $1M for ferry passenger terminal from original Hazus development (1998), escalated to $1.58M in 2019.
Airport Facility	All states and territories	Large passenger airports area proxy is based on annual passenger volume (0.5 ft^2 per annual passenger) and 2022 COM4 ft. replacement value, adjusted by county non-residential location factors (see Section 6.3). Other urban facilities use Airport Terminal legacy value from original Hazus development ($8M in 1998, escalated to $13.3356M in 2021), while rural facilities use Hazus legacy value for Hangar facilities ($3.2M in 1998, escalated to $5.3M in 2021). Costs are also adjusted by county non-residential location factors (see Section 6.3).
Airport Runway	All states and territories	Runway replacement costs are based on runway area (length times width) and assumed pavement thickness, and are derived from RSMeans Heavy Construction Costs (RSMeans, 2022b). Typical airport runways are assumed to be 20 inches thick with replacement costs of $124.30 per square yard (in 2022 dollars), while runways for heliports and other facility types with lighter aircraft are assumed to be 6 inches thick with replacement costs of $51.80 per square yard. Costs are adjusted by county non-residential location factors (see Section 6.3).

Table 9-3 Highway Bridge Replacement Cost Model

Bridge Class[1]	$/Square Foot (2021)
HWB1	$636
HWB2	$583
HWB3	$424
HWB4	$504
HWB5	$398
HWB6	$398
HWB7	$504
HWB8	$318
HWB9	$424
HWB10	$292
HWB11	$318
HWB12	$583
HWB13	$583

Bridge Class[1]	$/Square Foot (2021)
HWB14	$742
HWB15	$583
HWB16	$742
HWB17	$398
HWB18	$398
HWB19	$504
HWB20	$398
HWB21	$504
HWB22	$371
HWB23	$424
HWB24	$583
HWB25	$636
HWB26	$795
HWB27	$795
HWB28	$318

[1]See Table 9-6 for Hazus Bridge Class Definitions.

9.1 Highway Transportation System

A highway system is composed of three components: highway segments, bridges, and tunnels. In this section, a brief description for each is provided.

- *Highway Segments*: Highway segments are classified as major roads or urban roads. Major roads include interstate and state highways and other roads with four lanes or more. Parkways are also classified as major roads. Urban roads include intercity roads and other roads with two lanes.
- *Bridges:* Bridges are classified based on the following structural characteristics:
    - Seismic Design
    - *Number of spans:* single vs. multiple span bridges
    - *Structure type*: concrete, steel, and others
    - *Pier type:* multiple column bents, single column bents, and pier walls
    - *Abutment type and bearing type:* monolithic vs. non-monolithic, high rocker bearings, low steel bearings, and neoprene rubber bearings
    - *Span continuity:* continuous, discontinuous (in-span hinges), and simply supported
- *Tunnels:* Tunnels are classified as bored/drilled or cut and cover.

Additional background information for bridges is required, since the seismic design of a bridge is considered in terms of the (1) spectrum modification factor, (2) strength reduction factor due to cyclic motion, (3) drift limits, and (4) the longitudinal reinforcement ratio.

This classification scheme incorporates various parameters that affect damage into fragility analysis and provides a means to obtain better fragility curves when data become available. A total of 28 classes (HWB1 through HWB28) have been defined this way, based on bridge characteristics found in the NBI. Table 9-4 and Table 9-5 summarize the key NBI characteristics used, while Table 9-6 presents the 28 bridge classes derived for Hazus with detailed values related to flood analysis. Year built from the NBI is used to classify as seismic if built in 1990 or later in California, and 1975 or later outside of California.

Table 9-4 Bridge Material Classes in National Bridge Inventory

Code	Description
1	Concrete
2	Concrete continuous
3	Steel
4	Steel continuous
5	Prestressed concrete
6	Prestressed concrete continuous
7	Timber
8	Masonry
9	Aluminum, Wrought Iron, or Cast
0	Other

Table 9-5 Bridge Types in National Bridge Inventory

Code	Description
01	Slab
02	Stringer/Multi-Beam or Girder
03	Girder and Floor Beam System
04	Tee Beam
05	Box Beam or Girders – Multiple
06	Box Beam or Girders – Single or Spread
07	Frame
08	Orthotropic
09	Truss – Deck
10	Truss – Thru
11	Arch – Deck
12	Arch – Thru
13	Suspension
14	Stayed Girder
15	Movable – Lift
16	Movable – Bascule
17	Movable – Swing
18	Tunnel
19	Culvert

Code	Description
20	Mixed Types (applicable only to approach spans)
21	Segmental Box Girder
22	Channel Beam
00	Other

The 28 bridge classes in Table 9-6 (HWB1 through HWB28) reflect the maximum number of combinations for "standard" bridge classes.

Some of the items in Table 9-6 need further descriptions. K3D value shown in table represents different equations that calculate a factor that modifies the piers' 2-dimensional capacity to allow for the 3-dimensional arch action in the deck. The *Hazus Earthquake Model Technical Manual* (FEMA, 2022a) includes the specific equations for the actual K3D values.

The Ishape item is a Boolean indicator for the Kshape factor. The Kshape factor is the modifier that converts cases for short periods to an equivalent spectral amplitude at T=1.0 second. When Ishape = 0, the Kshape factor does not apply. When Ishape = 1, the Kshape factor applies. The *Hazus Earthquake Model Technical Manual* (FEMA, 2022a) includes more information on applying the Kshape factor.

Table 9-6 Detailed Hazus Bridge Classification Scheme

Class	NBI Class	State	Year Built	# Spans	Length of Max. Span (meter)	Length less than 20 meters	K3D	Ishape	Design	Description
HWB1	All	Non-CA	< 1990	N/A	> 150	N/A	EQ1	0	Conventional	Major Bridge – Length > 150 meters
HWB1	All	CA	< 1975	N/A	> 150	N/A	EQ1	0	Conventional	Major Bridge – Length > 150 meters
HWB2	All	Non-CA	>= 1990	N/A	> 150	N/A	EQ1	0	Seismic	Major Bridge – Length > 150 meters
HWB2	All	CA	>= 1975	N/A	> 150	N/A	EQ1	0	Seismic	Major Bridge – Length > 150 meters
HWB3	All	Non-CA	< 1990	1	N/A	N/A	EQ1	1	Conventional	Single Span
HWB3	All	CA	< 1975	1	N/A	N/A	EQ1	1	Conventional	Single Span
HWB4	All	Non-CA	>= 1990	1	N/A	N/A	EQ1	1	Seismic	Single Span
HWB4	All	CA	>= 1975	1	N/A	N/A	EQ1	1	Seismic	Single Span
HWB5	101-106	Non-CA	< 1990	N/A	N/A	N/A	EQ1	0	Conventional	Multi-Col. Bent, Simple Support – Concrete
HWB6	101-106	CA	< 1975	N/A	N/A	N/A	EQ1	0	Conventional	Multi-Col. Bent, Simple Support – Concrete
HWB7	101-106	Non-CA	>= 1990	N/A	N/A	N/A	EQ1	0	Seismic	Multi-Col. Bent, Simple Support – Concrete
HWB7	101-106	CA	>= 1975	N/A	N/A	N/A	EQ1	0	Seismic	Multi-Col. Bent, Simple Support – Concrete
HWB8	205-206	CA	< 1975	N/A	N/A	N/A	EQ2	0	Conventional	Single Col., Box Girder – Continuous Concrete
HWB9	205-206	CA	>= 1975	N/A	N/A	N/A	EQ3	0	Seismic	Single Col., Box Girder – Continuous Concrete
HWB10	201-206	Non-CA	< 1990	N/A	N/A	N/A	EQ2	1	Conventional	Continuous Concrete
HWB10	201-206	CA	< 1975	N/A	N/A	N/A	EQ2	1	Conventional	Continuous Concrete

Class	NBI Class	State	Year Built	# Spans	Length of Max. Span (meter)	Length less than 20 meters	K3D	Ishape	Design	Description
HWB11	201-206	Non-CA	>= 1990	N/A	N/A	N/A	EQ3	1	Seismic	Continuous Concrete
HWB11	201-206	CA	>= 1975	N/A	N/A	N/A	EQ3	1	Seismic	Continuous Concrete
HWB12	301-306	Non-CA	< 1990	N/A	N/A	No	EQ4	0	Conventional	Multi-Col. Bent, Simple Support – Steel
HWB13	301-306	CA	< 1975	N/A	N/A	No	EQ4	0	Conventional	Multi-Col. Bent, Simple Support – Steel
HWB14	301-306	Non-CA	>= 1990	N/A	N/A	N/A	EQ1	0	Seismic	Multi-Col. Bent, Simple Support – Steel
HWB14	301-306	CA	>= 1975	N/A	N/A	N/A	EQ1	0	Seismic	Multi-Col. Bent, Simple Support – Steel
HWB15	402-410	Non-CA	< 1990	N/A	N/A	No	EQ5	1	Conventional	Continuous Steel
HWB15	402-410	CA	< 1975	N/A	N/A	No	EQ5	1	Conventional	Continuous Steel
HWB16	402-410	Non-CA	>= 1990	N/A	N/A	N/A	EQ3	1	Seismic	Continuous Steel
HWB16	402-410	CA	>= 1975	N/A	N/A	N/A	EQ3	1	Seismic	Continuous Steel
HWB17	501-506	Non-CA	< 1990	N/A	N/A	N/A	EQ1	0	Conventional	Multi-Col. Bent, Simple Support – Prestressed Concrete
HWB18	501-506	CA	< 1975	N/A	N/A	N/A	EQ1	0	Conventional	Multi-Col. Bent, Simple Support – Prestressed Concrete
HWB19	501-506	Non-CA	>= 1990	N/A	N/A	N/A	EQ1	0	Seismic	Multi-Col. Bent, Simple Support – Prestressed Concrete

Class	NBI Class	State	Year Built	# Spans	Length of Max. Span (meter)	Length less than 20 meters	K3D	Ishape	Design	Description
HWB19	501-506	CA	>= 1975	N/A	N/A	N/A	EQ1	0	Seismic	Multi-Col. Bent, Simple Support – Prestressed Concrete
HWB20	605-606	CA	< 1975	N/A	N/A	N/A	EQ2	0	Conventional	Single Col., Box Girder – Prestressed Continuous Concrete
HWB21	605-606	CA	>= 1975	N/A	N/A	N/A	EQ3	0	Seismic	Single Col., Box Girder – Prestressed Continuous Concrete
HWB22	601-607	Non-CA	< 1990	N/A	N/A	N/A	EQ2	1	Conventional	Continuous Concrete
HWB22	601-607	CA	< 1975	N/A	N/A	N/A	EQ2	1	Conventional	Continuous Concrete
HWB23	601-607	Non-CA	>= 1990	N/A	N/A	N/A	EQ3	1	Seismic	Continuous Concrete
HWB23	601-607	CA	>= 1975	N/A	N/A	N/A	EQ3	1	Seismic	Continuous Concrete
HWB24	301-306	Non-CA	< 1990	N/A	N/A	Yes	EQ6	0	Conventional	Multi-Col. Bent, Simple Support – Steel
HWB25	301-306	CA	< 1975	N/A	N/A	Yes	EQ6	0	Conventional	Multi-Col. Bent, Simple Support – Steel
HWB26	402-410	Non-CA	< 1990	N/A	N/A	Yes	EQ7	1	Conventional	Continuous Steel
HWB27	402-410	CA	< 1975	N/A	N/A	Yes	EQ7	1	Conventional	Continuous Steel
HWB28				N/A	N/A					All other bridges that are not classified

In constructing the Hazus bridge inventory, when a bridge is identified as having been remodeled, the bridge is reclassified from Conventional to Seismic bridge classes, using the date of reconstruction (the "remodel" date, which is used to overwrite the original year built) if that date is after the seismic design threshold year for each State (>=1975 for CA, and >=1990 for other states). Proposed remodeled dates in the future are not used. This assumes that retrofits upgrade the bridges from conventional to seismic design and the approach was verified with Caltrans. Otherwise Hazus uses the original year-built date to classify bridges. If a remodeled date is not available in the NBI, the default remodeled date in Hazus is updated with the year built date. This makes remodeled dates equal to year built dates in the Hazus inventory except for the cases where the remodeled date is in the future.

Table 9-7 includes the full Hazus Highway Classification. See Table 9-2 and Table 9-3 for information on replacement cost models.

Table 9-7 Hazus Highway System Classification

Label	Description
HDFLT	Default Highway Segment
HRD1	Major Roads (1 kilometer length, 4 lanes)
HRD2	Urban Roads (1 kilometer length, 2 lanes)
HDFLT	Default Bridge
HWB1	Major Bridge - Length > 150 meters (Conventional Design)
HWB2	Major Bridge - Length > 150 meters (Seismic Design)
HWB3	Single Span – (Not HWB1 or HWB2) (Conventional Design)
HWB4	Single Span – (Not HWB1 or HWB2) (Seismic Design)
HWB5	Concrete, Multi-Column Bent, Simple Support (Conventional Design), Non-California (Non-CA)
HWB6	Concrete, Multi-Column Bent, Simple Support (Conventional Design), California (CA)
HWB7	Concrete, Multi-Column Bent, Simple Support (Seismic Design)
HWB8	Continuous Concrete, Single Column, Box Girder (Conventional Design)
HWB9	Continuous Concrete, Single Column, Box Girder (Seismic Design)
HWB10	Continuous Concrete, (Not HWB8 or HWB9) (Conventional Design)
HWB11	Continuous Concrete, (Not HWB8 or HWB9) (Seismic Design)
HWB12	Steel, Multi-Column Bent, Simple Support (Conventional Design), Non-California (Non-CA)
HWB13	Steel, Multi-Column Bent, Simple Support (Conventional Design), California (CA)
HWB14	Steel, Multi-Column Bent, Simple Support (Seismic Design)
HWB15	Continuous Steel (Conventional Design)
HWB16	Continuous Steel (Seismic Design)
HWB17	PS Concrete Multi-Column Bent, Simple Support (Conventional Design), Non-California
HWB18	PS Concrete, Multi-Column Bent, Simple Support (Conventional Design), California (CA)
HWB19	PS Concrete, Multi-Column Bent, Simple Support (Seismic Design)
HWB20	PS Concrete, Single Column, Box Girder (Conventional Design)
HWB21	PS Concrete, Single Column, Box Girder (Seismic Design)

Label	Description
HWB22	Continuous Concrete, (Not HWB20/HWB21) (Conventional Design)
HWB23	Continuous Concrete, (Not HWB20/HWB21) (Seismic Design)
HWB24	Same definition as HWB12 except the bridge length is less than 20 meters
HWB25	Same definition as HWB13 except the bridge length is less than 20 meters
HWB26	Same definition as HWB15 except the bridge length is less than 20 meters and Non-CA
HWB27	Same definition as HWB15 except the bridge length is less than 20 meters and in CA
HWB28	All other bridges that are not classified (including wooden bridges)
HDFLT	Default Highway Tunnel
HTU1	Highway Bored/Drilled Tunnel
HTU2	Highway Cut and Cover Tunnel

For the Hazus highway segment data, the data provided in Hazus is the National Highway Planning Network created by the Federal Highway Administration (FHWA) and updated every three to six years, with the latest data published in 2022.

For flood analysis of highway bridges, the inventory data also includes a scour potential index from the source FHWA data. The *Hazus Flood Model Technical Manual* (FEMA, 2022d) includes more information on the scour potential index and how the Flood Model uses the scour for analyzing probability of failure or functionality. For highway bridges in the Flood Model, the results are probability of bridge failure and probability of bridge functionality, as well as estimates of direct economic loss.

9.2 Railway Transportation System

A railway system consists of four components: tracks/roadbeds, bridges, tunnels, and facilities. This section provides a brief description of each.

- *Tracks/Roadbeds:* Tracks/roadbeds refers to the assembly of rails, ties, and fastenings, and the ground on which they rest. Only one classification is adopted for these components. This classification is analogous to that of urban roads in highway systems.

- *Bridges:* Railway bridges are classified in a manner similar to steel and concrete highway bridges.

- *Tunnels:* Railway tunnels follow the same classification as highway tunnels. That is, they are classified either as bored/drilled tunnels, or cut and cover tunnels.

- *Railway system facilities:* Railway system facilities include urban and suburban stations, maintenance facilities, fuel facilities, and dispatch facilities.

    - Urban and suburban stations are generally key connecting hubs that are important for system functionality. In the western U.S., these buildings are mostly made of reinforced concrete shear walls or moment resisting steel frames, while in the eastern U.S., the small stations are mostly wood and the large ones are mostly masonry or braced steel frames.

- Maintenance facilities are housed in large structures that are not usually critical for system functionality as maintenance activities can be delayed or performed elsewhere. These building structures are often made of steel braced frames.

- Fuel facilities include buildings, tanks (anchored, unanchored, or buried), backup power systems (if available, anchored or unanchored diesel generators), pumps, and other equipment (anchored or unanchored). It should be mentioned that anchored equipment in general refers to equipment designed with special seismic tiedowns or tiebacks, while unanchored equipment refers to equipment designed with no special considerations other than the manufacturer's normal requirements. Some vibrating components, such as pumps, are bolted down regardless of concern for earthquakes. As used here, "anchored" means all components have been engineered to meet seismic criteria, which may include bracing (e.g., pipe or stack bracing) or flexibility requirements (e.g., flexible connections across separation joints) as well as anchorage. These definitions of anchored and unanchored apply to all transportation system components. Above ground tanks are typically made of steel with roofs also made of steel. Buried tanks are typically concrete wall construction with concrete roofs. The fuel facility functionality module was determined with a fault tree analysis considering redundancies and subcomponent behavior. Note that generic building damage functions were used in this fault tree analysis to develop the overall fragility curve of fuel facilities. In total, five types of fuel facilities are considered. These are: fuel facilities with or without anchored equipment, with or without backup power (all combinations), and fuel facilities with buried tanks.

- Dispatch facilities consist of buildings, backup power supplies (if available, anchored or unanchored diesel generators), and electrical equipment (anchored or unanchored). Damage functions for a generic reinforced concrete building with shear walls were used in this fault tree to develop the overall fragility curves for dispatch facilities. In total, four types of dispatch facilities are considered. These are dispatch facilities with or without anchored equipment and with or without backup power (all combinations).

Table 9-8 includes the full Hazus railway classification. See Table 9-2 and Table 9-3 for information on replacement cost models.

Table 9-8 Hazus Railway System Classification

Label	Description
Railway Tracks	
RDFLT	Default Track
RTR	Railway Tracks (per km)
Railway Bridges	
RDFLT	Default Railway Bridge
RLB1	Steel, Multi-Column Bent, Simple Support (Conventional Design), Non-California (Non-CA)
RLB2	Steel, Multi-Column Bent, Simple Support (Conventional Design), California (CA)
RLB3	Steel, Multi-Column Bent, Simple Support (Seismic Design)
RLB4	Continuous Steel (Conventional Design)
RLB5	Continuous Steel (Seismic Design)
RLB6	Same definition as HWB1 except the bridge length is less than 20 meters
RLB7	Same definition as HWB2 except the bridge length is less than 20 meters
RLB8	Same definition as HWB4 except the bridge length is less than 20 meters and Non-CA
RLB9	Same definition as HWB5 except the bridge length is less than 20 meters and in CA
RLB10	All other bridges that are not classified
Railway Facilities	
RDFLT	Default Railway Facility
RST	Rail Urban Station (with all building type options enabled)
RFF	Rail Fuel Facility (different combinations for with or without anchored components and/or with or without backup power)
RDF	Rail Dispatch Facility (different combinations for with or without anchored components and/or with or without backup power)
RMF	Rail Maintenance Facility (with all building type options enabled)
Railway Tunnels	
RDFLT	Default Railway Tunnel
RTU1	Rail Bored/Drilled Tunnel
RTU2	Rail Cut and Cover Tunnel

For the Hazus railway tunnel data, the data provided in Hazus is the NBI created by the FHWA in 2001. Currently, railway tunnels are no longer part of the NBI and are not updated in Hazus with the NBI. Limitations for its current use are that the locations of the tunnels from the 2001 dataset are not very accurate and are incomplete.

For the Hazus railway facility data, the data provided in Hazus is the Intermodal Terminal Facility Database created by the Bureau of Transportation Statistics in 2007. The dataset is updated annually with the latest data from 2022.

9.3 Light Rail Transportation System

Like railway systems, light rail systems consist of railway tracks/roadbeds, bridges, tunnels, maintenance facilities, and dispatch facilities. The only difference between rail and light rail systems is in the fuel facilities, which for light rail are direct current power substations. Light rail systems use electric power and have low voltage direct current power substations. The direct current power substations consist of electrical equipment, which converts the local electric utility alternating current power to direct current power. Two types of direct current power stations are considered. These are: (1) direct current power stations with anchored (seismically designed) components and (2) direct current power stations with unanchored (which are not seismically designed) components.

Table 9-9 includes the full Hazus light rail system classification. See Table 9-2 for information on replacement cost models.

Table 9-9 Hazus Light Rail System Classification

Label	Description
Light Rail Tracks	
LDFLT	Default Light Rail Track
LTR	Light Rail Track
Light Rail Bridges	
LDFLT	Default Light Rail Bridges
LRB1	Steel, Multi-Column Bent, Simple Support (Conventional Design), Non-California (Non-CA)
LRB2	Steel, Multi-Column Bent, Simple Support (Conventional Design), California (CA)
LRB3	Steel, Multi-Column Bent, Simple Support (Seismic Design)
LRB4	Continuous Steel (Conventional Design)
LRB5	Continuous Steel (Seismic Design)
LRB6	Same definition as HWB1 except the bridge length is less than 20 meters
LRB7	Same definition as HWB2 except the bridge length is less than 20 meters
LRB8	Same definition as HWB4 except the bridge length is less than 20 meters and Non-CA
LRB9	Same definition as HWB5 except the bridge length is less than 20 meters and in CA
LRB10	All other bridges that are not classified
Light Rail Tunnels	
LDFLT	Default Light Rail Tunnel
LTU1	Light Rail Bored/Drilled Tunnel
LTU2	Light Rail Cut and Cover Tunnel
Light Rail Facilities	
LDFLT	Default Light Rail Facilities
LDC	Light Rail Direct Current Substation
LDF	Light Rail Dispatch Facility (different combinations for with or without anchored components and/or with or without backup power)
LMF	Maintenance Facility (with all building type options enabled)

For the Hazus light rail bridge data, the data provided in Hazus is from the NBI created by the FHWA in 2001. While the NBI does update their data annually, the light rail bridge data in Hazus is from 2001.

For the Hazus light rail tunnels, no data is provided, but it can be modeled using the Earthquake Model.

9.4 Bus Transportation System

A bus system consists mainly of four components: urban stations, fuel facilities, maintenance facilities, and dispatch facilities. This section provides a brief description of each.

- *Urban Stations:* These are mainly building structures.
- *Bus System Fuel Facilities:* Fuel facilities consist of fuel storage tanks, buildings, pump equipment and buried pipe, and sometimes backup power. The fuel facility functionality is determined with a fault tree analysis considering redundancies and sub-component behavior. The same sub-classes assumed for railway fuel facilities are assumed here.
- *Bus System Maintenance Facilities:* Maintenance facilities for bus systems are mostly of braced steel frame construction. The same classes assumed for railway maintenance facilities are assumed here.
- *Bus System Dispatch Facilities:* The same classes assumed for railway dispatch facilities above are assumed here.

Table 9-10 includes the Hazus bus system classification, including the legacy valuations still being used for elements not updated with HIFLD Open data.

Table 9-10 Hazus Bus System Classification

Label	Description	Hazus Valuation[1]
BDFLT	Default Bus facility	BPT value
BPT	Bus Urban Station (with all building type options enabled)	See Table 9-2
BFF	Bus Fuel Facility (different combinations for with or without anchored components and/or with or without backup power)	$150,000
BDF	Bus Dispatch Facility (different combinations for with or without anchored components and/or with or without backup power)	$400,000
BMF	Bus Maintenance Facilities (with all building type options enabled)	$1,300,000

[1]*Replacement cost data derived by original Hazus development team in 1998 from expert opinion.*

9.5 Port Transportation System

A port system consists of four components: waterfront structures, cranes/cargo handling equipment, fuel facilities, and warehouses. This section provides a brief description of each.

- *Waterfront Structures:* Waterfront structures include wharves (port embankments), seawalls (protective walls from erosion), and piers (break-water structures that form harbors). Waterfront

structures typically are supported by wood, steel, or concrete piles. Many also have batter piles to resist lateral loads from wave action and impact of vessels. Seawalls are caisson walls retaining earth fill material.

- *Cranes and Cargo Handling Equipment:* These are large equipment items used to load and unload freight from vessels. These can be stationary or mounted on rails.

- *Port Fuel Facilities*: The fuel facility consists mainly of fuel storage tanks, buildings, pump equipment, piping, and sometimes backup power. These facilities are assumed to be equivalent to those for railway systems. The functionality of fuel systems is determined with a fault tree analysis, which considers redundancies and sub-component behavior.

- *Warehouses:* Warehouses are large buildings usually constructed of structural steel. In some cases, warehouses may be several hundred feet from the shoreline, while in other instances; they may be located on the wharf itself.

Table 9-11 includes the Hazus port and harbor system classification, including the legacy valuations still being used for elements not updated with HIFLD Open data.

Table 9-11 Hazus Port and Harbor System Classification

Label	Description	Hazus Valuation[1]
PDFLT	Default Port facility	See Table 9-2
PWS	Waterfront Structures	$1,500,000
PEQ1	Stationary Port Handling Equipment	$2,000,000
PEQ2	Rail Mounted Port Handling Equipment	$2,000,000
PWH	Port Warehouses (with all building type options enabled)	$1,200,000
PFF	Port Fuel Facility (different combinations for with or without anchored components and/or with or without backup power)	$2,000,000

[1]*Replacement cost data derived by original Hazus development team in 1998 from expert opinion.*

9.6 Ferry Transportation System

A ferry system consists of five components: waterfront structures, fuel facilities, maintenance facilities, dispatch facilities, and passenger terminals. This section provides a brief description of each.

- *Waterfront Structures:* These are the same as those described for port systems above.

- *Fuel Facilities:* These facilities are similar to those for port systems above but may be built for a smaller range of boat sizes associated with ferries as compared to ports.

- *Maintenance Facilities*: These are often steel braced frame structures, but other building types are possible.

- *Dispatch Facilities:* These are the same as those defined for railway systems.

- *Passenger Terminals:* These are often moment resisting steel frames, but other building types are possible.

Table 9-12 includes the Hazus ferry system classification, including the legacy valuations still being used for elements not updated with HIFLD Open data.

Table 9-12 Hazus Ferry System Classification

Label	Description	Hazus Valuation[1]
FDFLT	Ferry Default facility	FPT Value
FWS	Ferry Waterfront Structures	$1,500,000
FPT	Passenger Terminals (with all building type options enabled)	See Table 9-2
FFF	Ferry Fuel Facility (different combinations for with or without anchored components and/or with or without backup power)	$400,000
FDF	Ferry Dispatch Facility (different combinations for with or without anchored components and/or with or without backup power)	$200,000
FMF	Piers and Dock Facilities (with all building type options enabled)	$520,000

[1]*Replacement cost data derived by original Hazus development team in 1998 from expert opinion.*

The Hazus Ferry data is from USACE CEIWR Navigation Data Center, Ports and Waterways Division in 2007.

9.7 Airport Transportation System

An airport system consists of seven components: runways, control towers, fuel facilities, terminal buildings, maintenance facilities, hangar facilities, and parking structures. This section provides a brief description of each.

- *Runways:* This component consists of well-paved "flat and wide surfaces."
- *Control Towers:* Control towers consist of a building and the necessary equipment for air traffic control and monitoring.
- *Fuel Facilities:* Previously defined in Section 9.2 of railway systems.
- *Terminal Buildings:* These are similar to urban stations of railway systems, but usually much larger in building area.
- *Maintenance and Hangar Facilities and Parking Structures:* These structures are mainly composed of buildings.

Table 9-13 includes the Hazus Airports Classifications including the legacy valuations still being used for elements not updated with HIFLD Open data.

Table 9-13 Hazus Airport Facility Systems Classifications

Label	Description	Hazus Valuation[1]
ADFLT	Airport Default facility	ATB value
ACT	Airport Control Tower (with all building type options enabled)	$5,000,000
ATB	Airport Terminal Building (with all building type options enabled)	See Table 9-2
APS	Airport Parking Structure (with all building type options enabled)	$1,400,000
AFF	Airport Fuel Facility (different combinations for with or without anchored components and/or with or without backup power)	$5,000,000
AMF	Airport Maintenance & Hangar Facility (with all building type options enabled)	$3,200,000
ARW	Airport Runway	See Table 9-2
AFO	Gliderport, Seaport, Stolport, Ultralight or Balloonport Facilities	$500,000
AFH	Heliport Facilities	$2,000,000

[1]*Replacement cost data derived by original Hazus development team in 1998 from expert opinion.*

9.8 Limitations

In summary, this section provided the latest status for Hazus data related to transportation systems. While many data sources have recently been updated from HIFLD Open sources, there are still some transportation systems with Hazus transportation data.

It should be noted that Hazus loads the national HIFLD Open data into individual inventory databases; differences between State abbreviation and spatial location can result in a small number of dropped records.

Hazus 6.0 captures facilities in water bodies (e.g., highway bridges) or nearby offshore (e.g., ports, ferries), where warranted, by assigning them to the nearest Census tract.

As noted above, the Public Transit Route data includes records for each named route; multiple routes may use the same segment of track, so track length and value may be over-estimated for individual segments and for light rail overall. That is, while losses for an individual route are expected to be reasonable, the exposure and losses for the entire system (i.e., multiple routes on the same segments) may be over-estimated.

Section 10. Utility Systems

Hazus includes limited modeling capabilities related to utility systems. The Utility Module is composed of the following six systems:

- Potable Water
- Wastewater
- Oil (crude and refined)
- Natural Gas
- Electric Power
- Communication

The classification system used in the Hazus Methodology was developed to be able to differentiate utility system components with substantially different damage and loss characteristics. All utility system elements can be modeled by the Earthquake Model. The Flood Model can model some of the utility system elements as shown in Table 10-1.

Table 10-1 summarizes the current status of the utility systems' spatial and tabular database elements by data type, hazard, sources. Table 10-2 and Table 10-3 provide supplemental information on the replacement cost models for the HIFLD-based datasets. Valuation models identified as "legacy" models are those developed during the original Hazus Earthquake or Flood Model development processes. Table 10-3 provides the power plant replacement cost model. The remaining discussion in this section will provide more background into the different elements of each utility system, Hazus classifications, and the Hazus valuation used for facility classes not currently modeled using HIFLD Open data.

Table 10-1 Baseline Utility Systems Databases Summary

Utilities Data Type	Data Element	Hazards	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source
Potable Water Distribution Lines Data	Potable Water Distribution Lines	EQ	2021	TIGER data
Potable Water Facilities Data	Potable Water Facilities	EQ, FL	2001	Envirofacts Data Warehouse
Potable Water Pipelines Data	Potable Water Pipelines	EQ	2001	SC only, from South Carolina Emergency Management Division
Wastewater Distribution Lines Data	Wastewater Distribution Lines	EQ	2021	TIGER data
Wastewater Facilities Data	Wastewater Facilities	EQ, FL	Apr. 2022	HIFLD Open: Wastewater Treatment Plants. Records for multiple permitted outflows have been de-duplicated based on field "Source_Id".

Utilities Data Type	Data Element	Hazards	Hazus 6.0 Dataset Date	Hazus 6.0 Dataset Source
Wastewater Pipelines Data	Wastewater Pipelines	EQ	2001	SC only, from South Carolina Emergency Management Division
Oil Facilities Data	Oil Facilities	EQ, FL	2001	Envirofacts Data Warehouse
Oil Pipelines Data	Oil Pipelines	EQ	2001	SC only, from South Carolina Emergency Management Division
Natural Gas Distribution Lines Data	Natural Gas Distribution Lines	EQ	2021	TIGER data
Natural Gas Facilities Data	Natural Gas Facilities	EQ, FL	Oct. 2020	HIFLD Open: Natural Gas Processing Plants. Processing plants with Status = “Inactive” are omitted.
Natural Gas Facilities Data	Natural Gas Facilities	EQ, FL	Jun. 2022	HIFLD Open: Natural Gas Compressor Stations. Compressor Stations with Status = “Closed” are omitted.
Natural Gas Pipelines Data	Natural Gas Pipelines	EQ	Aug, 2019	HIFLD Open: Natural Gas Pipelines
Electrical Power Facility Data	Electrical Power Facility	EQ	Dec. 2021	HIFLD Open: Power Plants. Plants with capacity less than 3 MW are omitted, as are Nuclear power plants. Plants with Status = “CN” (cancelled), “IP” (indefinitely postponed), “L” (regulatory approvals pending), “P” (proposed), “RE” (retired) and “T” (not under construction) are also omitted.
Communication Facility Data	Communication Facility	EQ	2001	Federal Communications Commission (FCC) Broadcast Auxiliary Microwave database

Table 10-2 Valuation Data for Utility Elements Developed from HIFLD Open Data

Element	Geographic Coverage	Valuation Approach
Wastewater Facilities	All states and territories.	Uses legacy value of $60M for a small wastewater treatment plant, derived from ATC-13 (ATC, 1985), escalated to $151.1M in 2021, adjusted by state non-residential location factors (see Section 6.3).
Natural Gas Facilities: Compressor Stations	All states except AK and DC; territory coverage limited to VI.	Replacement cost model based on data collected by the American Petroleum Institute (API, 2017): $3,400 per hp (in 2021 dollars). When no capacity data are available, an average value of 15,355 hp derived from 2021 HIFLD Open data are applied. Compressor station-specific regional multipliers by API-defined regions are applied.
Natural Gas Facilities: Processing Plants	All states except AK and DC; territory coverage limited to VI.	Replacement cost model based on data collected by the American Petroleum Institute (API, 2017): $720k per MMcf/day (in 2021 dollars). When no capacity data are available, an average value of 146 MMcf/day derived from 2021 HIFLD Open data are applied. The compressor station-specific regional multipliers are also applied to processing plants.
Natural Gas Pipelines	All states except AK, DC and HI; no territory coverage.	Replacement cost model based on data collected by the American Petroleum Institute (API, 2017): $201k (in 2021 dollars) per inch-mile for transmission pipelines (TYPEPIPE = “interstate” and “intrastate”), assumed to be 30 inches in diameter, and $168k per inch-mile (in 2021 dollars) for gathering pipelines (TYPEPIPE = ”gathering” and “other”), assumed to be 16 inches in diameter. Pipeline-specific regional multipliers for API-defined regions are applied.
Electrical Power Facility	All states except FL and HI; territory coverage limited to PR	Replacement cost models are derived from EIA generator construction cost data for 2019 (EIA, 2021), with $/kW associated with energy source (see Table 10-3). Where plant capacity is not available, the average capacity by fuel type derived from 2021 HIFLD Open data, also provided in Table 10-3, is applied. Costs are localized by Census region using cost factors developed from the available EIA generator cost data.

Table 10-3 Power Plant Replacement Cost Model

EIA Power Plant Major Energy Source	$/kW (2021)	Average Capacity (MW) estimated from 2021 HIFLD Open data	Applicable "PRIM_FUEL" Classes in HIFLD Power Plant Data
Battery Storage	$3,151	16	"MWH"
Biomass	$3,078	26	"AB", "BLQ", "LFG", "MSW", "OBG", "OBL", "OBS", "SLW", "WDL", "WDS"
Coal	$4,405	818	"ANT", "BIT", "LIG", "RC", "SGC", "SUB", "WC"
Geothermal	$3,316	61	"GEO"
Hydro	$5,998	94	"WAT"
Natural Gas	$1,143	329	"BFG", "NG", OG"
Petroleum Liquids	$1,218	59	"DFO", "JF", "KER", "PC", "PG", "RFO", "RG", "SG", "WO"
Solar	$1,903	20	"SUN"
Waste Heat	$3,541	36	"OTH", "PUR", "TDF", "WH"
Wind	$1,474	97	"WND"
Average	$2,462	N/A	"NOT AVAILABLE"

10.1 Potable Water Systems

A potable water system typically consists of terminal reservoirs, water treatment plants, wells, pumping plants, storage tanks, and transmission and distribution pipelines. In this subsection, a brief description of each of these components is presented.

- *Terminal Reservoirs:* Terminal reservoirs are typically lakes (man-made or natural) and are usually located nearby and upstream of the water treatment plant. Vulnerability of terminal reservoirs and associated dams is not assessed in the Hazus loss estimation methodology. Therefore, even though reservoirs are an essential part of a potable water system, it is assumed in the analysis of water systems that the amount of water flowing into water treatment plants from reservoirs right after an earthquake is essentially the same as before the earthquake.

- *Transmission Aqueducts:* These transmission conduits are typically large size pipes (more than 20 inches in diameter) or channels (canals) that convey water from its source (reservoirs, lakes, and/or rivers) to the treatment plant.

    - Transmission pipelines are commonly made of concrete, ductile iron, cast iron, or steel. These could be elevated/at grade or buried. Elevated or at grade pipes are typically made of steel (welded or riveted), and they can run in single or multiple lines.

    - Canals are typically lined with concrete, mainly to avoid excessive loss of water by seepage and to control erosion. In addition to concrete lining, expansion joints are usually used to account for swelling and shrinkage under varying temperature and moisture conditions. Some damage to

canals has occurred in historic earthquakes, but the modeling of damage to transmission aqueducts is outside the current scope of the methodology.

- *Water Treatment Plants (WTP):* Water treatment plants are generally composed of a number of physical and chemical unit processes connected in series, for the purpose of improving the water quality. A conventional WTP consists of a coagulation process, followed by a sedimentation process, and finally a filtration process. Alternately, a WTP can be regarded as a system of interconnected pipes, basins, and channels through which the water moves, and where the flow is governed by hydraulic principles. WTP are categorized as follows:

  - Small water treatment plants, with capacity ranging from 10 million gallons per day (mgd) to 50 mgd, are assumed to consist of a filter gallery with flocculation tanks (composed of paddles and baffles) and settling (or sedimentation) basins as the main components, as well as chemical tanks (needed in the coagulation and other destabilization processes), chlorination tanks, electrical and mechanical equipment, and elevated pipes.

  - Medium water treatment plants, with capacity ranging from 50 mgd to 200 mgd, are simulated by adding more redundancy to small treatment plants (i.e., twice as many flocculation, sedimentation, chemical, and chlorination tanks).

  - Large water treatment plants, with a capacity above 200 mgd, are simulated by adding even more redundancy to small treatment plants (i.e., three times as many flocculation, sedimentation, chemical, and chlorination tanks/basins).

  - Water treatment plants are also classified based on whether the subcomponents (equipment and backup power) are anchored or not.

- *Pumping Plants:* Pumping plants are usually composed of a building, one or more pumps, electrical equipment, and in some cases, backup power systems. Pumping plants are classified as either small (less than 10 mgd capacity), medium (10 to 50 mgd) or large (more than 50 mgd capacity). Pumping plants are also classified with respect to whether the subcomponents (equipment and backup power) are anchored or not. Anchored means equipment designed with special seismic tie downs and tiebacks, while unanchored means equipment installed with manufacturers' normal requirements.

- *Wells:* Wells typically have a capacity between 1 and 5 mgd. Wells are used in many cities as a primary or supplementary source of water supply. Wells include a shaft from the surface down to the aquifer, a pump to bring the water up to the surface, equipment used to treat the water, and sometimes a building, which encloses the well and equipment.

- *Water Storage Tanks:* Water storage tanks can be elevated steel, on ground steel (anchored/unanchored), on ground concrete (anchored/unanchored), buried concrete, or on ground wood tanks. Typical capacity of storage tanks is in the range of 0.5 mgd to 2 mgd.

- *Distribution Facilities and Distribution Pipes:* Distribution of water can be accomplished by gravity, or by pumps in conjunction with on-line storage. Except for storage reservoirs located at a much

higher altitude than the area being served, distribution of water necessitates at least some pumping along the way. Typically, water is pumped at a relatively constant rate, with flow in excess of consumption being stored in elevated storage tanks. The stored water provides a reserve for fire flow and may be used for general-purpose flow should the electric power fail, or in case of pumping capacity loss.

Distribution pipelines are commonly made of concrete (prestressed or reinforced), asbestos cement, ductile iron, cast iron, steel, or plastic. The selection of material type and pipe size are based on the desired carrying capacity, availability of material at the time of construction, durability, and cost. Distribution pipes represent the network that delivers water to consumption areas. Distribution pipes may be further subdivided into primary lines, secondary lines, and small distribution mains. The primary or arterial mains carry flow from the pumping station to and from elevated storage tanks, and to the consumption areas, whether residential, industrial, commercial, or public. These lines are typically laid out in interlocking loops, and all smaller lines connecting to them are typically valved so that failure in smaller lines does not require shutting off the larger pipeline. Primary lines can be up to 36 inches in diameter. Secondary lines are smaller loops within the primary mains and run from one primary line to another. They provide a large amount of water for firefighting without excessive pressure loss. Small distribution lines represent the mains that supply water to the user and to the fire hydrants.

Table 10-4 includes the Hazus potable water system classification, including the legacy valuations still being used for elements not updated with HIFLD Open data.

Table 10-4 Hazus Potable Water System Classification

Label	Description	Hazus Valuation[1]
Potable Water Pipelines		
PDFLT	Default potable water pipes (per break)	$1,000
PWP1	Brittle Pipe (per break)	$1,000
PWP2	Ductile Pipe (per break)	$1,000
Potable Water Facilities		
PDFLT	Default potable water facilities	PWTS value
PPPL	Large Pumping Plant (> 50 MGD) [different combinations for with or without anchored components]	$525,000
PPPM	Medium Pumping Plant (10 to 50 MGD) [different combinations for with or without anchored components]	$525,000
PPPS	Small Pumping Plant (< 10 MGD) [different combinations for with or without anchored components]	$150,000
PWE	Wells	$400,000
PSTAS	Above Ground Steel Tank	$800,000
PSTBC	Buried Concrete Tank	$1,500,000
PSTGC	On Ground Concrete Tank	$1,500,000
PSTGS	On Ground Steel Tank	$800,000
PSTGW	On Ground Wood Tank	$30,000

Label	Description	Hazus Valuation[1]
PWTL	Large WTP (> 200 MGD) [different combinations for with or without anchored components]	$360,000,000
PWTM	Medium WTP (50-200 MGD) [different combinations for with or without anchored components]	$100,000,000
PWTS	Small WTP (< 50 MGD) [different combinations for with or without anchored components]	$30,000,000
PCVS	Control Vaults and Control Stations	$50,000

[1]Replacement cost data for all facilities other than vaults were derived by original Hazus development team in 1998 from expert opinion; control vaults were added in 2003.

For the Hazus potable water distribution lines data, this data is based on total street length aggregated at the Census tract-level and comes from the 2021 TIGER data created by the U.S. Census Bureau. The data include Primary Roads (MTFCC = S1100), Secondary Roads (MTFCC = 1200), and Local Neighborhood Road/Rural Road/City Street (MTFCC = S1400). When a road link borders more than one tract, the length of the edges that make up the road link are equally distributed between the left and right tract that the link borders. It is assumed the water distribution pipe length equals the street length (80% being brittle pipe and 20% being ductile). The data is updated annually, with the latest update being from 2021.

For the Hazus potable water facilities data, this data is provided by the Envirofacts Data Warehouse from the U.S. Environmental Protection Agency (EPA). The data in Hazus was last updated in 2001.

For the Hazus potable water pipelines data, no baseline data was provided with Hazus, but user-input data can be modeled in the Earthquake Model.

For the Flood Model, Table 10-5 includes additional default values used for certain potable water data. Equipment Height represents the assumed flood elevation where electrical equipment is damaged. The Functional Depth represents the assumed flood elevation where the facility is closed and people evacuated, because the equipment is assumed to be flooded. It should be noted that the functional depth for utility systems components is not editable by the user and is not directly linked to the equipment height specified for each component in the inventory. As a result, if changes are made to the default equipment height assumptions in the inventory, functionality determinations will not reflect those changes. Similarly, the functional depth for utility systems and level of flood protection indicated in the inventory are also not linked in Hazus. If a system component is assigned a level of flood protection greater than or equal to the scenario return period, the component may be shown as non-functional regardless of its protection from the flood event.

Table 10-5 Potable Water System Classifications and Flood Model Default Parameters

Hazus Label	Specific Occupancy	FL Foundation Type	FL Equipment Height (ft)	FL Functional Depth (ft)	Comments
PDFLT	Default potable water pipes	N/A	N/A	N/A	Component is not analyzed in the flood model, mapping only capabilities.
PWP1	Brittle Pipe	N/A	N/A	N/A	Component is not analyzed in the flood model, mapping only capabilities.
PWP2	Ductile Pipe	N/A	N/A	N/A	Component is not analyzed in the flood model, mapping only capabilities.
PDFLT	Default potable water facilities	Slab on grade	0	4	
PPPL	Large Pumping Plant	Slab on grade	0	4	
PPPM	Medium Pumping Plant	Slab on grade	0	4	
PPPS	Small Pumping Plant	Slab on grade	0	4	
PWE	Wells	Slab on grade	0	4	
PSTAS	Above Ground Steel Tank	Slab on grade	80	80	
PSTBC	Buried Concrete Tank	Slab on grade	0	4	
PSTGC	On Ground Concrete Tank	Slab on grade	0	24	Tank floor at grade and tank does not float.
PSTGS	On Ground Steel Tank	Slab on grade	0	24	Tank floor at grade and tank does not float.
PSTGW	On Ground Wood Tank	Slab on grade	0	24	Tank floor at grade and tank does not float.
PWTL	Large WTP	Slab on grade	0	4	
PWTM	Medium WTP	Slab on grade	0	4	
PWTS	Small WTP	Slab on grade	0	4	
PCVS	Control Vaults and Control Stations	Slab on grade	0	1	Assumes entrance is at grade and not sealed.

10.2 Wastewater Systems

A wastewater system typically consists of collection sewers, interceptors, lift stations, and wastewater treatment plants. In this section, a brief description of each of these components is provided.

- *Collection Sewers*: Collection sewers are generally closed conduits that normally carry sewage with a partial flow. Collection sewers could be sanitary sewers, storm sewers, or combined sewers. Pipe materials used for potable water transportation may also be used for wastewater collection. The most commonly used sewer material is clay pipe manufactured with integral bell and spigot ends. These pipes range in size from 4 to 42 inches in diameter. Concrete pipes are mostly used for storm drains and for sanitary sewers carrying noncorrosive sewage (i.e., with organic materials). For the smaller diameter range, plastic pipes are also used.

- *Interceptors*: Interceptors are large diameter sewer mains. They are usually located at the lowest elevation areas. Pipe materials that are used for interceptor sewers are similar to those used for collection sewers.

- *Lift Stations:* Lift stations are important parts of the wastewater system. Lift stations serve to raise sewage over topographical rises. If the lift station is out of service for more than a short time, untreated sewage will either spill out near the lift station, or back up into the collection sewer system. Lift stations are classified as either small (capacity less than 10 mgd), medium (capacity 10 – 50 mgd), or large (capacity greater than 50 mgd). Lift stations are also classified as having either anchored or unanchored subcomponents.

- *Wastewater Treatment Plants (WWTP):* Three sizes of wastewater treatment plants are considered: small (capacity less than 50 mgd), medium (capacity between 50 and 200 mgd), and large (capacity greater than 200 mgd). Wastewater treatment plants have the same processes as water treatment plants, with the addition of secondary treatment subcomponents.

Table 10-6 presents the Hazus wastewater system classification, including the legacy valuations still being used for elements not updated with HIFLD Open data.

Table 10-6 Hazus Wastewater System Classification

Label	Description	Hazus Valuation[1]
Wastewater Pipelines		
WDFLT	Default wastewater pipe (per break)	$1,000
WWP1	Brittle Pipe (per break)	$1,000
WWP2	Ductile Pipe (per break)	$1,000
Wastewater Facilities		
WDFLT	Default wastewater facility	WWTS value
WWTL	Large WWTP (> 200 MGD) [different combinations for with or without anchored components]	$720,000,000
WWTM	Medium WWTP (50-200 MGD) [different combinations for with or without anchored components]	$200,000,000
WWTS	Small WWTP (< 50 MGD) [different combinations for with or without anchored components]	See Table 10-2
WLSL	Large Lift Stations (> 50 MGD) [different combinations for with or without anchored components]	$1,050,000

Label	Description	Hazus Valuation[1]
WLSM	Medium Lift Stations (–0 MGD - 50 MGD) [different combinations for with or without anchored components]	$1,050,000
WLSS	Small Lift Stations (< 10 MGD) [different combinations for with or without anchored components]	$300,000
WWCV	Wastewater Control Vaults and Control Station	$50,000

[1]Replacement cost data for all facilities other than vaults were derived by original Hazus development team in 1998 from expert opinion; control vaults were added in 2003.

For the Hazus wastewater distribution lines data, this data is based on total street length aggregated at the Census tract-level and comes from the 2021 TIGER data created by the U.S. Census Bureau. The data include Primary Roads (MTFCC = S1100), Secondary Roads (MTFCC = 1200), and Local Neighborhood Road/Rural Road/City Street (MTFCC = S1400). When a road link borders more than one tract, the length of the edges that make up the road link are equally distributed between the left and right tract that the link borders. It is assumed the wastewater distribution pipe length equals 60% of the street length (60% being brittle pipe and 40% being ductile). The data is updated annually with the latest one from 2021.

For the Hazus wastewater pipelines data, no baseline data is provided in Hazus, but user-input data can be modeled in the Earthquake Model.

For the Flood Model, Table 10-7 includes additional default values used for certain wastewater data. Equipment Height represents the assumed flood elevation where electrical equipment is damaged. The Functional Depth represents the assumed flood elevation where the facility is closed, and people evacuated, because the equipment is assumed to be flooded. It should be noted that the functional depth for utility systems components is not editable by the user and is not directly linked to the equipment height specified for each component in the inventory. As a result, if changes are made to the default equipment height assumptions in the inventory, functionality determinations will not reflect those changes. Similarly, the functional depth for utility systems and level of flood protection indicated in the inventory are also not linked in Hazus. If a system component is assigned a level of flood protection greater than or equal to the scenario return period, the component may be shown as non-functional regardless of its protection from the flood event.

Table 10-7 Wastewater Classifications and Flood Model Default Parameters

Hazus Label	Specific Occupancy	FL Foundation Type	FL Equipment Height (ft)	FL Functional Depth (ft)	Comments
WDFLT	Default wastewater pipe	N/A	N/A	N/A	Component is not analyzed in the flood model, mapping only capabilities.
WWP1	Brittle Pipe	N/A	N/A	N/A	Component is not analyzed in the flood model, mapping only capabilities.
WWP2	Ductile Pipe	N/A	N/A	N/A	Component is not analyzed in the flood model, mapping only capabilities.

Hazus Label	Specific Occupancy	FL Foundation Type	FL Equipment Height (ft)	FL Functional Depth (ft)	Comments
WDFLT	Default wastewater facility	Slab on grade	0	4	
WWTL	Large WWTP	Slab on grade	0	4	
WWTM	Medium WWTP	Slab on grade	0	4	
WWTS	Small WWTP	Slab on grade	0	4	
WLSL	Large Lift Stations	Slab on grade	0	4	
WLSM	Medium Lift Stations	Slab on grade	0	4	
WLSS	Small Lift Stations	Slab on grade	0	4	
WWCV	Wastewater Control Vaults and Control Station	Slab on grade	0	1	Assumes entrance is at grade and is not sealed.

10.3 Oil Systems

An oil system typically consists of refineries, pumping plants, tank farms, and pipelines. In this section, a brief description of each of these components is provided.

- *Refineries:* Refineries are an important part of an oil system. They process crude oil before it can be used. Although the supply of water is critical to the functioning of a refinery, it is assumed in the methodology that an uninterrupted supply of water is available to the refinery. Two sizes of refineries are considered: small and medium/large:
  - Small refineries (capacity less than 100,000 barrels per day) are assumed to consist of steel tanks on grade, stacks, other electrical and mechanical equipment, and elevated pipes. Stacks are essentially tall cylindrical chimneys.
  - Medium and large refineries (capacity of 100,000 to 500,000 barrels per day and more than 500,000 barrels per day, respectively) are simulated by adding more redundancy to small refineries (i.e., twice as many tanks, stacks, elevated pipes).
- *Oil Pipelines:* Oil pipelines are used for the transportation of crude oil over long distances. About 75% of the crude oil is transported throughout the United States by pipelines. A large segment of industry and millions of people could be severely affected by the disruption of crude oil supplies. Rupture of crude oil pipelines could lead to pollution of land and rivers. Pipelines are typically made of mild steel with submerged arc welded joints, although older gas welded steel pipe may be

present in some systems. Buried pipelines are considered to be vulnerable to Peak Ground Velocity (PGV) and Permanent Ground Deformation (PGD).

- *Pumping Plants:* Pumping plants serve to maintain the flow of oil in cross-country pipelines. Pumping plants usually use two or more pumps. Pumps can be of either centrifugal or reciprocating type. However, no differentiation is made between these two types of pumps in the analysis of oil systems. Pumping plants are classified as having either anchored or unanchored subcomponents.

- *Tank Farms:* Tank farms are facilities that store fuel products. They include tanks, pipes, and electrical components. Tank farms are classified as having either anchored or unanchored subcomponents.

Table 10-8 includes the Hazus oil system classification, including the legacy valuations still being used for elements not updated with HIFLD Open data.

Table 10-8 Hazus Oil System Classification

Label	Description	Hazus Valuation[1]
Oil Pipelines		
ODFLT	Default oil pipeline (per break)	$1,000
OIP1	Welded Steel Pipe with Gas Welded Joints (per break)	$1,000
OIP2	Welded Steel Pipe with Arc Welded Joints (per break)	$1,000
Oil Facilities		
ODFLT	Default oil facility	ORFS value
ORFL	Large Refinery (> 500,000 lb/day) [different combinations for with or without anchored components]	$750,000,000
ORFM	Medium Refinery (1–0,000 - 500,000 lb/day) [different combinations for with or without anchored components]	$750,000,000
ORFS	Small Refinery (< 100,000 lb/day) [different combinations for with or without anchored components]	$175,000,000
OPP	Pumping Plant [different combinations for with or without anchored components]	$1,000,000
OTF	Tank Farms with Anchored Tanks [different combinations for with or without anchored components]	$2,000,000
OCV	Oil Control Vaults and Control Station	$50,000

[1]*Replacement cost data for all facilities other than vaults were derived by original Hazus development team in 1998 from expert opinion; vaults were added in 2003.*

For the Hazus oil facilities data, the data are provided by the Envirofacts Data Warehouse from EPA. This data is updated annually with the latest one from 2001.

For the Hazus oil pipelines data, no baseline data are provided in Hazus, but user-input data can be modeled in the Earthquake Model.

For the Flood Model, Table 10-9 includes additional default values used for certain oil system data. Equipment Height represents the assumed flood elevation where electrical equipment is damaged. The

Functional Depth represents the assumed flood elevation where the facility is closed and people evacuated, because the equipment is assumed to be flooded. It should be noted that the functional depth for utility systems components is not editable by the user and is not directly linked to the equipment height specified for each component in the inventory. As a result, if changes are made to the default equipment height assumptions in the inventory, functionality determinations will not reflect those changes. Similarly, the functional depth for utility systems and level of flood protection indicated in the inventory are also not linked in Hazus. If a system component is assigned a level of flood protection greater than or equal to the scenario return period, the component may be shown as non-functional regardless of its protection from the flood event.

Table 10-9 Oil System Classifications and Flood Model Default Parameters

Hazus Label	Specific Occupancy	FL Foundation Type	FL Equipment Height (ft)	FL Functional Depth (ft)	Comments
ODFLT	Default oil pipeline	N/A	N/A	N/A	Component is not analyzed in the flood model, mapping only capabilities.
OIP1	Welded Steel Pipe with Gas Welded Joints	N/A	N/A	N/A	Component is not analyzed in the flood model, mapping only capabilities.
OIP2	Welded Steel Pipe with Arc Welded Joints	N/A	N/A	N/A	Component is not analyzed in the flood model, mapping only capabilities.
ODFLT	Default oil facility	Slab on grade	0	4	
ORFL	Large Refinery	Slab on grade	0	4	
ORFM	Medium Refinery	Slab on grade	0	4	
ORFS	Small Refinery	Slab on grade	0	4	
OPP	Pumping Plant	Slab on grade	0	0	
OTF	Tank Farms	Slab on grade	0	0	Assume tank bottom is at grade and tanks will not float.
OCV	Oil Control Vaults and Control Station	Slab on grade	0	1	Assumes entrance is at grade and is not sealed.

10.4 Natural Gas Systems

A natural gas system typically consists of compressor stations and pipelines, as defined below:

- *Compressor Stations*: Compressor stations serve to maintain the flow of gas in pipelines. Compressor stations consist of either centrifugal or reciprocating compressors. However, no differentiation is made between these two types of compressors in the analysis of natural gas

systems. Compressor stations are categorized as having either anchored or unanchored subcomponents. The compressor stations are similar to pumping plants in oil systems.

- *Natural Gas Pipelines*: Natural gas pipelines are typically made of mild steel with submerged arc-welded joints, although older lines may have gas-welded joints. These are used for the transportation of natural gas over long distances. Many industries and residents could be severely affected should disruption of natural gas supplies occur.

Table 10-10 presents the Hazus natural gas system classification, including the legacy valuations still being used for elements not updated with HIFLD Open data.

Table 10-10 Hazus Natural Gas System Classification

Label	Description	Hazus Valuation[1]
Buried Pipelines		
GDFLT	Default natural gas pipeline	See Table 10-2
NGP1	Welded Steel Pipe with Gas Welded Joints	See Table 10-2
NGP2	Welded Steel Pipe with Arc Welded Joints	See Table 10-2
Natural Gas Facilities		
GDFLT	Default natural gas facilities (including Processing Plants)	See Table 10-2
NGC	Compressor Stations [different combinations for with or without anchored components]	See Table 10-2
NGCV	Control Valves and Control Stations	$50,000

[1]Replacement cost data for all facilities other than vaults were derived by original Hazus development team in 1998 from expert opinion; control vaults were added in 2003.

For the Hazus natural gas distribution lines data, this data is based on total street length aggregated at the Census tract-level and comes from the 2021 TIGER data created by the U.S. Census Bureau. The data include Primary Roads (MTFCC = S1100), Secondary Roads (MTFCC = 1200), and Local Neighborhood Road/Rural Road/City Street (MTFCC = S1400). When a road link borders more than one tract, the length of the edges that make up the road link are equally distributed between the left and right tract that the link borders. It is assumed the gas distribution pipe length equals 40% of the street length (10% being brittle pipe and 90% being ductile). The data is updated annually with the latest one from 2021.

For the Flood Model, Table 10-11 includes additional default values used for certain natural gas system data. Equipment Height represents the assumed flood elevation where electrical equipment is damaged. The Functional Depth represents the assumed flood elevation where the facility is closed and people evacuated, because the equipment is assumed to be flooded. It should be noted that the functional depth for utility systems components is not editable by the user and is not directly linked to the equipment height specified for each component in the inventory. As a result, if changes are made to the default equipment height assumptions in the inventory, functionality determinations will not reflect those changes. Similarly, the functional depth for utility systems and level of flood protection indicated in the inventory are also not linked in Hazus. If a system component is assigned a level of flood

protection greater than or equal to the scenario return period, the component may be shown as non-functional regardless of its protection from the flood event.

Table 10-11 Natural Gas System Classifications and Flood Model Default Parameters

Hazus Label	Specific Occupancy	FL Foundation Type	FL Equipment Height (ft)	FL Functional Depth (ft)	Comments
GDFLT	Default natural gas pipeline	N/A	N/A	N/A	Component is not analyzed in the flood model, mapping only capabilities.
NGP1	Welded Steel Pipe with Gas Welded Joints	N/A	N/A	N/A	Component is not analyzed in the flood model, mapping only capabilities.
NGP2	Welded Steel Pipe with Arc Welded Joints	N/A	N/A	N/A	Component is not analyzed in the flood model, mapping only capabilities.
GDFLT	Default natural gas facility	Slab on grade	0	4	
NGC	Compressor Stations	Slab on grade	0	4	
NGCV	Control Valves and Control Stations	Slab on grade	0	1	Assumes entrance is at grade and is not sealed.

10.5 Electric Power Systems

The components of an electric power system considered in the loss estimation methodology are substations, distribution circuits, and generation plants. In this section, a brief description of each of these components is presented.

- *Substations*: An electric substation is a facility that serves as a source of energy supply for the local distribution area in which it is located. Substations can be entirely enclosed in buildings, where all the equipment is assembled into one metal clad unit. Other substations have step-down transformers, high voltage switches, oil circuit breakers, and lightning arrestors located outside the substation building. In the current loss estimation methodology, only transmission (138 kV to 765 kV or higher) and subtransmission (34.5 kV to 161 kV) substations are considered. These will be classified as high voltage (350 kV and above), medium voltage (150 kV to 350 kV) and low voltage (34.5 kV to 150 kV) and will be referred to as Large (500 kV) substations, Medium (230kV) substations, and Small (115 kV) substations, respectively. The classification is also a function of whether the subcomponents are anchored or typical (unanchored), as defined in Section 9.2. A substation has the following main functions:
  - Change or switch voltage from one level to another.
  - Provide points where safety devices such as disconnect switches, circuit breakers, and other equipment can be installed.

- Regulate voltage to compensate for system voltage changes.
- Eliminate lightning and switching surges from the system.
- Convert alternating current to direct current and direct current to alternating current, as needed.
- Change frequency, as needed.

- *Distribution Circuits*: The distribution system is divided into circuits. A distribution circuit includes poles, wires, in-line equipment and utility-owned equipment at customer sites. A distribution circuit also includes above ground and underground conductors. Distribution circuits either consist of anchored or unanchored components.

- *Generation Plants*: Generation plant subcomponents include diesel generators, turbines, racks and panels, boilers and pressure vessels, and the buildings in which these are housed. The size of the generation plant is determined from the number of Megawatts (MW) of electric power that the plant can produce under normal operations. Small generation plants have a generation capacity of less than 100 MW. Medium generation plants have a capacity between 200 and 500 MW, while Large plants have a capacity greater than 500 MW. Fragility curves for generation plants with anchored versus unanchored subcomponents are presented. These plants produce alternating current (AC) and may be any of the types listed below. Fossil fuels are either coal, oil, or natural gas.

  - Hydroelectric
  - Steam turbine (fossil fuel fired or nuclear)
  - Combustion turbine (fossil fuel fired)
  - Geothermal
  - Solar
  - Wind
  - Compressed air

Table 10-12 includes the Hazus electric power system classification, including the legacy valuations that are still being used for elements that have not been updated with HIFLD Open data.

Table 10-12 Hazus Electric Power Facilities System Classification

Label	Description	Hazus Valuation[1]
EDFLT	Default electric power facilities	use EPPS value
ESSL	Low Voltage (115 kV) Substation [different combinations for with or without anchored components]	$10,000,000
ESSM	Medium Voltage (230 kV) Substation [different combinations for with or without anchored components]	$20,000,000
ESSH	High Voltage (500 kV) Substation [different combinations for with or without anchored components]	$50,000,000
EDC	Distribution Circuits (either Seismically Designed Components or Standard Components)	$3,000
EPPL	Large Power Plants (> 500 MW) [different combinations for with or without anchored components]	See Table 10-2

Label	Description	Hazus Valuation[1]
EPPM	Medium Power Plant– (100 - 500 MW) [different combinations for with or without anchored components]	See Table 10-2
EPPS	Small Power Plants (< 100 MW) [different combinations for with or without anchored components]	See Table 10-2

[1]*Replacement cost models were derived by original Hazus development team in 1998 from expert opinion.*

For the Hazus electric power facilities data, the data are provided from the HIFLD Open Data: Power Plants (2021). This included data from all 50 states as well as the District of Columbia and Puerto Rico.

For the Flood Model, Table 10-13 includes additional default values used for certain electric power system data. Equipment Height represents the assumed flood elevation where electrical equipment is damaged. The Functional Depth represents the assumed flood elevation where the facility is closed and people evacuated, because the equipment is assumed to be flooded. It should be noted that the functional depth for utility systems components is not editable by the user and is not directly linked to the equipment height specified for each component in the inventory. Analysis is not performed for Electric Power Systems but can be mapped for reference.

Table 10-13 Electric Power System Classifications and Flood Model Default Parameters

Hazus Label	Specific Occupancy	FL Foundation Type	FL Equipment Height (ft)	FL Functional Depth (ft)	Comments
EDFLT	Default electric power facilities	Slab on grade	0	4	Component is not analyzed in the flood model, mapping only capabilities.
ESSL	Low Voltage Substation	Slab on grade	0	4	Component is not analyzed in the flood model, mapping only capabilities.
ESSM	Medium Voltage Substation	Slab on grade	0	4	Component is not analyzed in the flood model, mapping only capabilities.
ESSH	High Voltage Substation	Slab on grade	0	4	Component is not analyzed in the flood model, mapping only capabilities.
EDC	Distribution Circuits	N/A	N/A	N/A	Component is not analyzed in the flood model, mapping only capabilities.
EPPL	Large Power Plant	Slab on grade	0	4	Component is not analyzed in the flood model, mapping only capabilities.
EPPM	Medium Power Plant	Slab on grade	0	4	Component is not analyzed in the flood model, mapping only capabilities.
EPPS	Small Power Plant	Slab on grade	0	4	Component is not analyzed in the flood model, mapping only capabilities.

10.6 Communication Systems

The major components of a communication system are:

- Central offices and broadcasting stations (this includes all subcomponents such as central switching equipment).
- Transmission lines (these include all subcomponents such as equipment used to connect central office to end users).
- Cabling (low-capacity links).

Central offices and broadcasting stations are the only components of the communication system considered in this section.

A communication facility consists of a building (a generic type is assumed in the methodology), central switching equipment (i.e., digital switches, anchored or unanchored), and back-up power supply (i.e., diesel generators or battery generators, anchored or unanchored) that may be needed to supply the requisite power to the center in case of loss of off-site power.

Table 10-14 includes the Hazus communication system classification, including the legacy valuations still being used for elements not updated with HIFLD Open data.

Table 10-14 Hazus Communication Facilities System Classification

Label	Description	Hazus Valuation[1]
CDFLT	Default communication facility	CBO value
CCO	Central Offices (different combinations for with or without anchored components and/or with or without backup power)	$5,000,000
CBR	AM or FM radio stations or transmitters	$2,000,000
CBT	TV stations or transmitters	$2,000,000
CBW	Weather stations or transmitters	$2,000,000
CBO	Other stations or transmitters	$2,000,000
CCSV	Control Vault (FL only)	$50,000

[1]Replacement cost models for all facilities other than vaults were derived by original Hazus development team in 1998 from expert opinion; control vaults were added in 2003.

The Hazus communication facility data came from the FCC Broadcast Auxiliary Microwave database from 2001. Communication facilities are not analyzed in the flood model but are able to be mapped.

10.7 Limitations

In summary, this section provided the latest status for Hazus data related to utility systems. While some data sources have recently been updated from HIFLD Open sources, still over half of the utility system elements make use of some Hazus utility data.

It should be noted that Hazus loads the national HIFLD Open data into individual inventory databases; differences between State abbreviation and spatial location can result in a small number of dropped records.

Hazus 6.0 captures facilities in water bodies or nearby offshore (e.g., wastewater outfalls), where warranted, by assigning them to the nearest Census tract.

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Appendix A. Building Stock Mapping Scheme Tables

Table A-1. Distribution Percentage of Floor Area for Specific Occupancy Classes within each General Occupancy Class

Specific Occupancy Class Label	Specific Occupancy Class	RES	COM	IND	AGR	REL	GOV	EDU
RES1	Single-Family Dwelling	*						
RES2	Mobile Home	*						
RES3	Multi-Family Dwelling	*						
RES4	Temporary Lodging	*						
RES5	Institutional Dormitory	*						
RES6	Nursing Home	*						
COM1	Retail Trade		*					
COM2	Wholesale Trade		*					
COM3	Personal and Repair Services		*					
COM4	Professional/Technical		*					
COM5	Banks		*					
COM6	Hospital		*					
COM7	Medical Office/Clinic		*					
COM8	Entertainment & Recreation		*					
COM9	Theaters		*					
COM10	Parking		*					
IND1	Heavy			*				
IND2	Light			*				
IND3	Food/Drugs/Chemicals			*				
IND4	Metals/Minerals Processing			*				
IND5	High Technology			*				
IND6	Construction			*				
AGR1	Agriculture				100			
REL1	Church					100		
GOV1	General Services						*	
GOV2	Emergency Response						*	
EDU1	Schools							*
EDU2	Colleges/Universities							*

**The relative distribution varies by Census tract and is computed directly from the specific occupancy class square footage inventory. For Agriculture (AGR) and Religion (REL) there is only one specific occupancy class, therefore the distribution is always 100%.*

Table A-2. Distribution Percentage of Floor Area for Specific Building Types within each Building Occupancy Class, Low-Rise, Pre-1950, West Coast (after ATC-13, 1985) [1]

Specific Occup. Class	W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML	MH
RES2																100
RES3	73		1	1	1		6		3	3			1		9	2
RES4	34		2	1	2	1	19		16	3			4		18	
RES5	20		5	1		1			28	18			6		21	
RES6	45				10		5		10				20		10	
COM1		22	2		6	3	20		17	1			6		23	
COM2		8	3		4	2	41		18	1	3		5	2	13	
COM3		28	1	1	3		18		7		1		8		33	
COM4		27	2	1	3		19		15				7		26	
COM5		27	2	1	3		19		15				7		26	
COM6		8	5	2	11		11		27	2	1		27		6	
COM7		25	5	2	10		10		15	2	1		20		10	
COM8		8	12	1	2	3	16		27	4			5	1	21	
COM9		5	20	7			15		20	3			10		20	
COM10				8		8	18		43	7		1	6	3	6	
IND1		3	29	13	2	2	15		14	7	1		4	2	8	
IND2		4	14	8	22	1	18		16	1	1		2		13	
IND3		1	18	8	3	3	20		22		2		3		20	
IND4		2	24	12	7	2	13		16		2		2	6	14	
IND5			21	5	5		3		35	2	10	2	15		2	
IND6		32	3	2	10		18		8	7					13	7
AGR1	56		3	2	14		2		9					1	13	
REL1	22		8		2		21		15	5			8		19	
GOV1		9	8	1	3	4	12		42	4			6		11	
GOV2	45					2			37				3		13	
EDU1	11		6		3	3	21		21	4			9		22	
EDU2	2		5	10		5	15		20				20	5	18	

[1] *Refer to Table A-22 for states' classifications. For "Res1" Distribution, refer to Table A-17.*

Table A-3. Distribution Percentage of Floor Area for Specific Building Types within each Building Occupancy Class, Low-Rise, 1950-1970, West Coast (after ATC-13, 1985) [1]

Specific Occup. Class	W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML	MH
RES2																100
RES3	72		1	2	2		1		6	2			8		3	3
RES4	55		1	2	2	2	3		11	2			18	1	3	
RES5	39		3	3		1	8		16	6			18	1	5	
RES6	70				3	1	1		5				20			
COM1		34	3	1	3	2	4		13	5	10	1	18	2	4	
COM2		12	4	5	5	3	3		18		22	1	19	4	4	
COM3		12	3	5	5	2	3		23	4	12	1	22	4	4	
COM4		34	3	3	1	2	3		17	5	3		23	4	2	
COM5		34	3	3	1	2	3		17	5	3		23	4	2	
COM6		32	5	2	4	3			16	6			28	4		
COM7		46	13	1	3	3			9				20		5	
COM8		13	17	12	3	3			13	6			30	3		
COM9		10	10	30			5		10		5		30			
COM10			5	8		20			34			5	20	6	2	
IND1		10	25	30	3			7	14				9	2		
IND2		8	5	14	17	4			10	5	22	3	12			
IND3			14	16	6	1		5	17		28	1	10	2		
IND4			18	25	9			11	10		7		15	3		2
IND5			4	9	3	2		4	20		35	3	15	4		1
IND6		30		1	15				7		4		20	3		20
AGR1	51		4	8	12				2		10		11	2		
REL1	20		4	1	3	3			24		4		37	4		
GOV1		21	6	3	2	2			26	5	4	2	27	2		
GOV2	50								13		7		20	10		
EDU1	25		3	4	5	4			20		4	2	29	4		
EDU2	5		2	12		5			20				50	6		

[1]Refer to Table A-22 for states' classifications. For "Res1" Distribution, refer to Table A-18.

Table A-4. Distribution Percentage of Floor Area for Specific Building Types within each Building Occupancy Class, Low-Rise, Post-1970, West Coast (after ATC-13, 1985) [1]

Specific Occup. Class	W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML	MH
RES2																100
RES3	73				2	3			6	1		1	9			5
RES4	53		3		2	3		4	13				20	2		
RES5	33		3	3		6		5	24				23	3		
RES6	70								5		5		20			
COM1		26	9	1	2	1		6	10	1	15	5	21	3		
COM2		8	4	1	3	4		2	12		41	3	19	3		
COM3		13	3	2	2	3		3	13		20	5	34	2		
COM4		35	3	2	1	3		4	15		8	3	24	2		
COM5		35	3	2	1	3		4	15		8	3	24	2		
COM6		31	6	1	1	7		4	13		7		28	2		
COM7		47	16			5		4	6		2		20			
COM8		4	23	8	1	3		2	15		4	1	32	7		
COM9		5	27	20					12		4		27	5		
COM10			8	8		6		3	49		3	13	7	3		
IND1		11	19	28	3	2		1	9		11	3	11	1		1
IND2		3	13	9	6	3			10		41	3	12			
IND3		2	15	10	5	3			12		28	7	18			
IND4		1	26	18	5	4		1	11	1	12	5	15	1		
IND5		1	12	8	2	3			10		38	7	17	1		1
IND6		30	4	6	11				8		16	6	14			5
AGR1	40		8	11	8				3		11	1	15	1		2
REL1	23		12	3	1	6			26		1	3	22	3		
GOV1		8	15	4	3	7		2	32			4	16	9		
GOV2	40		3	7		23			10			7	3	7		
EDU1	24		9	6	1	5		3	16	3	4	3	21	5		
EDU2	5		10	10		5			20		5		40	5		

[1] *Refer to Table A-22 for states' classifications. For "Res1" Distribution, refer to Table A-19.*

Table A-5. Distribution Percentage of Floor Area for Specific Building Types within Each Building Occupancy Class, Mid-Rise, Pre-1950, West Coast (after ATC-13, 1985) [1]

Specific Occup. Class	S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
RES3	15	4	5		1	19	25		8		23
RES4	18	4	12		1	20	20		8		17
RES5	16	1	5			40	20				18
RES6	20		5			35	20		10		10
COM1	8	6	3			21	34		11	1	16
COM2	8					27	53		5		7
COM3	18					22	42		5		13
COM4	25	7	10		2	22	16		9		9
COM5	25	7	10		2	22	16		9		9
COM6	18	4	6		1	35	19		8		9
COM7	20	5	5			30	20		10		10
COM8	25		20			40	5				10
COM9	30		10			40	10				10
COM10		10	5		2	55	18		3	2	5
IND1											
IND2			10			5	75				10
IND3	32	3	1		1	14	41		3		5
IND4	25	3	1			9	52				10
IND5	35	10				30	5		20		
IND6						20	80				
AGR1						25	75				
REL1						10	90				
GOV1	30	15	5		3	23	10		4		10
GOV2											
EDU2	10		20			60	3		5		2

[1] *Refer to Table A-22 for states' classifications.*

Table A-6. Distribution Percentage of Floor Area for Specific Building Types within Each Building Occupancy Class, Mid-Rise, 1950-1970, West Coast (after ATC-13, 1985) [1]

Specific Occup. Class	S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
RES3	10	15	6		4	37		1	21	6	
RES4	9	24	9		5	34	1		14	4	
RES5	6	1	11		9	45			18	10	
RES6	15	10	15		5	25			25	5	
COM1	7	25	5		3	31			22	7	
COM2	21	3			2	34		1	34	5	
COM3	10	3				28			54	5	
COM4	17	18	9		9	18		2	23	4	
COM5	17	18	9		9	18		2	23	4	
COM6	14	10	14		5	23		3	23	8	
COM7	15	10	15		5	25			25	5	
COM8	5		28			52			10	5	
COM9	5		30			50			10	5	
COM10	5	8	8		7	39		8	18	7	
IND1		10	20			40			20	10	
IND2		15	10			50			20	5	
IND3	11	4	10		30	20		1	15	9	
IND4					100						
IND5	10	5	13			32			30	10	
IND6											
AGR1											
REL1						80			10	10	
GOV1	15	6	15		11	28		2	18	5	
GOV2	5	10	10		5	60				10	
EDU2	20		15		5	35			15	10	

[1] *Refer to Table A-22 for states' classifications.*

Table A-7. Distribution Percentage of Floor Area for Specific Building Types within Each Building Occupancy Class, Mid-Rise, Post-1970, West Coast (after ATC-13, 1985) [1]

Specific Occup. Class	S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
RES3	9	23	8		10	28		7	12	3	
RES4	16	28	8		11	18		3	13	3	
RES5	9	10	11		16	34		4	11	5	
RES6	25	10	15		10	35			5		
COM1	34	9	3		12	17		5	15	5	
COM2	20	17			15	10		8	15	15	
COM3	11	17	3		10	17		12	17	13	
COM4	37	10	12		9	15		3	9	5	
COM5	37	10	12		9	15		3	9	5	
COM6	25	9	15		10	33		1	6	1	
COM7	25	10	15		10	35			5		
COM8		10			90						
COM9		10			90						
COM10	4	8	3		4	66		8	6	1	
IND1											
IND2											
IND3	62	5	1		23	4		1	3	1	
IND4	100										
IND5	18	14	3		34	13		5	10	3	
IND6											
AGR1											
REL1		5			90					5	
GOV1	25	11	15		22	12		4	9	2	
GOV2	25	20	35			20					
EDU2	20	5	10		25	25			10	5	

[1] *Refer to Table A-22 for states' classifications.*

Table A-8. Distribution Percentage of Floor Area for Specific Building Types within Each Building Occupancy Class, High-Rise, Pre-1950, West Coast (after ATC-13, 1985) [1]

Specific Occup. Class	S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
RES3	39	1	2		8	24	23	3	
RES4	45	3	3		8	20	18	3	
RES5	15	5	10			30	40		
COM4	47	10	4		1	21	16	1	
COM5	47	10	4		1	21	16	1	
COM6	56	9	1		1	24	8	1	
COM7									
COM10									
AGR1									
GOV1	53	5	5		3	30	3	1	
EDU2	5	5	35			40	15		

[1] *Refer to Table A-22 for states' classifications.*

Table A-9. Distribution Percentage of Floor Area for Specific Building Types within Each Building Occupancy Class, High-Rise, 1950-1970, West Coast (after ATC-13, 1985) [1]

Specific Occup. Class	S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
RES3	30	21	6		13	24		3	3
RES4	48	10	9		12	19		1	1
RES5	20	15	25		30	5			5
COM4	40	26	18		6	7		1	2
COM5	40	26	18		6	7		1	2
COM6	35	27	17		4	15		1	1
COM7									
COM10									
AGR1									
GOV1	46	13	22		10	8			1
EDU2	35	20	20		25				

[1] *Refer to Table A-22 for states' classifications.*

Table A-10. Distribution Percentage of Floor Area for Specific Building Types within Each Building Occupancy Class, High-Rise, Post-1970, West Coast (after ATC-13, 1985) [1]

Specific Occup. Class	S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
RES3	44	6	5		18	20		5	2
RES4	56	10	6		16	9		2	1
RES5	25	18	20		37				
COM4	56	10	14		14	5		1	
COM5	54	10	15		15	5		1	
COM6	45	6	19		13	17			
COM7									
COM10									
AGR1									
GOV1	52	14	14		14	6			
EDU2	30	10	10		50				

[1] *Refer to Table A-22 for states' classifications.*

Table A-11. Distribution Percentage of Floor Area for Specific Building Types within Each Building Occupancy Class, Low-Rise, Mid-West[1]

Specific Occup. Class	W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML	MH
RES2																100
RES3	75												2		23	
RES4	50												3	2	45	
RES5	20							4	13	2	22	4	2		33	
RES6	90														10	
COM1		30	2	4	11	6	7		5		5		2		28	
COM2		10	2	4	11	6	7	2	10	2	14	2	2		28	
COM3		30	2	4	11	6	7		5		5		2		28	
COM4		30	2	4	11	6	7		5		5		2		28	
COM5		30	2	4	11	6	7		5		5		2		28	
COM6				2	4	2	2	6	21	4	33	6	2		18	
COM7		30	2	4	11	6	7		5		5		2		28	
COM8		30	2	4	11	6	7		5		5		2		28	
COM9			2	6	14	8	10	4	13	2	22	4			15	
COM10			2	4	11	6	7	6	21	4	33	6				
IND1			5	10	25	13	17	2	7	2	12	2			5	
IND2		10	2	4	11	6	7	2	10	2	14	2	3		27	
IND3		10	2	4	11	6	7	2	10	2	14	2	3		27	
IND4			5	10	25	13	17	2	7	2	12	2			5	
IND5		10	2	4	11	6	7	2	10	2	14	2	2		28	
IND6		30	2	4	11	6	7		5		5		2		28	
AGR1		10	2	4	11	6	7	2	10	2	14	2	2		28	
REL1	30			3	5	3	4		5		5		2	2	41	
GOV1		15	14	21				7	6		4		3		30	
GOV2		14	7	17				4	12					3	43	
EDU1		10	5	12				5	7				11		50	
EDU2		14	6	12			2	8	11					10	37	

[1]Refer to Table A-22 for states' classifications. For "Res1" Distribution, refer to Table A-20.

Table A-12. Distribution Percentage of Floor Area for Specific Building Types within Each Building Occupancy Class, Mid-Rise, Mid-West[1]

Specific Occup. Class	S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
RES3		10	7	3	14	39		7		2	18
RES4		10	7	3	14	37	2	7		2	18
RES5					25	62	2	11			
RES6											
COM1	3	20	16	6	11	27	2	5		2	8
COM2		7	3		14	37	2	7		3	27
COM3	3	20	16	6	11	27	2	5		2	8
COM4	3	20	16	6	11	27	2	5		2	8
COM5	3	20	16	6	11	27	2	5		2	8
COM6	3	20	16	6	12	30	2	6			5
COM7	3	20	16	6	11	27	2	5		2	8
COM8	3	20	16	6	11	27	2	5		2	8
COM9											
COM10	2	14	10	4	17	43	2	8			
IND1											
IND2		7	3		14	37	2	7		3	27
IND3		7	3		14	37	2	7		3	27
IND4											
IND5		7	3		14	37	2	7		3	27
IND6											
AGR1		7	3		14	37	2	7		3	27
REL1	3	20	16	6	11	27	2	5		2	8
GOV1	20	24			11	9				5	31
GOV2											
EDU2	7	14			9	13				13	44

[1]*Refer to Table A-22 for states' classifications.*

Table A-13. Distribution Percentage of Floor Area for Specific Building Types within Each Building Occupancy Class, High-Rise, Mid-West[1]

Specific Occup. Class	S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
RES3	3	13	4		16	44	7	7	6
RES4	3	13	4		16	44	7	7	6
RES5					26	74			
COM4	7	29	9		12	32	4	4	3
COM5	7	29	9		12	32	4	4	3
COM6	7	29	9		13	36	2	2	2
COM7	7	29	9		12	32	4	4	3
COM10	5	19	6		18	52			
AGR1	2	6	2		16	44	11	11	8
GOV1									
EDU2									

[1]*Refer to Table A-22 for states' classifications.*

Table A-14. Distribution Percentage of Floor Area for Specific Building Types within Each Building Occupancy Class, Low-Rise, East Coast[1]

Specific Occup. Class	W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML	MH
RES2																100
RES3	62			3				2	2				5	4	22	
RES4	48		5	4			4	8	4		3	3	3	3	15	
RES5	7		7	6			6	17	6	3	8	6	5	5	24	
RES6	22		11	8			8	8	3	2	4	3	5	4	22	
COM1		14	20	15	5		16	3	2		2		4	2	17	
COM2		10	21	15	7		16	3	2		2		3	4	17	
COM3		25	7	5	11		5	3	2		2		6	4	30	
COM4		26	11	8	4		9	4	2		3		5	4	24	
COM5		13	13	9	13		10	5	3		2	2	5	3	22	
COM6		2	22	15			18	10	4	2	5	4	3	2	13	
COM7		24	10	7	15		8	3	2		3		4	4	20	
COM8		19	19	13	6		15	3	2		2		3	3	15	
COM9		5	20	13	12	2	16	7	2		3	3	3	2	12	
COM10			10	7			8	30	11	6	14	12			2	
IND1		5	22	15	4	2	17	7	3		3	3	3	3	13	
IND2		10	15	9	15		11	5	3		2	2	4	5	19	
IND3		7	25	18	3		19	4	2		2	2	3	2	13	
IND4		7	26	19	3		20	3	2		2		2	3	13	
IND5		5	25	17	3	2	20	7	3		3	3		2	10	
IND6		10	21	14	7	2	16	5	2		2	2	2	3	14	
AGR1		48	8	6	12		7	2					3	2	12	
REL1	36		4	4			3	2	2		2		7	6	34	
GOV1		7	24	16	3		19	5	3		2	1	3	3	13	
GOV2		8	16	11	4		13	8	3	2	4	3	4	5	19	
EDU1		13	17	13			13	5	3		2	2	5	5	22	
EDU2		4	18	13			14	8	3	2	4	3	5	4	22	

[1]Refer to Table A-22 for states' classifications. For "RES1" Distribution, refer to Table A-21.

Table A-15. Distribution Percentage of Floor Area for Specific Building Types within Each Building Occupancy Class, Mid-Rise, East Coast[1]

Specific Occup. Class	S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
RES3	3	4			6	3		14		13	57
RES4	9	12		3	18	9	2	11		7	29
RES5	7	10		3	23	11	3	12		5	26
RES6											
COM1	23	29	2	8	5	3		5		5	20
COM2	23	30	3	8	4	3		5		5	19
COM3	10	13		3	5	4		11		10	44
COM4	14	19	2	5	7	4		9		7	33
COM5	15	21	2	6	8	5		8		6	29
COM6	21	27	2	8	12	6	2	7		2	13
COM7	15	20	2	5	7	4		9		6	32
COM8	22	30	3	8	5	3		5		5	19
COM9											
COM10	10	13		3	38	17	6	11			2
IND1											
IND2	22	28	2	8	10	5	2	6		3	14
IND3	25	32	3	9	6	4		4		3	14
IND4											
IND5	24	32	3	9	9	6		5		2	10
IND6											
AGR1	19	25	2	7	4	2		7		6	28
REL1	5	9		2	4	3		12		12	53
GOV1	24	30	3	9	7	5		5		3	14
GOV2											
EDU2	17	23	2	6	10	5	2	8		4	23

[1]*Refer to Table A-22 for states' classifications.*

Table A-16. Distribution Percentage of Floor Area for Specific Building Types within Each Building Occupancy Class, High-Rise, East Coast[1]

Specific Occup. Class	S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
RES3	8	21	8		34	17	2	5	5
RES4	8	21	8		34	17	2	5	5
RES5	6	16	6		40	20	3	5	4
COM4	15	36	15		15	8		2	9
COM5	15	36	15		15	8		2	9
COM6	14	35	14		17	8	2	2	8
COM7	15	38	15		14	8		2	8
COM10	5	12	5		43	21	4	6	4
AGR1	7	4	18		20	42			9
GOV1									
EDU2									

[1]Refer to Table A-22 for states' classifications.

Table A-17. Distribution Percentage of Floor Area for Specific Building Types within "RES1" Building Occupancy Class, Pre-1950, West Coast[1]

State FIPS[1]	State Abbreviation	State	W1	S3	S5L	C2L	RM1L	URML
02	AK	Alaska	99			1		
04	AZ	Arizona	60				25	16
06	CA	California	99				1	0
08	CO	Colorado	76				15	9
15	HI	Hawaii	92			1	4	3
16	ID	Idaho	95				3	2
30	MT	Montana	98				1	1
35	NM	New Mexico	74				16	10
32	NV	Nevada	97				2	1
41	OR	Oregon	99				1	
49	UT	Utah	82				11	7
53	WA	Washington	98				1	1
56	WY	Wyoming	92				5	3

[1]State FIPS are two digit unique number representative of each state and U.S. territory. Refer to Table A-22 for a complete list of State FIPS.

Table A-18. Distribution Percentage of Floor Area for Specific Building Types within "RES1" Building Occupancy Class, 1950-1970, West Coast

State FIPS	State Abbreviation	State	W1	S3	S5L	C2L	RM1L	URML
02	AK	Alaska	99			1		
04	AZ	Arizona	60				36	4
06	CA	California	99				1	0
08	CO	Colorado	76				21	3
15	HI	Hawaii	92			1	6	1
16	ID	Idaho	95				4	1
30	MT	Montana	98				2	
35	NM	New Mexico	74				23	3
32	NV	Nevada	97				3	
41	OR	Oregon	99				1	
49	UT	Utah	82				16	2
53	WA	Washington	98				2	
56	WY	Wyoming	92				7	1

Table A-19. Distribution Percentage of Floor Area for Specific Building Types within "RES1" Building Occupancy Class, Post-1970, West Coast

State FIPS	State/Territory Abbreviation	State/Territory	W1	S3	S5L	C2L	RM1L	URML
02	AK	Alaska	99			1		
04	AZ	Arizona	60				40	
60	AS	American Samoa	92			1	7	
06	CA	California	99				1	0
08	CO	Colorado	76				24	
66	GU	Guam	92			1	7	
15	HI	Hawaii	92			1	7	
16	ID	Idaho	95				5	
69	MP	Northern Mariana Islands	92			1	7	
30	MT	Montana	98				2	
35	NM	New Mexico	74				26	
32	NV	Nevada	97				3	
41	OR	Oregon	99				1	
49	UT	Utah	82				18	
53	WA	Washington	98				2	
56	WY	Wyoming	92				8	

Table A-20. Distribution Percentage of Floor Area for Specific Building Types within "RES1" Building Occupancy Class, Mid-West

State FIPS	State Abbreviation	State	Specific Building Type W1	Specific Building Type C2L	Specific Building Type URML
05	AR	Arkansas	87		13
19	IA	Iowa	92		8
17	IL	Illinois	77	1	22
18	IN	Indiana	80		20
20	KS	Kansas	91		9
21	KY	Kentucky	88		12
22	LA	Louisiana	89		11
26	MI	Michigan	86		14
27	MN	Minnesota	95	1	4
29	MO	Missouri	76		24
28	MS	Mississippi	94		6
38	ND	North Dakota	98		2
31	NE	Nebraska	89	1	10
39	OH	Ohio	76		24
40	OK	Oklahoma	71		29
46	SD	South Dakota	97		3
47	TN	Tennessee	90		10
48	TX	Texas	100		
55	WI	Wisconsin	90		10

Table A-21. Distribution Percentage of Floor Area for Specific Building Types within "RES1" Building Occupancy Class, East Coast

State FIPS	State/Territory Abbreviation	State/Territory	Specific Building Type W1	Specific Building Type C2L	Specific Building Type URML
01	AL	Alabama	95		5
09	CT	Connecticut	96		4
11	DC	District of Columbia	21	3	76
10	DE	Delaware	71	1	28
12	FL	Florida	25	5	70
13	GA	Georgia	93		7
25	MA	Massachusetts	96		4
24	MD	Maryland	71	1	28
23	ME	Maine	99		1
37	NC	North Carolina	90		10
33	NH	New Hampshire	97	1	2
34	NJ	New Jersey	91		9
36	NY	New York	85	1	14
42	PA	Pennsylvania	66		34
72	PR	Puerto Rico	24		76
44	RI	Rhode Island	98		2
45	SC	South Carolina	92		8
51	VA	Virginia	75		25
50	VT	Vermont	96	2	2
78	VI	U.S. Virgin Islands	23		77
54	WV	West Virginia	72		28

Table A-22. Regional Distribution of States/Territories

State/Territory FIPS	State/Territory Abbreviation	State/Territory Name	Group
02	AK	Alaska	West Coast
01	AL	Alabama	East Coast
05	AR	Arkansas	Mid-West
04	AZ	Arizona	West Coast
06	CA	California	West Coast
08	CO	Colorado	West Coast
09	CT	Connecticut	East Coast
11	DC	District of Columbia	East Coast
10	DE	Delaware	East Coast
12	FL	Florida	East Coast
13	GA	Georgia	East Coast
15	HI	Hawaii	West Coast
19	IA	Iowa	Mid-West
16	ID	Idaho	West Coast
17	IL	Illinois	Mid-West
18	IN	Indiana	Mid-West
20	KS	Kansas	Mid-West
21	KY	Kentucky	Mid-West
22	LA	Louisiana	Mid-West
25	MA	Massachusetts	East Coast
24	MD	Maryland	East Coast
23	ME	Maine	East Coast
26	MI	Michigan	Mid-West
27	MN	Minnesota	Mid-West
29	MO	Missouri	Mid-West
28	MS	Mississippi	Mid-West
30	MT	Montana	West Coast
37	NC	North Carolina	East Coast
38	ND	North Dakota	Mid-West
31	NE	Nebraska	Mid-West
33	NH	New Hampshire	East Coast
34	NJ	New Jersey	East Coast
35	NM	New Mexico	West Coast
32	NV	Nevada	West Coast
36	NY	New York	East Coast
39	OH	Ohio	Mid-West

State/Territory FIPS	State/Territory Abbreviation	State/Territory Name	Group
40	OK	Oklahoma	Mid-West
41	OR	Oregon	West Coast
42	PA	Pennsylvania	East Coast
44	RI	Rhode Island	East Coast
45	SC	South Carolina	East Coast
46	SD	South Dakota	Mid-West
47	TN	Tennessee	Mid-West
48	TX	Texas	Mid-West
49	UT	Utah	West Coast
51	VA	Virginia	East Coast
50	VT	Vermont	East Coast
53	WA	Washington	West Coast
55	WI	Wisconsin	Mid-West
54	WV	West Virginia	East Coast
56	WY	Wyoming	West Coast
60	AS	American Samoa	West Coast
66	GU	Guam	West Coast
69	MP	Northern Mariana Islands	West Coast
72	PR	Puerto Rico	East Coast
78	VI	U.S. Virgin Islands	East Coast

Appendix B. Earthquake Essential Facilities Mapping Schemes

Table B-1 Benchmark Years for Design Level Assignment

Building Scheme Seismic Design Level (Scheme Name[1])	Pre-Code	Low Code	Moderate Code	Moderate Superior	High Code	High Superior
High (XX3)	< 1940	1940	1960	N/A	1973	2000
Moderate (XX2)	< 1940	1940	1973	2000	N/A	N/A
Low (XX1)	< 1973	1973	2000	N/A	N/A	N/A

[1](XX#) is the general mapping scheme designation stored in field = BldgSchemesId in SQL table hzTract. XX is the two letter State designation (e.g., CA1, CA2 and CA3), and the following number designates the seismic design level upon which the mapping scheme is based.

Table B-2 Example Design Level Assignments Using Benchmark Years

Year Built	High Seismic Design Level (Scheme XX3[1])	Moderate Seismic Design Level (Scheme XX2[1])	Low Seismic Design Level (Scheme XX1[1])
1912	PC	PC	PC
1940	LC	LC	PC
1972	MC	LC	PC
1973	HC	MC	LC
2010	HS	MS	MC

[1](XX#) is the general mapping scheme designation stored in field = BldgSchemesId in SQL table hzTract. XX is the two letter State designation (e.g., CA1, CA2 and CA3), and the following number designates the seismic design level upon which the mapping scheme is based.

Table B-3 State Assignment of East or West for Model Building Type Assignment

Area	State List
East	AL, AR, CT, DE, DC, FL, GA, IL, IN, IA, KS, KY, LA, ME, MD, MA, MI, MN, MS, MO, NE, NH, NJ, NY, NC, ND, OH, OK, PA, RI, SC, SD, TN, TX, VT, VA, WV, WI, PR
West	AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, WY, AS (TS only), GU (TS Only), MP (TS Only), VI (TS Only)

Table B-4 Essential Facility Model Building Type Assignment

Design Level	Urban Area	Area	Model Building Type Assignment for: eqCareFlty, eqSchool	Model Building Type Assignment for: eqFireStation, eqPoliceStation, eqEmergencyCtr
MC, HC, or HS	Rural	West	W2	W1
MC, HC, or HS	Rural	East	RM1L	RM1L
MC, HC, or HS	Urban	West	RM1L	RM1L
MC, HC, or HS	Urban	East	RM1L	RM1L
PC or LC	Rural	West	W2	W1
PC or LC	Rural	East	URML	URML
PC or LC	Urban	West	URML	URML
PC or LC	Urban	East	URML	URML

Appendix D-2: Vulnerability Summary

Critical Facility Data and Description							Critical Facilities by Participating Jurisdictions ("x" indicates jurisdiction considers facility critical)									Hazard Vulnerability Summary ("yes" indicates facility mapped within hazard zone; "no" indicates facility is not)								
Critical Facility #	Facility Name	Facility Address	City	Asset Type	Community Lifeline Type	Building Replacement Cost (thous. $)	City of Forks	City of Port Angeles	City of Sequim	Clallam County PUD #1	Jamestown S'Klallam Tribe	Lower Elwha S'Klallam Tribe	Peninsula College	Port of Port Angeles	Unincorporated ClallamCounty	Flood	Landslide Hazard Zone	Earthquake - Fault Rupture	Earthquake - Seismic Site Class	Tsunami	Wildfire - WUI Interface and Intermix	Liquefaction	Hist. Landslide (within 1,000 ft)	Sea Level Rise (10 ft)
3	5th & McCurdy Pump Station	803 S 5th	Sequim	Utility - Potable Water	Water Systems	525			X						X	No	No	No	8 - Severe	No	No	Yes	No	No
12	Angeles Buff Tower	48° 08' 34"N 123° 32' 22"W 36 m	Clallam County	Communications	Communications	2000									X	No	No	No	7 - Very Strong	No	Yes	No	No	Yes
14	Assembly Of God, Forks	81 Huckleberry Lane	Forks	Shelter	Food, Hydration, Shelter	3775.7	X									No	Yes	No	8 - Severe	No	No	No	No	No
15	Bahokus Peak GATR, USCG Commo	48 °22' 18"N 124° 40' 33"W 432 m	Clallam County	Communications	Communications	2000									X	No	No	No	7 - Very Strong	No	No	No	No	No
16	Baptist	651 S Forks Ave	Forks	Shelter	Food, Hydration, Shelter	3775.7	X									Yes	No	No	8 - Severe	No	No	No	No	No
21	Bible Church	HWY 112	Joyce	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
22	Black Diamond Reservoir	203 Reservoir Rd	Port Angeles	Utility - Potable Water	Water Systems	1500									X	No	No	Yes	7 - Very Strong	No	No	No	Yes	No
23	Bluff's Well	1433 Gasman Rd	Port Angeles	Utility, Water, Potable	Water Systems	400				X						No	No	No	7 - Very Strong	No	No	No	Yes	Yes
25	Wireless Communication Facilities	271754 HWY 101	Sequim	Wireless Communicaiton	Communications	2000					X					No	No	No	7 - Very Strong	No	Yes	No	No	No
26	Blyn Station – Station 37	54 Sophus Rd	Sequim	Fire Department	Safety and Security	1236.44			X		X					No	No	No	7 - Very Strong	No	No	Yes	No	Yes
27	Blyn Water Towers & Water System Infrastructure	48.021088, -122.990727	Sequim	Water Supply	Water Systems	1500					X					No	No	No	7 - Very Strong	No	No	No	No	No
28	Bobcat Hollow Well	152 Bobcat Hollow Rd	Port Angeles	Utility, Water, Potable	Water Systems	400				X						No	No	No	7 - Very Strong	No	No	No	No	No
29	Bogachiel Clinic	390 Founders Way	Forks	Medical Facility	Health and Medical	3000.7	X									No	Yes	No	8 - Severe	No	No	No	No	No
30	Administration - Happy Valley Substation	48° 02' 33"N 123° 06' 21"W 226 m	Clallam County	Energy - Power - Electric	Energy	20000		X								No	No	No	7 - Very Strong	No	No	No	No	No
31	Bonneville Power Administration - Port Angeles Substation	48° 06' 02"N 123° 25' 04"W 102 m	Clallam County	Energy - Power - Electric	Energy	20000		X								No	No	Yes	7 - Very Strong	No	No	No	No	No
32	Bonneville Power Administration - Sappho Substation	48° 04' 19"N 124° 16' 08"W 154 m	Clallam County	Energy - Power - Electric	Energy	20000		X								No	Yes	No	8 - Severe	No	No	No	No	No
37	And Maintenance Facility	70 Carlsborg Rd	Sequim	Fire Department	Safety and Security	1236.44			X							No	No	No	7 - Very Strong	No	No	Yes	No	No
38	Carlsborg Reservoir	110 Frost Road	Sequim	Utility, Water, Potable	Water Systems	1500			X	X						No	No	No	7 - Very Strong	No	No	No	No	No
40	Carlsborg Well & Pump Station	315 Business Park Loop	Sequim	Utility, Water, Potable	Water Systems	525			X	X						No	No	No	8 - Severe	No	No	Yes	No	No
41	Catholic, Queen Of Angels	209 W 11th St	Port Angeles	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
42	Catholic, St. Josephs	121 E Maple St	Sequim	Shelter	Food, Hydration, Shelter	3775.7			X							No	No	No	8 - Severe	No	No	Yes	No	No
43	CCFD # 4 - Station 2 Freshwater Bay	55922 Highway 112	Clallam County	Safety and Security	Safety and Security	1236.44									X	No	No	No	7 - Very Strong	No	No	No	No	No
44	CCFD # 4 - Station 1 Joyce	51250 Hwy 112	Clallam County	Safety and Security	Safety and Security	1236.44									X	No	No	No	7 - Very Strong	No	No	No	No	No
45	CCFD # 5 - Clallam Bay	60 Eagle Crest Way	Clallam Bay	Safety and Security	Safety and Security	1236.44									X	No	Yes	No	7 - Very Strong	No	No	Yes	No	No

Critical Facility Data and Description							Critical Facilities by Participating Jurisdictions ("x" indicates jurisdiction considers facility critical)									Hazard Vulnerability Summary ("yes" indicates facility mapped within hazard zone; "no" indicates facility is not)								
Critical Facility #	Facility Name	Facility Address	City	Asset Type	Community Lifeline Type	Building Replacement Cost (thous. $)	City of Forks	City of Port Angeles	City of Sequim	Clallam County PUD #1	Jamestown S'Klallam Tribe	Lower Elwha S'Klallam Tribe	Peninsula College	Port of Port Angeles	Unincorporated ClallamCounty	Flood	Landslide Hazard Zone	Earthquake - Fault Rupture	Earthquake - Seismic Site Class	Tsunami	Wildfire - WUI Interface and Intermix	Liquefaction	Hist. Landslide (within 1,000 ft)	Sea Level Rise (10 ft)
46	CCFD # 6 - Mora	Mora Rd and La Push Rd	Mora	Safety and Security	Safety and Security	1236.44									X	No	No	No	8 - Severe	No	No	Yes	No	No
47	CCPUD Agnew Substation	31 Spring Rd	Port Angeles	Utility, Energy - power	Energy	20000				X					X	No	No	No	7 - Very Strong	No	No	No	No	No
48	CCPUD Blyn Substation	83 Zaccardo Rd	Sequim	Utility, Energy - power	Energy	20000			X	X						No	No	No	7 - Very Strong	No	No	No	No	No
49	CCPUD Calawah Substation	513 Calawah Way	Forks	Utility, Energy - power	Energy	20000	X			X						No	Yes	No	8 - Severe	No	No	No	No	No
50	CCPUD Carlsborg Meter Barn	83 Idea Place, Carlsborg	Sequim	Utility, Energy - power	Energy	20000			X	X						No	No	No	8 - Severe	No	No	Yes	No	No
51	OPS Center, Engineering, crew, shop and storage	110 Idea Pl, Carlsborg	Sequim	Energy - power & potable water	Energy	4064.1			X	X						No	No	No	8 - Severe	No	No	Yes	No	No
52	CCPUD Carlsborg Substation Shop	112 Idea Pl, Carlsborg	Sequim	Utility, Energy - power	Energy	20000			X	X						No	No	No	8 - Severe	No	No	Yes	No	No
53	CCPUD Carlsborg Warehouse	100 Hooker Rd, Carlsborg	Sequim	Energy - power & potable water	Energy	20000			X	X						No	No	No	7 - Very Strong	No	No	Yes	No	No
54	CCPUD Deer Park Substation	101 Old Deer Park Rd	Port Angeles	Utility, Energy - power	Energy	20000				X						No	No	Yes	7 - Very Strong	No	No	No	No	No
55	CCPUD Dungeness Substation	761 Hogback Rd	Sequim	Utility, Energy - power	Energy	20000			X	X						No	No	No	7 - Very Strong	No	No	No	No	No
56	CCPUD Evergreen Substation	9701 Old Olympic Hwy	Sequim	Utility, Energy - power	Energy	20000			X	X						No	No	No	8 - Severe	No	No	Yes	No	No
57	CCPUD FAA Substation	5000 HWY 112	Sekiu	Utility, Energy - power	Energy	20000				X						No	Yes	No	7 - Very Strong	No	No	No	No	No
58	CCPUD Forks New Warehouse	241 Industrial Center	Forks	Utility - Power - Electric	Energy	20000	X			X						No	Yes	No	8 - Severe	No	No	No	No	No
59	CCPUD Forks Office	31 Spartan Ave	Forks	Utility, Energy - power	Energy	1,917.85	X			X						No	Yes	No	8 - Severe	No	No	No	No	No
60	CCPUD Forks Substation	101 La Push Road	Forks	Utility - Power - Electric	Energy	20000	X			X						No	Yes	No	8 - Severe	No	No	No	No	No
61	CCPUD Forks Substation 1 & 2	441 W East St	Forks	Utility, Energy - power	Energy	20000	X			X						No	No	No	8 - Severe	No	No	No	No	No
62	CCPUD Forks Warehouse	441 W E St	Forks	Utility, Energy - power	Energy	20000	X			X						No	No	No	8 - Severe	No	No	No	No	No
63	CCPUD Johnson Creek Substation	400 Washington Harbor Loop	Sequim	Utility, Energy - power	Energy	20000			X	X						No	No	No	7 - Very Strong	No	No	No	No	No
64	CCPUD Laird's Corner Substation	813 Power Plant Rd	Port Angeles	Utility, Energy - power	Energy	20000				X						No	No	No	8 - Severe	No	No	No	No	No
65	CCPUD Main Office	104 Hooker Road, Carlsborg	Sequim	Utility. Energy , power-Admin	Energy, water, wastewater	1,917.85			X	X						No	No	No	7 - Very Strong	No	No	No	No	No
66	CCPUD Neah Bay Substation	Backtrack Rd & Roosevelt St	Neah Bay	Utility, Energy - power	Energy	20000				X						No	No	No	8 - Severe	Yes	No	Yes	No	No
67	CCPUD Old Beaver Camp Substation	97 La Push Rd	La Push	Utility, Energy - power	Energy	20000				X						No	Yes	No	8 - Severe	No	No	No	No	No
68	CCPUD Olympic Substation	630 Carlsborg Rd	Sequim	Utility, Energy - power	Energy	20000			X	X						No	No	No	8 - Severe	No	No	Yes	No	No
69	CCPUD Prairie Power Substation	670 S 3rd Ave	Sequim	Utility, Energy - power	Energy	20000			X	X						No	No	No	8 - Severe	No	No	Yes	No	No
70	CCPUD Pysht Substation	23133 State Route 112	Clallam Bay	Utility, Energy - power	Energy	20000				X						No	No	No	7 - Very Strong	No	No	No	No	No
71	CCPUD Sekiu Substation, Office & Warehouse	15 Sekiu Airport Rd	Port Angeles	Energy - power & potable water	Energy	20000				X						No	Yes	No	7 - Very Strong	No	No	No	No	No

Critical Facility Data and Description							Critical Facilities by Participating Jurisdictions ("x" indicates jurisdiction considers facility critical)									Hazard Vulnerability Summary ("yes" indicates facility mapped within hazard zone; "no" indicates facility is not)								
Critical Facility #	Facility Name	Facility Address	City	Asset Type	Community Lifeline Type	Building Replacement Cost (thous. $)	City of Forks	City of Port Angeles	City of Sequim	Clallam County PUD #1	Jamestown S'Klallam Tribe	Lower Elwha S'Klallam Tribe	Peninsula College	Port of Port Angeles	Unincorporated ClallamCounty	Flood	Landslide Hazard Zone	Earthquake - Fault Rupture	Earthquake - Seismic Site Class	Tsunami	Wildfire - WUI Interface and Intermix	Liquefaction	Hist. Landslide (within 1,000 ft)	Sea Level Rise (10 ft)
72	CCPUD Sequim Substation	410 E Washington St	Sequim	Utility, Energy - power	Energy	20000			X	X						No	No	No	8 - Severe	No	No	Yes	No	No
73	CCPUD Silverado Substation	1201 Joyce Piedmont Rd	Port Angeles	Utility, Energy - power	Energy	20000				X						No	No	No	7 - Very Strong	No	No	No	No	No
74	CCPUD Sol Duc Rd Substation	216395 Hwy 101 W	Port Angeles	Utility, Energy - power	Energy	20000				X						No	Yes	No	7 - Very Strong	No	No	No	No	No
75	CCPUD Sunland Substation	1971 Sequim-Dungeness Way	Sequim	Utility, Energy - power	Energy	20000			X	X						No	No	No	8 - Severe	No	No	No	No	No
79	City Maintenance & Operations Shop	169 W. Hemlock	Sequim	Government Building	Safety and Security	4064.1			X							No	No	No	8 - Severe	No	No	Yes	No	No
80	City of Forks Airport	1500 S Forks Ave	Forks	Airport	Transportation	5300	X									No	No	No	8 - Severe	No	No	No	No	No
83	City of Forks Recreation Building	651 E Division Street	Forks	Park	Food, Hydration, Shelter	1,917.85	X									No	Yes	No	8 - Severe	No	No	No	No	No
84	City of Port Angeles COMMO Bldg	1022 E St	Clallam County	Communications	Communications	5000									X	No	No	No	7 - Very Strong	No	Yes	No	No	No
86	Clallam Bay Medical Ctr,	74 Bogachiel St	Clallam Bay	Health and Medical	Health and Medical	3000.7									X	No	Yes	No	7 - Very Strong	Yes	No	Yes	No	No
87	Clallam Bay Prison Reservoir	1830 Eagle Crest Way	Clallam Bay	Utility, Water, Potable	Water Systems	1500				X					X	No	Yes	No	7 - Very Strong	Yes	No	Yes	Yes	No
88	Clallam Bay Reservoir	154 Kellogg St	Clallam County	Utility - Potable Water	Water Systems	1500				X					X	No	Yes	No	7 - Very Strong	No	No	No	Yes	No
89	Clallam Bay School	16933 HWY 112	Clallam Bay	School, Shelter	Safety and Security; Food, Hydration, Shelter	3711.12									X	No	Yes	No	7 - Very Strong	No	No	Yes	No	No
90	Clallam County Courthouse, Jail & Sheriff	223 E 4th St	Port Angeles	Government Building	Safety and Security	3254.22		X							X	No	No	No	7 - Very Strong	No	No	No	No	No
92	Clallam County Fire Protection District 1	11 Spartan Ave	Forks	Fire Department	Safety and Security	1236.44	X									No	Yes	No	8 - Severe	No	No	No	No	No
93	Clallam County Juvenile Detention	1912 W 16th St	Port Angeles	Local Government and Law Enforcement	Safety and Security	1236.44									X	No	No	No	7 - Very Strong	No	No	No	No	No
94	Clallam County Maintenance Facility	1033 W Lauridsen Blvd	Clallam County	Local Government and Law Enforcement	Safety and Security	4064.1		X							X	No	No	No	7 - Very Strong	No	No	No	No	No
95	Clallam Transit	830 W Lauridsen Blvd	Port Angeles	Communications System	Communications	1,917.85		X								No	No	No	7 - Very Strong	No	Yes	No	No	No
100	Community Drainfld/ Pump Sta	369 View Ridge Drive	Sequim	Utility, Wastewater	Water Systems	525				X						No	No	No	7 - Very Strong	No	No	No	No	No
101	Congregational Church	280 Forks Avenue	Forks	Shelter	Food, Hydration, Shelter	3775.7	X									No	Yes	No	8 - Severe	No	No	No	No	No
102	Crescent School (Joyce)	50350 HWY 112	Joyce	School	Safety and Security; Food, Hydration, Shelter	7188.46									X	No	No	No	7 - Very Strong	No	No	No	No	No
103	Crescent Water Association - Access Rd Tank	48° 07' 19"N 123° 43' 21"W 174 m	Clallam County	Utility - Potable Water	Water Systems	1500									X	No	No	No	7 - Very Strong	No	No	No	No	No
104	Crescent Water Association - Filtration Plant	48° 06' 01"N 123° 49' 09"W 163 m	Clallam County	Utility - Potable Water	Water Systems	1500									X	No	No	No	7 - Very Strong	No	No	No	No	No
105	Crescent Water Association - Holly Hill Tank Reservoirs, Holly Hill Road	48° 06' 51"N 123° 36' 59"W 172 m	Port Angeles	N/A	Water Systems	1500									X	No	No	No	7 - Very Strong	No	No	No	No	No
106	Crescent Water Association - Office	50870 Hwy 112	Clallam County	Utility - Potable Water	Water Systems	1,917.85									X	No	No	No	7 - Very Strong	No	No	No	No	No

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107	Crescent Water Association - Water Line Rd Tank	48° 07' 34"N 123° 48' 52"W 170 m	Clallam County	Utility - Potable Water	Water Systems	1500									X	No	No	No	7 - Very Strong	No	No	No	No	No
109	Deer Park Rd Pump Station B	3400 Deer Park Road	Port Angeles	Utility, Water, Potable	Water Systems	525				X						No	No	No	7 - Very Strong	No	No	No	No	No
110	Deer Park Rd Pump Station C	4280 Deer Park Road	Port Angeles	Utility, Water, Potable	Water Systems	525				X						No	No	No	7 - Very Strong	No	No	No	No	No
111	Deer Park Reservoir and Pump Station A	1771 Deer Park Rd	Port Angeles	Utility, Water, Potable	Water Systems	525				X						No	No	No	7 - Very Strong	No	No	No	No	No
112	Diamond Point Airstrip	Airport Way	Sequim	Airport	Transportation	5300			X							No	No	No	7 - Very Strong	No	No	No	No	Yes
114	Diamond Point Station – Station 35	121 Sunshine Ave	Sequim	Fire Department	Safety and Security	1236.44			X							No	No	No	7 - Very Strong	No	No	No	No	No
115	Discovery Vw Dr Pump Sta. (Pond)	450 Discovery View Dr	Sequim	Utility, Wastewater	Water Systems	525				X						No	No	No	7 - Very Strong	No	No	No	Yes	Yes
116	DNR Oly Region, Forks	411 Tillicum Ln, Forks	Forks	Fire Department	Safety and Security	1236.44	X									No	Yes	No	8 - Severe	No	No	No	No	No
117	Dry Creek School	25 Rife Rd	Port Angeles	School	Safety and Security; Food, Hydration, Shelter	6069.77									X	No	No	No	8 - Severe	No	No	No	No	No
118	Dungeness – Station 31	4721 Sequim Dungeness Way	Sequim	Fire Department	Safety and Security	1236.44			X							Yes	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
119	Dungeness Community Church	45 Eberle Lane	Sequim	Shelter	Food, Hydration, Shelter	3775.7			X							No	No	No	7 - Very Strong	No	No	No	No	No
122	E St Reservoir	1018 E St	Port Angeles	Utility - Potable Water	Water Systems	1500									X	No	No	No	7 - Very Strong	No	No	No	No	No
123	Economic Development Authority Offices	257 Business Park Loop	Carlsborg	Tribal economic infrastructure, future Data Center and records storage facility	Safety and Security	1,917.85					X					No	No	No	8 - Severe	No	No	Yes	No	No
124	Education Center/ Children's Program Facility	233 Zaccardo Road	Sequim	Vulnerable population	Food, Hydration, Shelter	1,917.85					X					No	No	No	7 - Very Strong	No	No	No	No	No
127	Ellis Lookout COMMO	48° 07' 46"N 124° 18' 20"W 805 m	Beaver	Communications	Communications	5000									X	No	Yes	No	8 - Severe	No	No	No	No	No
128	Elwha Clinic	243511 HWY 101	Port Angeles	Health and Medical	Health and Medical	3000.7									X	No	No	No	8 - Severe	No	No	No	No	No
130	Collector & Pump Station	673 Crown Z Water Rd	Port Angeles	Utility - Potable Water	Water Systems	525									X	No	No	No	7 - Very Strong	No	No	Yes	Yes	No
133	Episcopal, St Andrews	510 E Park Ave	Port Angeles	Shelters	Food, Hydration, Shelter	3775.7									X	Yes	No	No	7 - Very Strong	Yes	No	No	No	Yes
134	Episcopal, St Lukes	525 N 5th	Sequim	Shelter	Food, Hydration, Shelter	3775.7			X							No	No	No	8 - Severe	No	No	Yes	No	No
135	Evaluation and Treatment	48.074434, -123.122731	Sequim	Medical Services, Mental/Behavior Health	Health and Medical	3000.7					X					No	No	No	8 - Severe	No	No	Yes	No	No
136	Evergreen - R1- Loma Vista Well, Reservoir and Pump Station	100 Burnt Mountain Pl	Sequim	Utility, Water, Potable	Water Systems	1500			X	X						No	No	No	8 - Severe	No	No	Yes	No	No
137	Evergreen- R4- Stampede Drive Reservoir	1120 Stampede Drive	Sequim	Utility, Water, Potable	Water Systems	1500			X	X						No	No	No	7 - Very Strong	No	No	No	No	No
138	Duxbury Res. & Pump Station	2294 S 7th Ave	Sequim	Utility, Water, Potable	Water Systems	1500			X	X						No	No	Yes	7 - Very Strong	No	No	No	No	No
139	Fairmount Pump Station	4400 C St	Port Angeles	Utility - Potable Water	Water Systems	525									X	No	No	No	7 - Very Strong	No	No	No	No	No

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140	Fairview Bible Church	385 O'Brien Rd	Port Angeles	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
141	Fairview-LUD#1 WTP	1257 Glass Road	Port Angeles	Utility, Water, Potable	Water Systems	30000				X						No	No	No	7 - Very Strong	No	No	No	No	No
142	Family Medical Center	461 G St	Forks	Medical Facility	Health and Medical	3000.7	X									No	No	No	8 - Severe	No	No	No	No	No
143	Family Medicine	240 West Front St	Clallam County	Health and Medical	Health and Medical	3000.7									X	No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
145	FD# 2 Port Angeles - Station 22 Dry Creek	700 Power Plant Road	Port Angeles	Safety and Security	Safety and Security	1236.44									X	No	No	No	8 - Severe	No	No	No	No	No
146	FD# 2 Port Angeles - Station 23 Black Diamond	1992 Black Diamond Road	Port Angeles	Safety and Security	Safety and Security	1236.44									X	No	No	No	7 - Very Strong	No	No	No	No	No
147	Station 24 Deer Park Rd	22 Prospect Place	Port Angeles	Safety and Security	Safety and Security	1236.44									X	No	No	No	7 - Very Strong	No	No	No	No	No
148	FD#1 Forks - Beaver	Hwy 101	Forks	Safety and Security	Safety and Security	1236.44									X	No	Yes	No	8 - Severe	No	No	No	No	No
154	Forks Alternative School	161 East E Street	Forks	School	Food, Hydration, Shelter	710.8	X									Yes	No	No	8 - Severe	No	No	No	No	No
155	Forks Elementary	301 S Elderberry Ave, Forks, WA 98331	Forks	Schools	Food, Hydration, Shelter	7703.94	X									No	Yes	No	8 - Severe	No	No	No	No	No
156	Forks High School	261 Spartan Ave, Forks, WA 98331	Forks	Schools	Food, Hydration, Shelter	17849.1	X									No	Yes	No	8 - Severe	No	No	No	No	No
157	Forks Junior High School	191 S Spartan Ave, Forks, WA 98331	Forks	Schools	Food, Hydration, Shelter	6039.04	X									No	Yes	No	8 - Severe	No	No	No	No	No
159	Forks Post Office	61 S Spartan Avenue	Forks	Government Building, USA	Communications	1,917.85	X									No	Yes	No	8 - Severe	No	Yes	No	No	No
160	Forks Transit Station	551/553 S. Forks Avenue	Forks	Transportation - Bus Station	Transportation	1971.5	X									No	No	No	8 - Severe	No	No	No	No	No
161	Franklin Elementary School	2505 S Washington St	Port Angeles	School	Safety and Security; Food, Hydration, Shelter	9189.55		X								No	No	No	7 - Very Strong	No	No	No	No	No
162	Reservoir & Pump Station	75 Round Tree Ln	Port Angeles	Utility, Water, Potable	Water Systems	1500				X						No	No	No	7 - Very Strong	No	No	No	No	No
170	Grey Wolf School	171 Carlsborg Rd	Sequim	School, Shelter	Food, Hydration, Shelter	12903.58			X							No	No	No	7 - Very Strong	No	No	Yes	No	No
178	Center/Carrie Blake Park	202 N Blake Ave	Sequim	Government Building/Shelter	Food, Hydration, Shelter	1917.85			X							No	No	No	8 - Severe	No	No	Yes	No	No
179	Haller Elementary School	350 W Fir St	Sequim	School, Shelter	Food, Hydration, Shelter	12373			X							No	No	No	8 - Severe	No	No	Yes	No	No
180	Haller Well	2510 Doe Run Road	Sequim	Utility, Water, Potable	Water Systems	400			X	X						No	No	No	7 - Very Strong	No	No	No	No	No
182	Harbor Heights Pump Station	76 Harbor Heights Rd	Port Angeles	Utility, Water, Potable	Water Systems	1971.5				X						No	No	No	7 - Very Strong	No	No	No	No	No
185	High Production Well	33 Knapp Rd	Sequim	Water supply	Water Systems	400					X					No	No	No	7 - Very Strong	No	No	No	No	No
186	High School, Sequim	601 N Sequim Ave	Sequim	School, Shelter	Food, Hydration, Shelter	33012.94			X							No	No	No	8 - Severe	No	No	Yes	No	No
191	Hillcrest Baptist Church	205 Black Diamond Rd	Port Angeles	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
192	HOH Administrative Center	2269 Lower Hoh Rd	Forks	Government Building, Tribal	Safety and Security	1917.85	X									No	No	No	8 - Severe	No	No	No	No	No
193	Hoh Tribal Offices	71 South Forks Avenue	Forks	Government Building, Tribal	Safety and Security	1,917.85	X									No	Yes	No	8 - Severe	No	No	No	No	No

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194	Hoko Pump Station	1110 Hoko-Ozette Road	Sekiu	Utility, Water, Potable	Water Systems	525				X					X	No	Yes	No	8 - Severe	No	No	Yes	No	No
195	Holgerson Well & Pump Sta	70 Coyote Meadow Lane	Sequim	Utility, Water, Potable	Water Systems	525			X	X						No	No	No	7 - Very Strong	No	No	No	No	No
197	Human Resources Office	193 Zaccardo Rd	Sequim	Tribal offices, Technology, Network	Communications	1,917.85					X					No	No	No	7 - Very Strong	No	Yes	No	No	No
201	Island View- LUD #9 Reservoir	123 Dawnsridge Road	Sekiu	Utility, Water, Potable	Water Systems	1500				X					X	No	Yes	No	7 - Very Strong	No	No	No	No	No
205	Jamestown Family Dental	48.087753, -123.110085	Sequim	Dental health, Vulnerable population, Essential facilities community gatherings	Health and Medical	3000.7					X					No	No	No	8 - Severe	No	No	Yes	No	No
206	Jamestown Family Dental Clinic and Red Cedar Hall Community Center	1031 Old Blyn Hwy	Sequim	Dental health, Vulnerable population, Essential facilities community gatherings	Health and Medical	3000.7					X					No	No	No	7 - Very Strong	No	No	Yes	No	Yes
207	Jamestown Family Health Clinic	808 N FIFTH AVE	Sequim	Medical services, primary care	Health and Medical	3000.7			X		X					No	No	No	8 - Severe	No	No	Yes	No	No
208	Jamestown Healing Clinic	526 S 9th Ave	Sequim	Medical Services, Treatment for opioid use disorder	Health and Medical	3000.7			X		X					No	No	No	8 - Severe	No	No	Yes	No	No
211	Jefferson School	218 E 12th St	Port Angeles	School	Safety and Security; Food, Hydration, Shelter	6982.36		X								No	No	No	7 - Very Strong	No	No	No	No	No
213	Jones St Reservoir & Pump Station	1211 E 9th St	Port Angeles	Utility - Potable Water	Water Systems	1500									X	No	No	No	7 - Very Strong	No	No	No	No	No
215	KFKB Radio 1490 (KBDB FM 96.7)	260 Cedar St, Forks	Forks	Communications System	Communications	2000	X									No	Yes	No	8 - Severe	No	Yes	No	No	No
216	Kingsway 4 Square Church	1023 Kitchen Dick Road	Sequim	Shelter	Food, Hydration, Shelter	3775.7			X							No	No	No	8 - Severe	No	No	No	No	No
218	KONP Radio (KONP FM 101.7)	721 East 1st St	Port Angeles	Communications System	Communications	2000		X								No	No	No	7 - Very Strong	No	Yes	No	No	No
219	KSQM FM 91.5	609 W Washington St, Suite 17	Sequim	Communications System	Communications	2000			X							No	No	No	8 - Severe	No	Yes	Yes	No	No
221	Latter Day Saints - Forks	1301 Calawah Way	Forks	Shelter	Food, Hydration, Shelter	3775.7	X									No	Yes	No	8 - Severe	No	No	No	No	No
222	Latter Day Saints - Joyce	HWY 112	Joyce	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
223	Latter Day Saints - Pa	591 Monroe Rd	Port Angeles	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
224	Latter Day Saints - Sequim	815 W Washington St	Sequim	Shelter	Food, Hydration, Shelter	3775.7			X							No	No	No	8 - Severe	No	No	Yes	No	No
231	Lost Mountain – Station 36	269160 Hwy 101	Sequim	Fire Department	Safety and Security	1236.44			X							No	No	No	7 - Very Strong	No	No	No	No	No
232	and Language Department	322 Stratton Rd	Port Angeles	Tribal Government	Safety and Security	1,917.85						X				No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
233	Lower Elwha Head Start	291 Spokwes Dr	Port Angeles	Tribal Government	Safety and Security	1,917.85						X				No	No	No	7 - Very Strong	No	No	No	No	Yes
235	Lower Elwha Klallam Tribal Police	341 Spokwes Dr	Port Angeles	Tribal Government	Safety and Security	3254.22						X			X	No	No	No	7 - Very Strong	No	No	No	No	Yes
237	Lower Elwha Klallam Tribe Counseling Services	243613 West Hwy 101	Port Angeles	Medical Facility	Health and Medical	3000.7						X				No	No	No	8 - Severe	No	No	No	No	No
240	Lower Elwha Klallam Tribe Health Clinic	243511 West Hwy 101	Port Angeles	Medical Facility	Health and Medical	3000.7						X				No	No	No	8 - Severe	No	No	No	No	No

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241	Lower Elwha Klallam Tribe Heritage Center	401 East 1st Street	Port Angeles	Tribal Government	Food, Hydration, Shelter	1917.85						X				No	No	No	7 - Very Strong	No	No	No	No	Yes
242	Tribe Housing Authority	22 Kwitsen Drive	Port Angeles	Tribal Government	Safety and Security	1,917.85						X				No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
243	Lower Elwha Klallam Tribe Public Works	465 Stratton Rd	Port Angeles	Tribal Government	Safety and Security	1,917.85						X				No	No	No	7 - Very Strong	Yes	No	Yes	No	No
246	Lower Elwha Natural Resources	760 Stratton Rd	Port Angeles	Tribal Government	Safety and Security	1917.85						X				No	No	No	7 - Very Strong	No	No	Yes	No	No
247	Lower Elwha Social Services	3080 Lower Elwha Rd	Port Angeles	Tribal Government	Safety and Security; Communications	1,917.85						X				No	No	No	7 - Very Strong	Yes	Yes	Yes	No	Yes
248	Lower Elwha Tribal Community	2851 Lower Elwha Rd	Port Angeles	Tribal Government	Safety and Security; Communications	1917.85						X				No	No	No	7 - Very Strong	Yes	Yes	Yes	No	Yes
249	and Upper Pump Station	860 Key Road	Port Angeles	Utility, Water, Potable	Water Systems	1500				X					X	No	No	Yes	7 - Very Strong	No	No	No	No	No
250	LUD #3 Upper Reservoir	5112 S. Mt Angeles Rd	Port Angeles	Utility, Water, Potable	Water Systems	1500				X						No	No	No	7 - Very Strong	No	No	No	No	No
251	Lutheran, Dungeness ELCA	925 N Sequim Ave	Sequim	Shelter	Food, Hydration, Shelter	3775.7			X							No	No	No	8 - Severe	No	No	Yes	No	No
252	Lutheran Church-Missouri Synod	382 W Cedar	Sequim	Shelter	Food, Hydration, Shelter	3775.7			X							No	No	No	8 - Severe	No	No	Yes	No	No
253	Lutheran, Holy Trinity Elca	301 Lopez	Port Angeles	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
254	Lutheran, St Matthews Lcms	132 E 13th	Port Angeles	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
255	Makah Marina	1251 Bay View Ave.	Neah Bay	Hazardous Materials	Hazardous Materials	3349.6									X	No	No	No	8 - Severe	Yes	No	Yes	No	No
256	Makah Tribal Police & Jail	113 Waadah View St	Neah Bay	Local Government and Law Enforcement	Safety and Security	3254.22									X	No	No	No	8 - Severe	Yes	No	Yes	No	No
257	Makah Tribal police COMMO	48° 22 '14"N 124° 35' 42"W 5 m	Neah Bay	Communications	Communications	2000									X	No	No	No	8 - Severe	Yes	Yes	Yes	No	No
260	Masonic Temple, Port Angeles	622 S Lincoln	Port Angeles	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
261	Masonic Temple, Sequim	700 S 5th Ave	Sequim	Shelter	Food, Hydration, Shelter	3775.7			X							No	No	No	8 - Severe	No	No	Yes	No	No
262	Mazanita Dr Pump Station	341 Manzanita Drive	Sequim	Utility, Wastewater	Water Systems	525				X						No	No	No	7 - Very Strong	No	No	No	No	No
263	McDougal St Pump Station	3500 McDougal St	Port Angeles	Utility - Potable Water	Water Systems	525		X								No	No	No	7 - Very Strong	No	No	No	Yes	No
266	Methodist, First United	110 E 7th	Port Angeles	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
267	Methodist, Trinity United	100 Blake Ave	Sequim	Shelter	Food, Hydration, Shelter	3775.7			X							No	No	No	8 - Severe	No	No	Yes	No	No
269	Middle School, Sequim	301 W Hendrickson	Sequim	School, Shelter	Food, Hydration, Shelter	17530			X							No	No	No	8 - Severe	No	No	Yes	No	No
271	Mill Creek Reservoir/ Scribner Rd Pump Station	326 Scribner Rd	Port Angeles	Utility - Potable Water	Water Systems	1500									X	No	No	No	7 - Very Strong	No	No	No	No	No
272	Monroe - LUD#2 Reservoir	178 Alderwood Creek	Port Angeles	Utility, Water, Potable	Water Systems	1500				X					X	No	No	No	7 - Very Strong	No	No	No	Yes	No
274	Mora Ranger Station	3283 Mora Rd	Forks	Government Building	Safety and Security; Communcations	1,917.85	X									No	No	No	8 - Severe	No	No	Yes	No	No
275	Mountain View Christian	255 Medsker Rd	Sequim	School, Shelter	Food, Hydration, Shelter	404.78			X							No	No	No	8 - Severe	No	No	No	No	No

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276	Mt Octopus Tower WSP MPLS	47° 44? 56?N, 124° 10? 40?W 510 m	Jefferson County	Communications	Communications	2000									X	No	No	No	8 - Severe	No	No	No	No	No
277	Mt Pleasant E. Pump Station	1210 Mt Pleasant Rd	Port Angeles	Utility, Water, Potable	Water Systems	525				X						No	No	No	7 - Very Strong	No	No	No	No	No
278	Mt Vista Well and Public Water System	Vista View Dr. and Woodcock	Dungeness	Class A public water system and water supply	Water Systems	400					X					No	No	No	7 - Very Strong	No	No	No	No	No
279	Natural Resource Lab	861 Old Blyn Highway	Sequim	Treaty Resource Protection/Management, Science, Education, Health	Health and Medical	3000.7					X					Yes	No	No	7 - Very Strong	No	No	Yes	No	Yes
280	Natural Resource Lab, Canoe Storage Shed and Barn	263 Zaccardo Road	Sequim	Treaty Resource Protection/Management, Science, Education, Health, Cultural/Historical Asset		3000.7					X					No	No	No	7 - Very Strong	No	No	No	No	No
281	Nazarene, Sequim Valley	481 Carlsborg Rd	Sequim	Shelter	Food, Hydration, Shelter	3775.7			X							No	No	No	8 - Severe	No	No	Yes	No	No
282	Clinic (Sophie Trettevick Indian Health Center)	250 Fort St	Neah Bay	Health and Medical	Health and Medical	3000.7									X	No	No	No	8 - Severe	Yes	No	Yes	No	No
283	Neah Bay Schools	3560 Deer St	Neah Bay	School	Safety and Security; Food, Hydration, Shelter	4117.26									X	No	No	No	8 - Severe	Yes	No	Yes	No	No
284	Neah Bay Tribal Fire Dept.	W 2nd & Kal Chote Ave	Neah Bay	Safety and Security	Safety and Security	1236.44									X	No	No	No	8 - Severe	Yes	No	Yes	No	No
286	North Point Tower	48° 05' 04"N 124° 04' 21"W 1,020 m	Clallam County	Communications	Communications	2000									X	No	No	No	8 - Severe	No	No	No	No	No
287	Old Olympic Hwy Well	991 Old Olympic Hwy	Port Angeles	Utility, Water, Potable	Water Systems	400				X						No	No	No	7 - Very Strong	No	No	No	No	No
289	Olympic Christian – Ahlvers	116 E Ahlvers	Port Angeles	School	Safety and Security; Food, Hydration, Shelter	1547.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
290	Olympic Christian – O'Brien	43 O'Brien Rd	Sequim	School, Shelter	Food, Hydration, Shelter	1547.7			X						X	No	No	No	7 - Very Strong	No	No	No	No	No
293	Olympic Medical Cancer Center	844 N 5th Ave	Sequim	Medical Facility	Health and Medical	7371.68			X							No	No	No	8 - Severe	No	No	Yes	No	No
294	Center - Sequim Campus	#1500, 840 N 5th Ave	Sequim	Medical Facility	Health and Medical	7371.68			X							No	No	No	8 - Severe	No	No	Yes	No	No
296	Olympic National Park Fire Services Head Quarters	3002 Mt Angeles Rd	Port Angeles	Safety and Security	Safety and Security	1236.44									X	No	No	Yes	7 - Very Strong	No	No	No	No	No
300	PA City Light 7th St Substation	1538 W 7th St	Port Angeles	Utility - Power - Electric	Energy	20000		X								No	No	No	7 - Very Strong	No	No	No	No	No
301	PA City Light A St Substation	1616 A St	Port Angeles	Utility - Power - Electric	Energy	20000		X								No	No	No	7 - Very Strong	No	No	No	No	No
302	PA City Light Airport Substation	4528 S Airport Rd	Port Angeles	Utility, Energy - power	Energy	20000				X						No	No	No	8 - Severe	No	No	No	No	No
303	PA City Light College Substation	1306 E Park	Port Angeles	Utility - Power - Electric	Energy	20000		X								No	No	Yes	7 - Very Strong	No	No	No	No	No
304	PA City Light F St Substation	1604 F St	Port Angeles	Utility - Power - Electric	Energy	20000		X								No	No	No	7 - Very Strong	No	No	No	No	No
305	PA City Light Laurel Substation	110 E 14th St	Port Angeles	Utility - Power - Electric	Energy	20000		X								No	No	No	7 - Very Strong	No	No	No	No	No
306	PA City Light Main Office	1734 W Highway 101	Port Angeles	Utility - Power - Electric	Energy	1,917.85		X								No	No	No	7 - Very Strong	No	No	No	No	No

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307	PA City Light Mill Substation	200657 Hwy 101	Port Angeles	Utility, Energy - power	Energy	20000				X						No	Yes	No	8 - Severe	No	No	No	No	No
308	PA City Light Monroe Substation	311 Gales St	Port Angeles	Utility, Energy - power	Energy	20000				X						No	No	No	7 - Very Strong	No	No	No	No	No
309	Yard, Transformer & Maint Ctr	1707 A St	Port Angeles	Utility - Power - Electric	Energy	4064.1		X								No	No	No	7 - Very Strong	No	No	No	No	No
310	PA City Light Valley Substation	206 S Valley St	Port Angeles	Utility - Power - Electric	Energy	20000		X								No	No	No	7 - Very Strong	Yes	No	No	No	Yes
311	Washington Substation	224 S Washington St	Port Angeles	Utility - Power - Electric	Energy	20000		X								No	No	No	7 - Very Strong	No	No	No	No	No
314	Panoramic Heights Well and Reservoir	5740 S Pastoral Dr	Port Angeles	Utility, Water, Potable	Water Systems	1500				X						No	No	No	7 - Very Strong	No	No	No	No	No
315	Peabody Heights Reservoir & Pumps	601 Viewcrest Ave	Port Angeles	Utility - Potable Water	Water Systems	1500									X	No	No	Yes	7 - Very Strong	No	No	No	Yes	No
317	Peninsula College	1502 E Lauridsen	Port Angeles	School	Safety and Security; Communications	70927.74							X			No	No	Yes	7 - Very Strong	No	Yes	No	No	No
318	Peninsula Evangelical Friends @ Agnew	1291 N Barr Road	Port Angeles	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
319	Pioneer Park Clubhouse	387 E Washington St	Sequim	Government Building	Food, Hydration, Shelter	1917.85			X							No	No	No	8 - Severe	No	No	Yes	No	No
322	Port Angeles Boat Haven	W Boat-haven Drive	Port Angeles	Hazardous Materials Storage	Hazardous Materials	3349.6		X								No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
323	Port Angeles Care Ctr	825 E 5th St	Clallam County	Health and Medical	Health and Medical	3000.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
324	Police Department, Vern Burton Community Ctr, PenCom, EOC	321 E 5th St	Port Angeles	Local Government and Law Enforcement	Safety and Security; Communications	3254.22									X	No	No	No	7 - Very Strong	No	Yes	No	No	No
325	Light - Albert St Substation	618 S Albert	Clallam County	Energy - Power - Electric	Energy	20000		X								No	No	No	7 - Very Strong	No	No	No	No	No
326	Port Angeles City Light - Main Office	2007 S O St	Port Angeles	Utility - Power - Electric, Admin	Energy	1,917.85		X								No	No	No	7 - Very Strong	No	No	No	No	No
327	Light - Peabody Substation	2803 S Peabody	Clallam County	Energy - Power - Electric	Energy	20000		X								No	No	Yes	7 - Very Strong	No	No	No	No	No
328	Port Angeles City Light Warehouse	1936 W 18th St, Port Angeles	Port Angeles	Utility, Energy - power	Energy	4064.1		X								No	No	No	7 - Very Strong	No	No	No	No	No
329	Port Angeles Coast Guard	1 Ediz Hook Rd	Port Angeles	Airport, Hazardous Materials Storage	Transportation; Hazardous Materials	5300		X								Yes	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
330	Port Angeles Fire Department	102 E 5th St	Port Angeles	Fire Department	Safety and Security	3254.22		X								No	No	No	7 - Very Strong	No	No	No	No	No
331	Port Angeles High School	304 E Park	Port Angeles	School	Safety and Security; Food, Hydration, Shelter	42411.36		X								No	No	Yes	7 - Very Strong	No	No	No	No	No
333	Port Angeles Vern Burton Center	308 E 4th St, Port Angeles	Port Angeles	Local Government and Law Enforcement	Safety and Security	1,917.85									X	No	No	No	7 - Very Strong	No	No	No	No	No
334	Port Angeles Water Department	2444 East Pioneer	Port Angeles	Utility - Potable Water	Water Systems	1,917.85									X	No	No	No	7 - Very Strong	No	No	No	Yes	No
335	Department Warehouse	125 North Gales Addition	Port Angeles	Utility - Potable Water	Water Systems	4064.1									X	No	No	No	7 - Very Strong	No	No	No	Yes	No
336	Port of La Push	71 Main St.	Forks	Hazardous Materials Storage	Hazardous Materials	3349.6	X								X	Yes	No	No	8 - Severe	Yes	No	Yes	No	No
337	Port of Port Angeles	Port	Port Angeles	Hazardous Materials Storage	Hazardous Materials	3349.6		X						X	X	No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes

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339	Port of Port Angeles – Fairchild Airport & Customs	1404 Airport Rd 48.116450, -123.493266	Port Angeles	Transportation / Airport	Transportation; Safety and Security	5300		X						X	X	No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
340	Marine Terminal 2 (Black Ball Ferry Dock)	115 E Railroad Ave 48.121222, -123.431663	Port Angeles	Transportation / Marine Terminal	Transportation	3349.6								X		No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
341	Port of Port Angeles – Marine Terminal 4	48.121956, -123.434635	Port Angeles	Transportation / Marine Terminal	Transportation	3349.6								X		No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
342	Marine Terminals 1 & 3	202 N Cedar Street 48.124553, -12.442967	Port Angeles	Transportation / Marine Terminal	Transportation	3349.6								X		No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
343	Port of Port Angeles – Sekiu Airport	48.265666, -124.309079	Clallam Bay / Sekiu	Transportation / Airport	Transportation	5300								X	X	No	Yes	No	7 - Very Strong	No	No	No	No	No
344	Port of Port Angeles Boat Haven	48.125997, -123.451924	Port Angeles	Transportation / Marina	Transportation	3349.6								X		No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
345	Port of Port Angeles John Wayne Marina	2577 W Sequim Bay Rd 48.063804, -123.041549	Sequim	Government Building, Hazardous Materials Storage	Transportation	3349.6			X					X	X	No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
346	Port of Port Angeles Maintenance	48.120984, -123.440478	Port Angeles	Government Building	Safety and Security; Communications	4064.1								X	X	No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
347	Port of Port Angeles Office Building	48.121145, -123.439336	Port Angeles	Government Building	Safety and Security	1,917.85		X						X		No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
348	Port of Port Angeles Rental Buildings	48.120569, -123.489686	Port Angeles	Government Building	Safety and Security	1,917.85								X	X	No	No	No	7 - Very Strong	No	No	No	No	No
349	Port Williams Well Field	702 Port Williams Rd	Sequim	Utility - Potable Water	Water Systems	400			X							No	No	No	8 - Severe	No	No	Yes	No	No
351	Presbyterian, Community	950 N 5th Ave	Sequim	Shelter	Food, Hydration, Shelter	3775.7			X							No	No	No	8 - Severe	No	No	Yes	No	No
352	Pres-Byterian, First	139 8th St	Port Angeles	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
353	Presbyterian, Neah Bay	2nd & Forth St	Neah Bay	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	8 - Severe	Yes	No	Yes	No	No
355	Pumping Station 1	48.100744, -123.091891	Sequim	Utility - Wastewater	Water Systems	525			X							No	No	No	8 - Severe	No	No	No	No	No
356	Pumping Station 10	1829 W 12th St	Clallam County	Utility - Potable Water	Water Systems	525									X	No	No	No	7 - Very Strong	No	No	No	No	No
357	Pumping Station 11	10 Eclipse Ind Way	Clallam County	Utility - Potable Water	Water Systems	525									X	No	No	No	8 - Severe	No	No	No	No	No
358	Pumping Station 12	150 N Brook Ave	Clallam County	Utility - Potable Water	Water Systems	525									X	No	No	No	7 - Very Strong	No	No	No	Yes	No
359	Pumping Station 13	740 N Masters Rd	Clallam County	Utility - Potable Water	Water Systems	525									X	No	No	No	7 - Very Strong	No	No	No	No	No
360	Pumping Station 14	1100 P St	Clallam County	Utility - Potable Water	Water Systems	525									X	No	No	No	7 - Very Strong	No	No	No	No	Yes
361	Pumping Station 15	314 Marine Drive	Clallam County	Utility - Potable Water	Water Systems	525									X	No	No	No	7 - Very Strong	Yes	No	Yes	Yes	Yes
362	Pumping Station 2	48.050684, -123.096548	Sequim	Utility - Wastewater	Water Systems	525			X						X	No	No	No	7 - Very Strong	No	No	No	No	No
363	Pumping Station 3	48.083257, -123.134295	Sequim	Utility - Wastewater	Water Systems	525			X						X	No	No	No	8 - Severe	No	No	Yes	No	No
364	Pumping Station 4	48.069674, -123.053601	Sequim	Utility - Wastewater	Water Systems	525			X						X	No	No	No	7 - Very Strong	No	No	No	No	No
365	Pumping Station 5	219 E 2nd St	Clallam County	Utility - Potable Water	Water Systems	525									X	No	No	No	7 - Very Strong	No	No	No	Yes	Yes

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366	Pumping Station 6	933 Church Ave	Port Angeles	Utility - Wastewater	Hazardous Materials; Water Systems	1050		X								No	No	No	7 - Very Strong	No	No	No	No	No
367	Pumping Station 7	2250 W 19th St	Clallam County	Utility - Potable Water	Water Systems	525									X	No	No	No	7 - Very Strong	No	No	No	No	No
368	Pumping Station 8	1312 H St	Clallam County	Utility - Potable Water	Water Systems	525									X	No	No	No	7 - Very Strong	No	No	No	No	No
369	Pumping Station 9	226 Del Guzzi Dr	Clallam County	Utility - Potable Water	Water Systems	525									X	No	No	No	7 - Very Strong	No	No	No	Yes	No
371	Quileute Tribal police	Ockalat Center	La Push	Local Government and Law Enforcement	Safety and Security	3254.22									X	No	No	No	8 - Severe	Yes	No	Yes	No	No
373	Quillayute Naval Air Station	5144 Quillayute Road	Forks	Airport	Transportation	5300	X									No	No	No	8 - Severe	No	No	No	No	No
376	Ranney Well System	175 Kincaid Rd	Sequim	Utility - Potable Water	Water Systems	400			X							No	No	No	7 - Very Strong	No	No	Yes	No	No
377	Reservoir & Pump Station	8932 Raven's Ridge Rd	Sequim	Utility - Potable Water	Water Systems	1500			X	X						No	No	Yes	7 - Very Strong	No	No	No	No	No
378	R-Corner – Station 32	256702 Hwy 101	Sequim	Fire Department	Safety and Security	1236.44			X							No	No	No	7 - Very Strong	No	No	No	No	No
380	Reservoir 1.7 MG Steel	553 Reservoir Rd	Sequim	Utility - Potable Water	Water Systems	1500			X							No	No	No	8 - Severe	No	No	No	No	No
381	Reservoir 250 KG Tank	553 Reservoir Rd	Sequim	Utility - Potable Water	Water Systems	1500			X						X	No	No	No	8 - Severe	No	No	No	No	No
382	Reservoir 500 KG Pond	553 Reservoir Rd	Sequim	Utility - Potable Water	Water Systems	1500			X						X	No	No	No	8 - Severe	No	No	No	No	No
383	Reservoir Rd Pump Station	553 Reservoir Rd	Sequim	Utility - Potable Water	Water Systems	1500			X						X	No	No	Yes	7 - Very Strong	No	No	No	Yes	No
384	Reservoir, 1 mil gallon	1700 East Division Street	Forks	Utility - Potable Water	Water Systems	1500	X									No	Yes	No	8 - Severe	No	No	No	No	No
385	Reservoir, 150,000 gallon	24 Sportsman Club Road	Forks	Utility - Potable Water	Water Systems	1500	X									No	No	No	8 - Severe	No	No	No	No	No
386	Reservoir, 750,000 gallon	401 Peterson Road	Forks	Utility - Potable Water	Water Systems	1500	X									No	Yes	No	8 - Severe	No	No	No	No	No
387	Roosevelt School	106 Monroe Rd	Port Angeles	School	Safety and Security; Food, Hydration, Shelter	11608.97		X								No	No	Yes	7 - Very Strong	No	No	No	No	No
394	Sekiu & DOC Pump Station	10 Sekiu Airport Rd	Clallam County	Utility - Potable Water	Water Systems	525				X					X	No	Yes	No	7 - Very Strong	No	No	No	Yes	No
396	Sekiu Heights Reservoir	468 Sekiu Airport Rd	Clallam County	Utility - Potable Water	Water Systems	1500				X					X	No	Yes	No	7 - Very Strong	No	No	No	Yes	No
397	Sekiu Reservoir & Pump Station	174 Sekiu Airport Rd	Sekiu	Utility, Water, Potable	Water Systems	1500				X						No	Yes	No	7 - Very Strong	No	No	No	Yes	No
399	Senior Center - Sequim	921 E Hammond St	Sequim	Government Building	Food, Hydration, Shelter	1917.85			X							No	No	No	8 - Severe	No	No	Yes	No	No
400	Sequim – Station 34, HQ	323 N 5th Avenue	Sequim	Fire Department	Safety and Security	1236.44			X							No	No	No	8 - Severe	No	No	Yes	No	No
405	Sequim Civic Center & Police Department	152 W Cedar Street	Sequim	Government Building	Food, Hydration, Shelter	1917.85			X						X	No	No	No	8 - Severe	No	No	Yes	No	No
407	Sequim Medical Plaza	777 N 5th Ave	Sequim	Medical Facility	Health and Medical	3000.7			X							No	No	No	8 - Severe	No	No	Yes	No	No
409	Sequim Transit Center	190 W Cedar Street	Sequim	Government Building	Transportation	1971.5			X							No	No	No	8 - Severe	No	No	Yes	No	No
410	Sequim Valley Airport	468 Dorothy Hunt Ln	Sequim	Airport	Transportation	5300			X							No	No	No	8 - Severe	No	No	No	No	No
412	Seven Cedars Resort – Casino and Hotel	270756 US-101	Sequim	Economic asset, Critical Facility	Food, Hydration, Shelter	27618.3					X					No	No	No	7 - Very Strong	No	No	No	No	Yes

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413	Seven Cedars Resort Storage facilities–Water Tower	Enterpirse Ln	Sequim	Water supply and storage infrastructure	Water Systems	1500					X					No	No	No	7 - Very Strong	No	No	No	Yes	No
414	Seventh Day Adventist - Forks	1141 E Division St	Forks	Shelter	Food, Hydration, Shelter	3775.7	X									No	Yes	No	8 - Severe	No	No	No	No	No
415	Seventh Day Adventist - PA	124 W 9th	Port Angeles	Shelters	Food, Hydration, Shelter	3775.7									X	No	No	No	7 - Very Strong	No	No	No	No	No
416	Seventh Day Adventist - Sequim	30 Sanford Lane	Sequim	Shelter	Food, Hydration, Shelter	3775.7			X							No	No	No	8 - Severe	No	No	Yes	No	No
419	Silberhorn Well Field	130 W Silberhorn	Sequim	Utility - Potable Water	Water Systems	400			X							No	No	No	8 - Severe	No	No	Yes	No	No
422	Smithfield Dr Well & Pump Station	161 Smithfield Dr	Sequim	Utility - Potable Water	Water Systems	400			X	X						No	No	No	8 - Severe	No	No	Yes	No	No
423	Social & Community Services Offices	70-72 Zaccardo Road	Sequim	Vulnerable populations, Elder Services, Youth Services, Family services, food bank essential facility, offices and records	Food, Hydration, Shelter	1,917.85					X					No	No	No	7 - Very Strong	No	No	No	No	Yes
424	Solana Lower Pump Station	213 Tamerlane Loop	Sequim	Utility - Potable Water	Water Systems	525			X						X	No	No	Yes	7 - Very Strong	No	No	No	No	No
425	Solana Upper Pump Station	262 Simdars Rd	Sequim	Utility - Potable Water	Water Systems	525			X						X	No	No		7 - Very Strong	No	No	No	No	No
427	Spruce Street Pump Station	1000 Spruce St	Clallam County	Utility - Potable Water	Water Systems	525									X	No	No	No	7 - Very Strong	No	No	No	No	No
428	Stevens Middle School	1139 W 14th	Port Angeles	School	Safety and Security; Food, Hydration, Shelter	15992.28		X								No	No	No	7 - Very Strong	No	No	No	No	No
429	Storage Building - Bus Barn (Gesdahl)	233 Zaccardo Road	Sequim	Tribal Government Storage	Safety and Security	4064.1					X					No	No	No	7 - Very Strong	No	No	No	No	No
430	Storm King Ranger Station	240000 HWY 101	Port Angeles	Local Government and Law Enforcement	Safety and Security	1,917.85									X	Yes	No	No	7 - Very Strong	No	No	No	No	No
432	Striped Peak Tower	48° 09' 01"N 123° 40' 12"W 294 m	Clallam County	Communications	Communications	2000									X	No	No	No	7 - Very Strong	No	No	No	No	No
436	Tesoro Port Angeles Marine Terminal	1720 Ediz Hook Rd	Port Angeles	Hazardous Materials Storage	Hazardous Materials	3349.6		X						X	X	No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
438	Three Rivers Fire Department	7810 La Push Rd	Forks	Fire Department	Safety and Security	1236.44	X									No	No	No	8 - Severe	No	No	Yes	No	No
440	Township Line Rd Reservoir	496 Township Line Rd	Port Angeles	Utility, Water, Potable	Water Systems	1500				X						No	No	No	7 - Very Strong	No	No	No	No	No
442	Treatment Plant	Confidential 47.95075646126379, -124.40852390660005	Forks	Utility - Wastewater	Hazardous Materials; Water Systems	200000	X									No	Yes	No	8 - Severe	No	No	No	No	No
443	Tribal Gaming Agency Office	192 Correia Rd	Sequim	Tribal offices and gaming related records	Safety and Security	1,917.85					X					No	No	No	7 - Very Strong	No	No	No	No	No
444	Tribal Government Campus and Administration	1033 Old Blyn Hwy	Sequim	Tribal Government, Offices/Tribal records	Safety and Security; Communications	1,917.85					X					No	No	No	7 - Very Strong	No	Yes	Yes	No	Yes
445	Tribal Planning Office - Information Systems Office & Exercise Room	931 Old Blyn Highway	Sequim	Tribal offices, Technology, Network, Exercise facility/Economic	Communications; Safety and Security; Food, Hydration, Shelter	1,917.85					X					No	No	No	7 - Very Strong	No	Yes	Yes	No	Yes
446	Tsunami Warning System COMMO	850 Ediz Hook Rd	Clallam County	Communications	Communications	2000									X	Yes	No	No	7 - Very Strong	Yes	No	Yes	No	Yes

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451	USCG Air Sta/SFO COMMO	48° 08' 24"N 123° 24' 43"W 3 m	Port Angeles	Communications	Communications	2000									X	Yes	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
452	USCG Slip Point COMMO	48° 15' 37"N 124° 14' 33"W 140 m	Clallam Bay	Communications	Communications	2000									X	No	Yes	No	7 - Very Strong	No	Yes	No	No	No
453	Van Riper's Marina	48° 15' 47"N 124° 17' 57"W 7 m	Sekiu / Clallam Bay	Hazardous Materials	Hazardous Materials	3349.6									X	Yes	No	No	7 - Very Strong	Yes	No	No	No	No
457	Warehouse- Costco	955 W Washington Street	Sequim	Commercial	Food, Hydration, Shelter	4064.1			X							No	No	No	8 - Severe	No	No	Yes	No	No
458	Wastewater Treatment	1509 Columbia St	Port Angeles	Utility - Wastewater	Hazardous Materials; Water Systems	151251.1		X								No	No	No	7 - Very Strong	No	No	No	No	No
459	Water Reclamation Facility	247 Schmuck Road	Sequim	Utility - Wastewater	Water Systems	151251.1			X							No	No	No	7 - Very Strong	No	No	No	No	No
460	Water Street Pump Station	520 N Jones St	Clallam County	Utility - Potable Water	Water Systems	525									X	No	No	No	7 - Very Strong	No	No	No	Yes	Yes
461	Water Treatment Facility	231 Stratton Rd	Port Angeles	Utility - Potable Water	Water Systems	200000						X				No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
462	Water Treatment Plant	3501 W 18th	Port Angeles	Utility - Potable Water	Water Systems	200000		X								No	No	No	7 - Very Strong	No	No	No	Yes	Yes
463	West End Outreach Services (Forks Community Hospital)	530 Bogachiel Way	Forks	Medical Facility	Health and Medical	37443.93	X									No	No	No	8 - Severe	No	No	No	No	No
465	Westport Shipyard	637 Marine View Dr	Port Angeles	Hazardous Materials Storage	Hazardous Materials	3349.6		X								No	No	No	7 - Very Strong	Yes	No	Yes	No	Yes
467	WSP - WA State Patrol - Port Angeles	62 Old Olympic HWY	Port Angeles	Local Government and Law Enforcement	Safety and Security; Communications	3254.22									X	No	No	No	7 - Very Strong	No	Yes	No	No	No

Appendix E: HAZUS Results

APPENDIX E.1

Flood HAZUS Results

Hazus: Flood Global Risk Report

Region Name: ClallamWA

Flood Scenario: ClallamWA_flood100

Print Date: Tuesday, July 23, 2024

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Washington

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is approximately 34 square miles and contains 2,014 census blocks. The region contains over 34 thousand households and has a total population of 77,054 people. The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 40,033 buildings in the region with a total building replacement value (excluding contents) of 15,115 million dollars. Approximately 90.75% of the buildings (and 64.14% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 40,033 buildings in the region which have an aggregate total replacement value of 15,115 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	9,695,704	64.1%
Commercial	2,996,841	19.8%
Industrial	1,147,087	7.6%
Agricultural	56,206	0.4%
Religion	196,378	1.3%
Government	261,563	1.7%
Education	761,515	5.0%
Total	**15,115,294**	**100%**

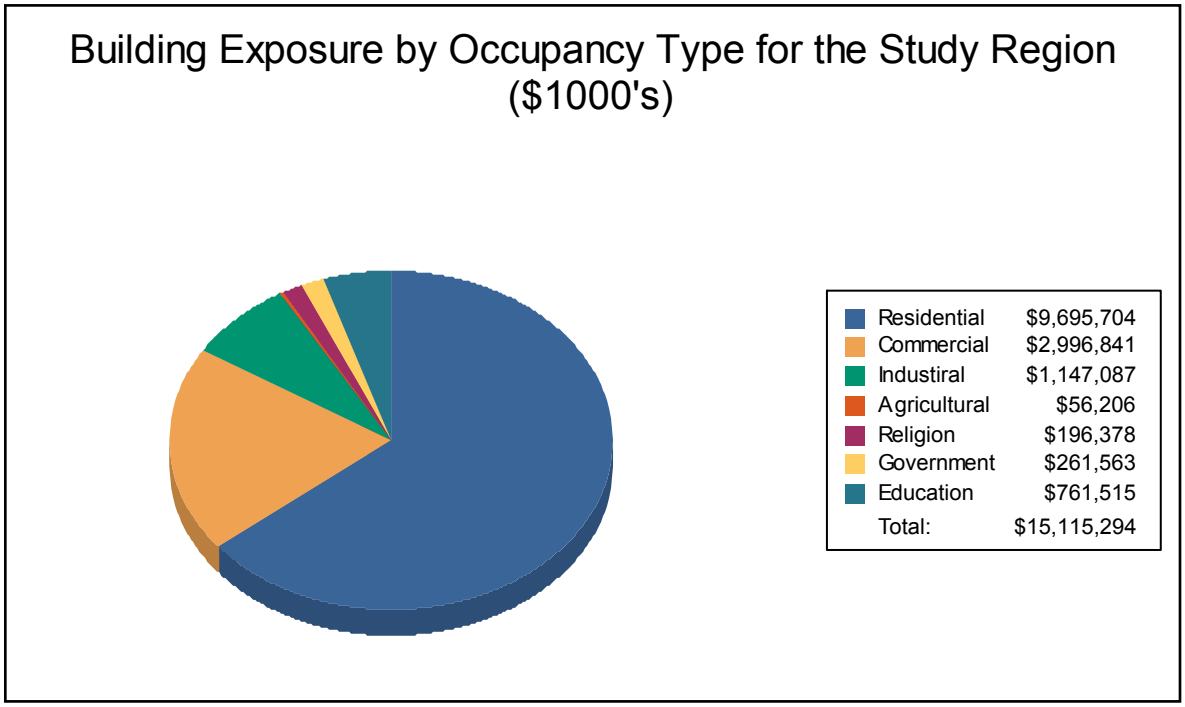
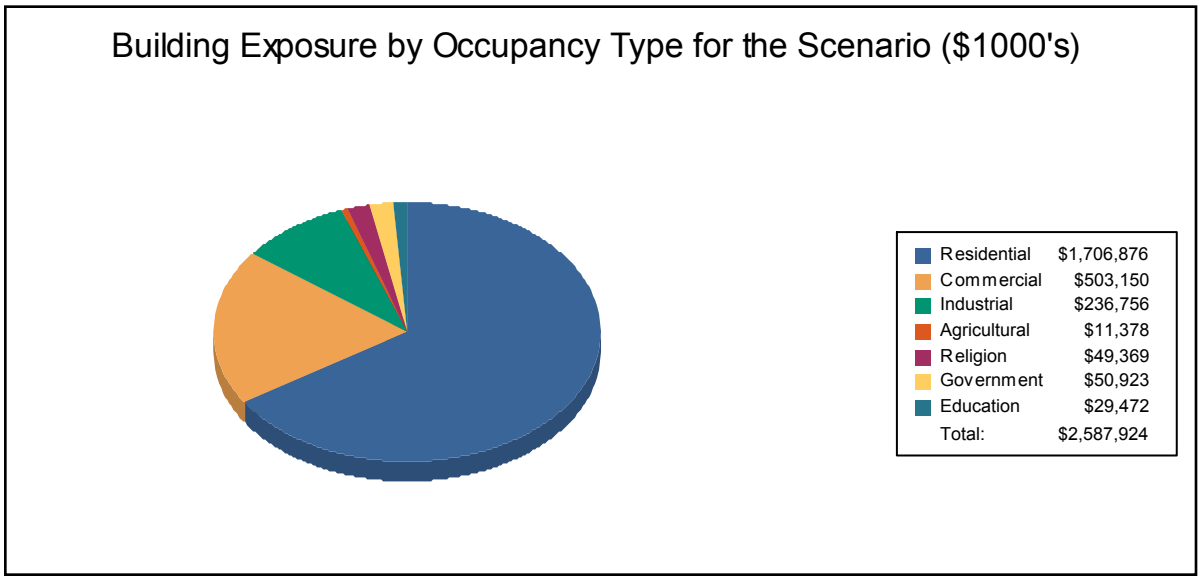


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,706,876	66.0%
Commercial	503,150	19.4%
Industrial	236,756	9.1%
Agricultural	11,378	0.4%
Religion	49,369	1.9%
Government	50,923	2.0%
Education	29,472	1.1%
Total	**2,587,924**	**100%**



Essential Facility Inventory

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 163 beds.
There are 34 schools, 19 fire stations, 6 police stations and 2 emergency operation centers.

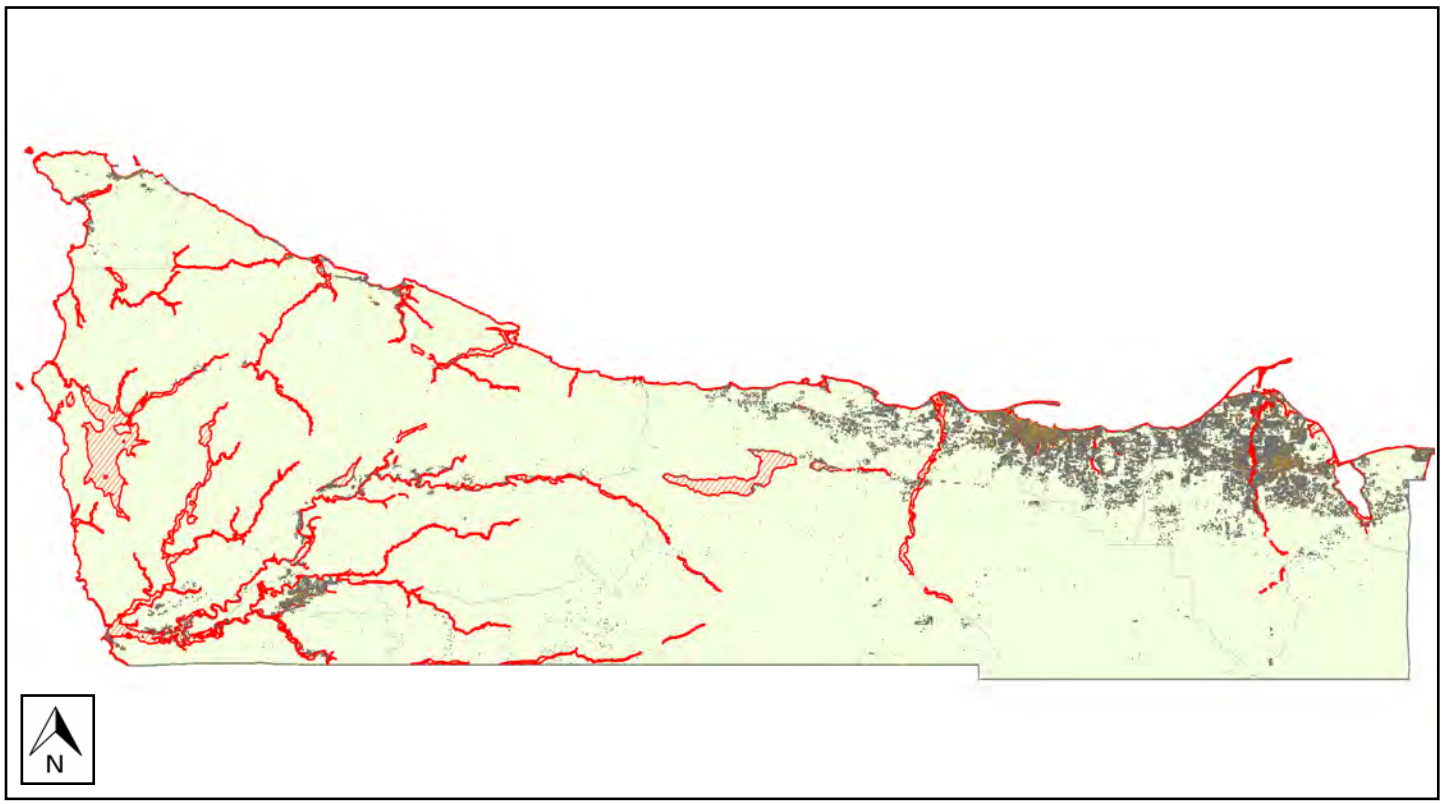
Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	ClallamWA
Scenario Name:	ClallamWA_flood100
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 42 buildings will be at least moderately damaged. This is over 39% of the total number of buildings in the scenario. There are an estimated 5 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

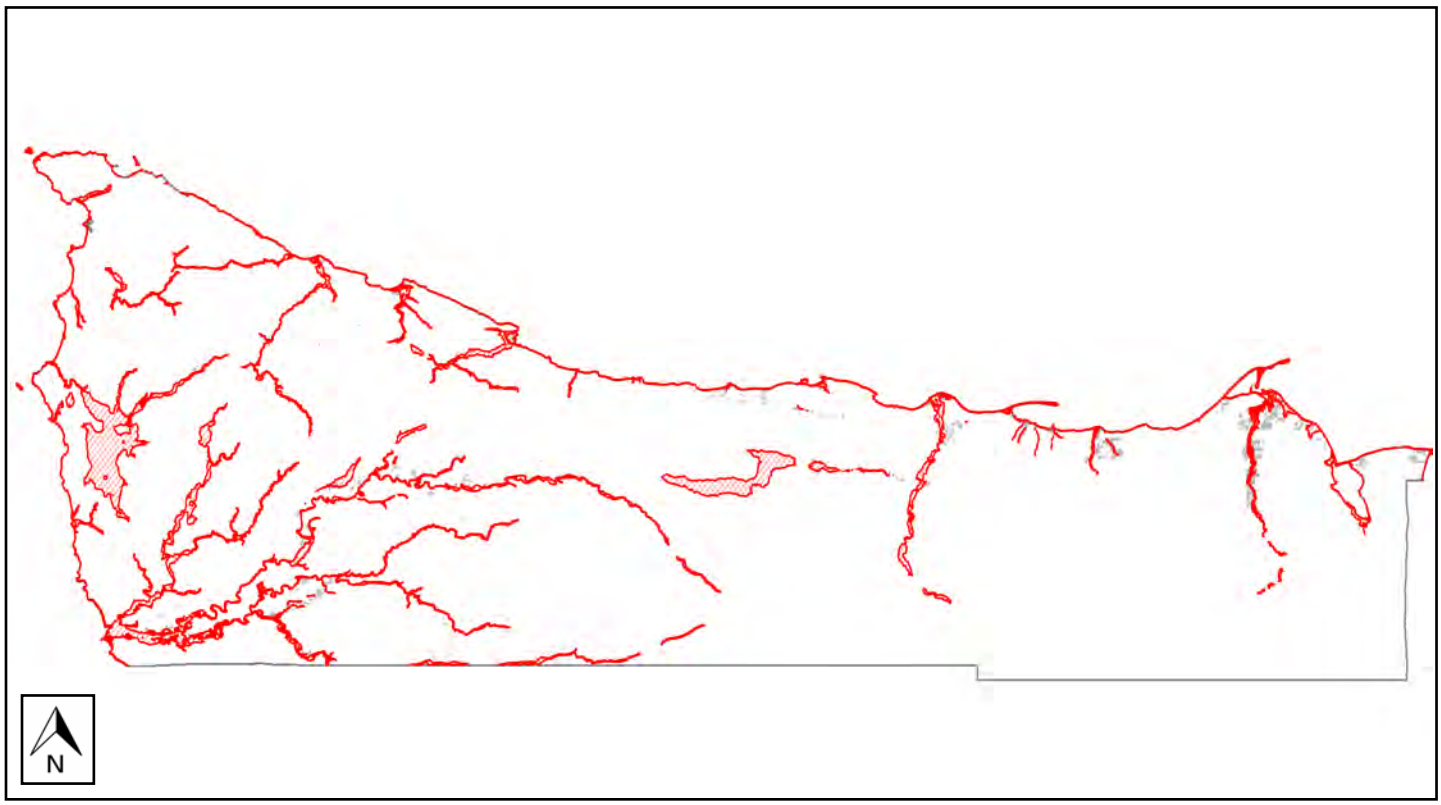


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	31	42	26	36	7	10	3	4	1	1	5	7
Total	**31**		**26**		**7**		**3**		**1**		**5**	

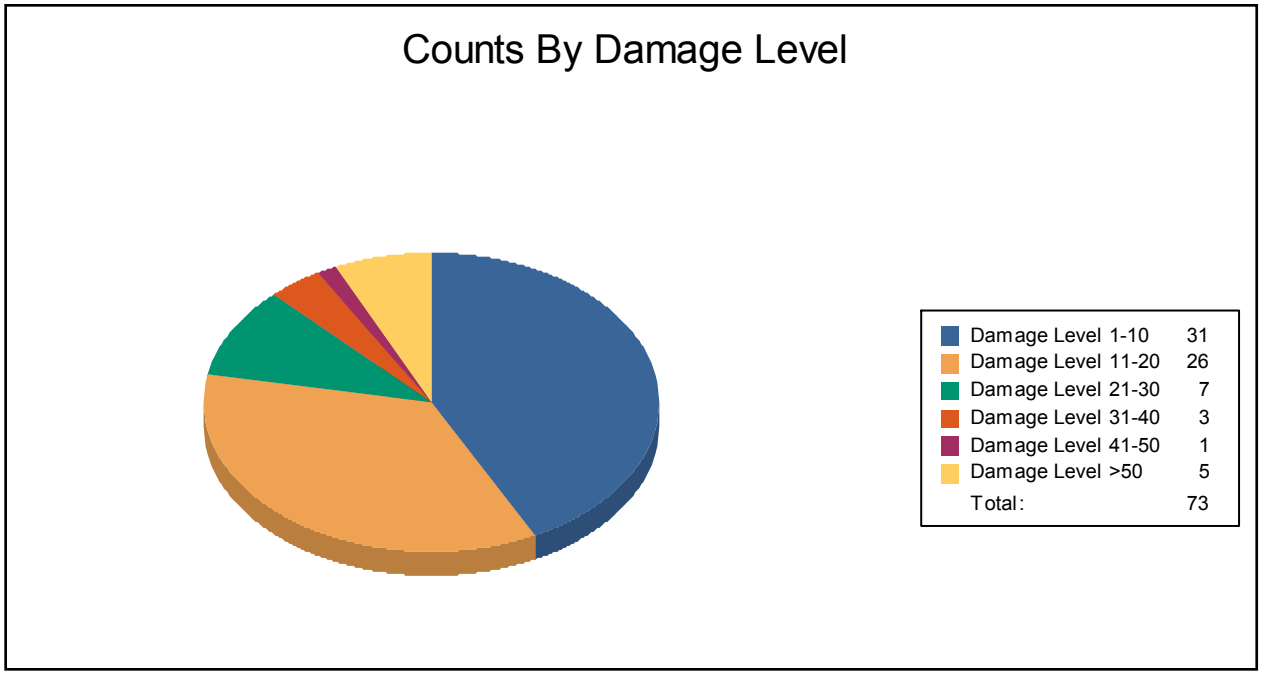


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	1	17	0	0	1	17	4	67
Masonry	0	0	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	31	46	26	39	6	9	3	4	0	0	1	1

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 163 hospital beds available for use. On the day of the scenario flood event, the model estimates that 163 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	2	0	0	0
Fire Stations	19	0	0	0
Hospitals	2	0	0	0
Police Stations	6	0	0	0
Schools	34	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

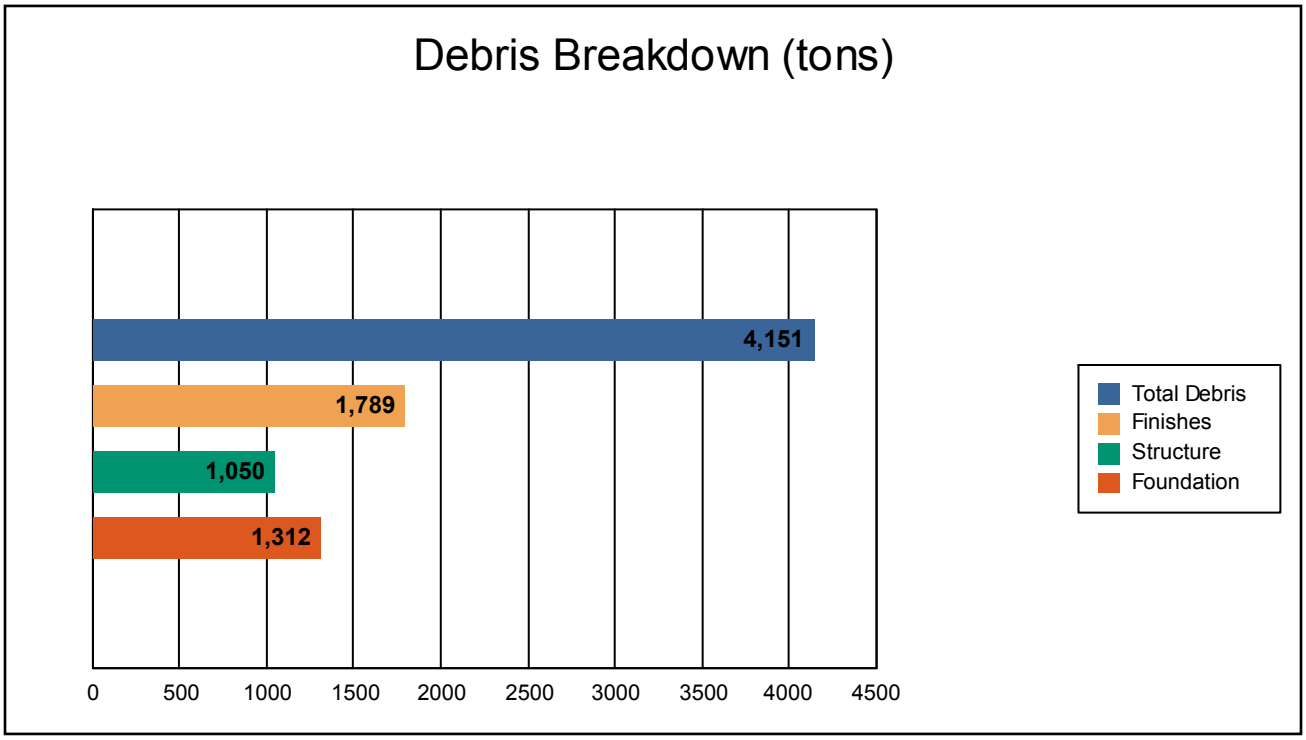
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

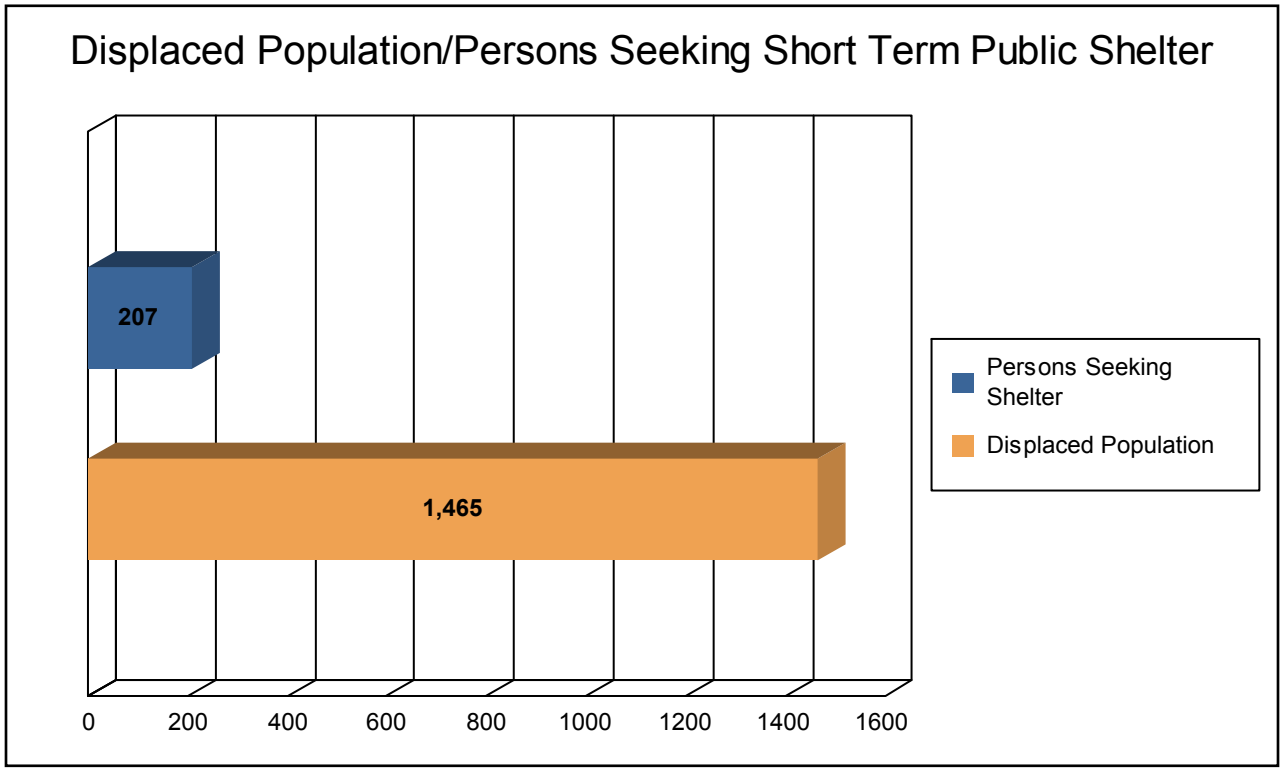


The model estimates that a total of 4,151 tons of debris will be generated. Of the total amount, Finishes comprises 43% of the total, Structure comprises 25% of the total, and Foundation comprises 32%. If the debris tonnage is converted into an estimated number of truckloads, it will require 167 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 488 households (or 1,465 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 207 people (out of a total population of 77,054) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 187.42 million dollars, which represents 7.24 % of the total replacement value of the scenario buildings.

Building-Related Losses

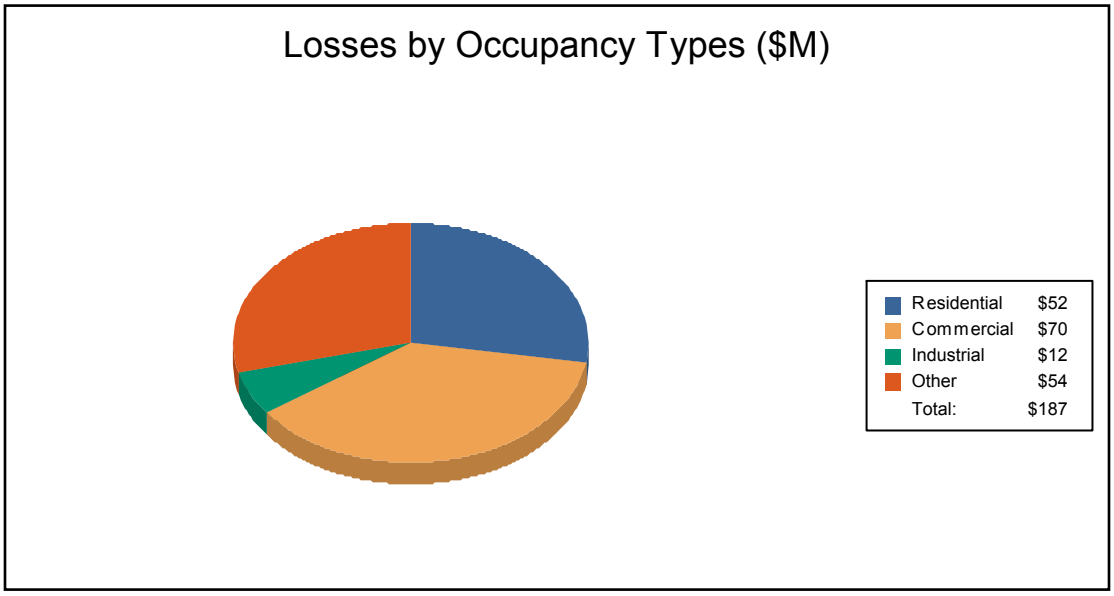
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 78.68 million dollars. 58% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 27.67% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	21.17	7.44	2.77	0.38	31.76
	Content	12.52	22.50	7.30	2.06	44.39
	Inventory	0.00	1.33	1.09	0.12	2.53
	Subtotal	**33.69**	**31.27**	**11.16**	**2.56**	**78.68**
Business Interruption						
	Income	1.84	13.97	0.19	1.63	17.62
	Relocation	7.71	3.19	0.18	1.96	13.04
	Rental Income	4.26	1.67	0.07	0.70	6.69
	Wage	4.36	19.64	0.32	47.07	71.39
	Subtotal	**18.16**	**38.46**	**0.75**	**51.36**	**108.74**
ALL	**Total**	**51.85**	**69.73**	**11.91**	**53.92**	**187.42**



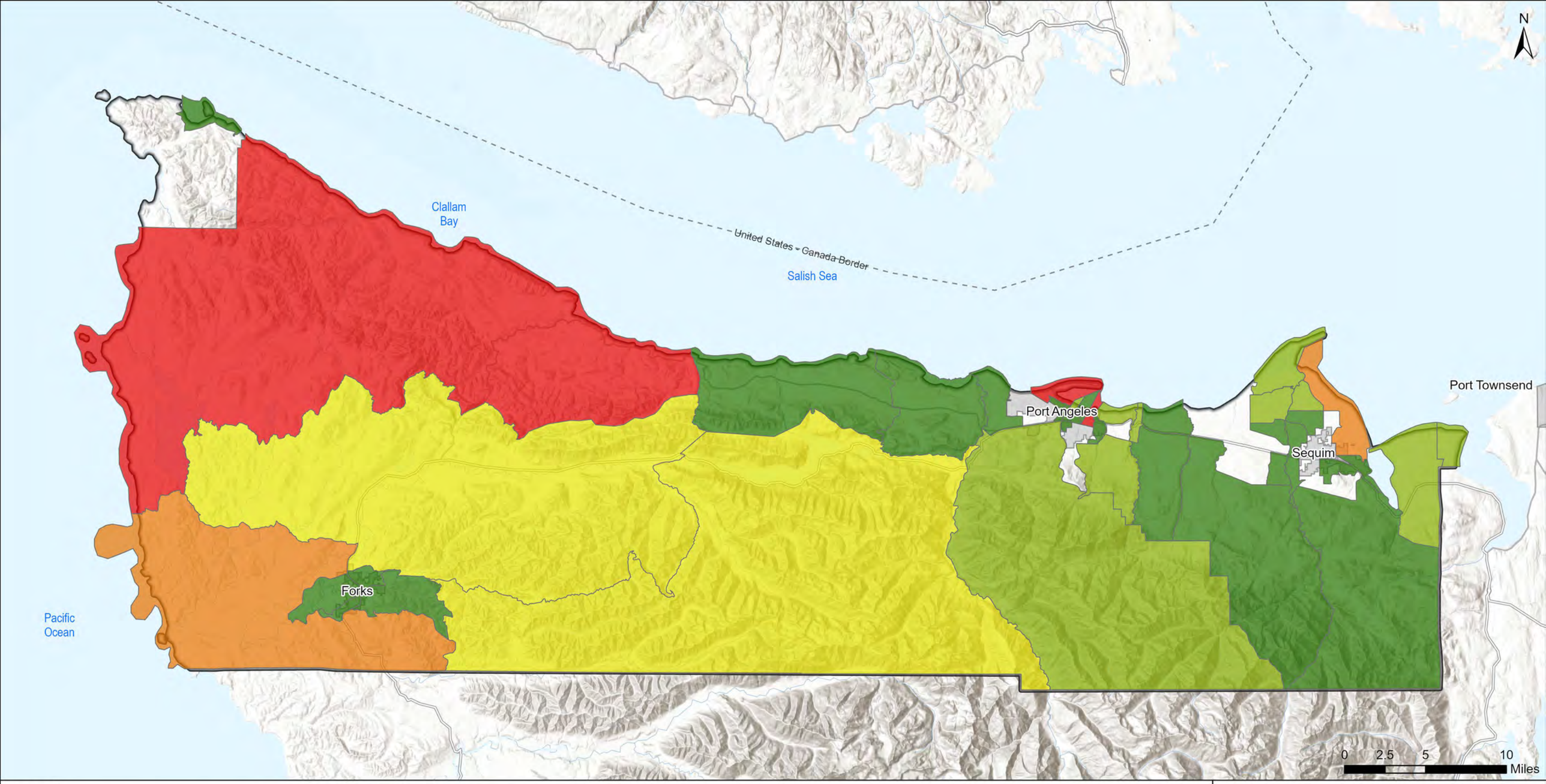
Appendix A: County Listing for the Region

Washington

- Clallam

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Washington				
Clallam	77,054	9,695,704	5,419,590	15,115,294
Total	**77,054**	**9,695,704**	**5,419,590**	**15,115,294**
Total Study Region	**77,054**	**9,695,704**	**5,419,590**	**15,115,294**



Legend

- County Boundary
- City Limit

Hazus Total Economic Loss - Flood

Block Groups ($1,000s)

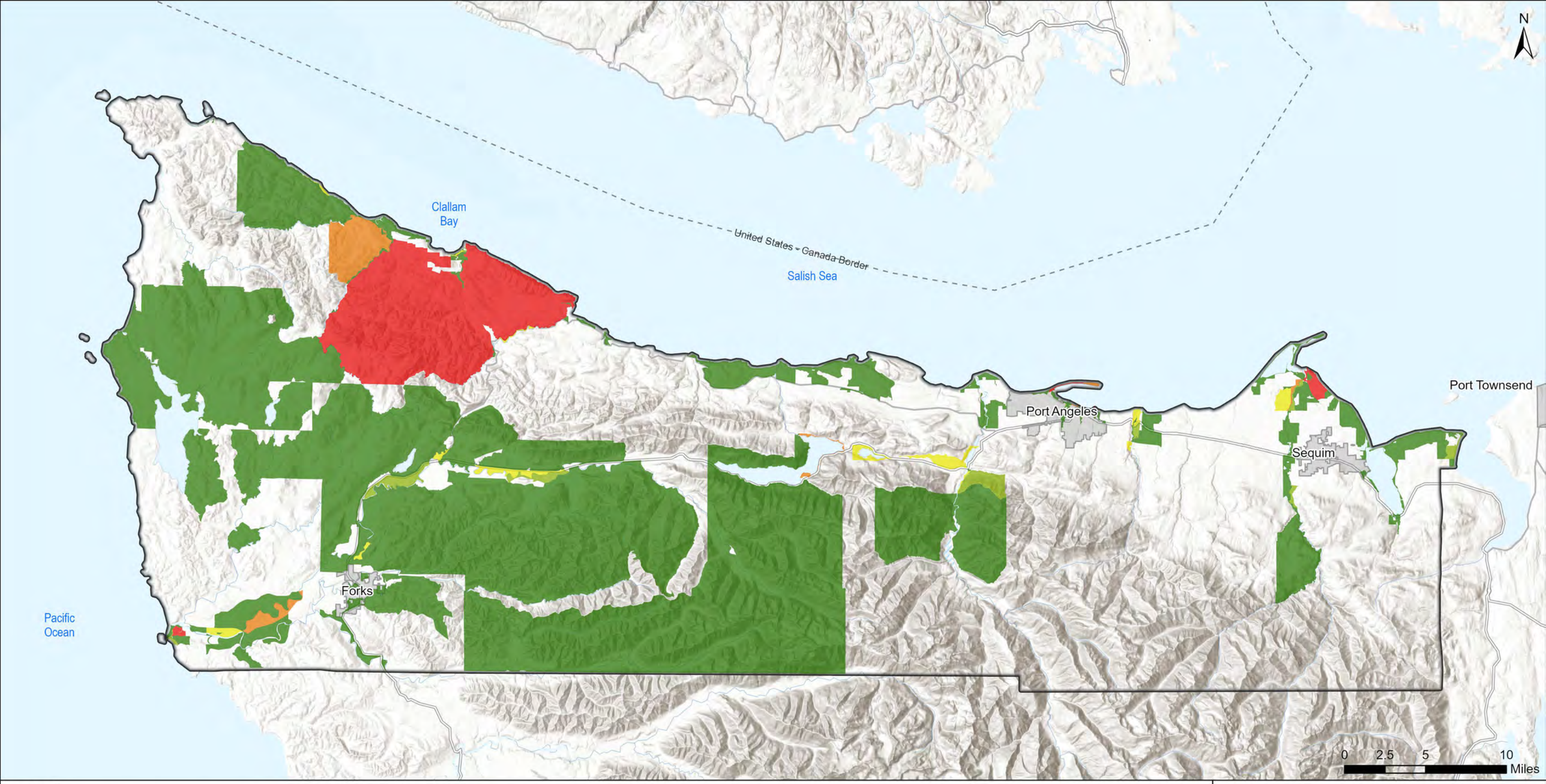
- Less than 1,000
- 1,001 - 5,000
- 5,001 - 10,000
- 10,001 - 20,000
- Greater than 20,000

Clallam County, WA

July 24, 2024

Coordinate System: Washington State Plane North

Data Source: FEMA Hazus 6.1 2024



Legend

- County Boundary
- City Limit

Hazus Total Economic Loss - Flood

Census Blocks ($1,000s)

- 0 - 500
- 501 - 1,000
- 1,001 - 3,000
- 3,001 - 5,000
- 5,001 - 33,385

Clallam County, WA

July 24, 2024

Coordinate System: Washington State Plane North

Data Source: FEMA Hazus 6.1 2024

APPENDIX E.2

Earthquake HAZUS Results

Hazus: Earthquake Global Risk Report

Region Name: ClallamWA

Earthquake Scenario: M9.3-Cascadia Megathrust - whole CSZ Cha

Print Date: July 23, 2024

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Washington

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 1,762.86 square miles and contains 24 census tracts. There are over 34 thousand households in the region which has a total population of 77,155 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 40 thousand buildings in the region with a total building replacement value (excluding contents) of 15,117 (millions of dollars). Approximately 91.00 % of the buildings (and 64.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 2,444 and 1,371 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 40 thousand buildings in the region which have an aggregate total replacement value of 15,117 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 69% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 163 beds. There are 34 schools, 19 fire stations, 6 police stations and 2 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes no hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 3,815.00 (millions of dollars). This inventory includes over 219.34 miles of highways, 142 bridges, 6,979.24 miles of pipes.

Table 1: Transportation System Lifeline Inventory

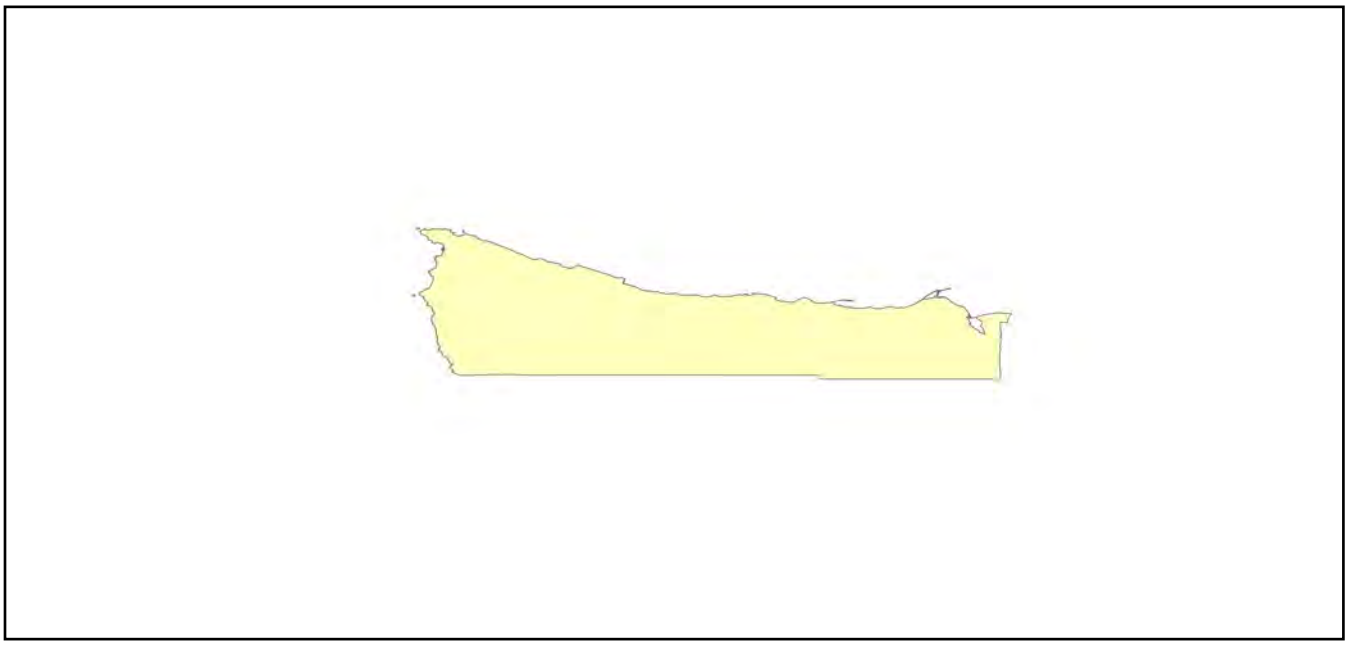
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	142	267.0379
	Segments	44	1967.8770
	Tunnels	3	11.5115
		Subtotal	**2246.4264**
Railways	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	1	2.0503
		Subtotal	**2.0503**
Ferry	Facilities	1	1.3310
		Subtotal	**1.3310**
Port	Facilities	38	127.4120
		Subtotal	**127.4120**
Airport	Facilities	6	31.8000
	Runways	6	35.9167
		Subtotal	**67.7167**
		Total	**2,444.90**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	112.3295
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**112.3295**
Waste Water	Distribution Lines	NA	67.3977
	Facilities	7	1058.7577
	Pipelines	0	0.0000
		Subtotal	**1126.1554**
Natural Gas	Distribution Lines	NA	44.9318
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**44.9318**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	1	87.4152
		Subtotal	**87.4152**
Communication	Facilities	5	0.5500
		Subtotal	**0.5500**
		Total	**1,371.40**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	M9.3-Cascadia Megathrust - whole CSZ Cha
Type of Earthquake	
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	0.00
Latitude of Epicenter	0.00
Earthquake Magnitude	9.34
Depth (km)	0.00
Rupture Length (Km)	0.00
Rupture Orientation (degrees)	0.00
Attenuation Function	

Direct Earthquake Damage

Building Damage

Hazus estimates that about 15,521 buildings will be at least moderately damaged. This is over 39.00 % of the buildings in the region. There are an estimated 3,086 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

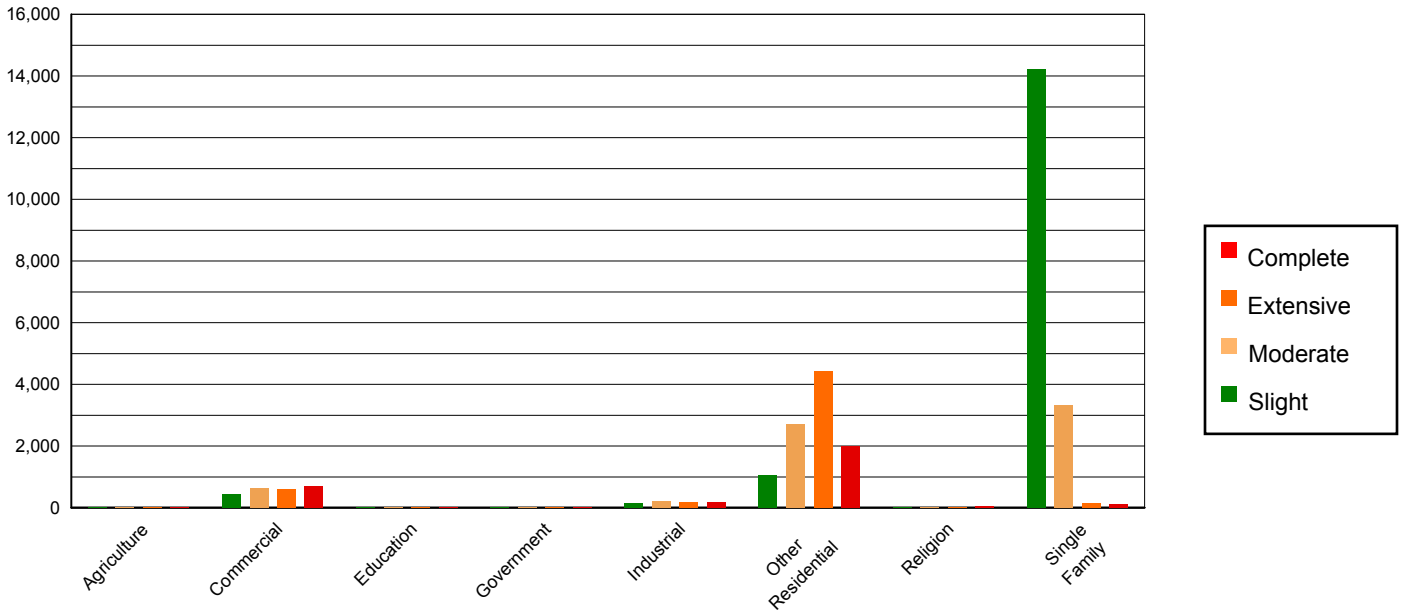


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	14.80	0.17	29.44	0.19	30.18	0.43	26.88	0.49	24.70	0.80
Commercial	175.02	2.04	429.05	2.70	631.92	9.02	589.68	10.86	685.33	22.21
Education	7.81	0.09	8.49	0.05	8.73	0.12	14.08	0.26	16.89	0.55
Government	11.50	0.13	21.71	0.14	35.91	0.51	30.45	0.56	32.43	1.05
Industrial	53.75	0.63	134.49	0.85	221.54	3.16	169.84	3.13	173.38	5.62
Other Residential	480.88	5.59	1062.58	6.68	2713.84	38.74	4429.54	81.56	2005.15	64.97
Religion	7.69	0.09	19.44	0.12	28.82	0.41	29.88	0.55	38.18	1.24
Single Family	7845.72	91.26	14208.76	89.28	3333.56	47.59	140.94	2.59	110.03	3.57
Total	**8,597**		**15,914**		**7,004**		**5,431**		**3,086**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	8436.00	98.13	15385.54	96.68	3681.06	52.55	177.18	3.26	38.12	1.24
Steel	14.18	0.16	54.09	0.34	221.50	3.16	237.23	4.37	317.23	10.28
Concrete	17.19	0.20	80.98	0.51	202.25	2.89	239.02	4.40	322.27	10.44
Precast	17.02	0.20	62.57	0.39	209.93	3.00	147.43	2.71	147.04	4.76
RM	109.21	1.27	206.02	1.29	403.94	5.77	250.30	4.61	156.92	5.08
URM	0.08	0.00	2.01	0.01	41.71	0.60	170.50	3.14	271.27	8.79
MH	3.50	0.04	122.75	0.77	2244.10	32.04	4209.63	77.51	1833.23	59.40
Total	**8,597**		**15,914**		**7,004**		**5,431**		**3,086**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 163 hospital beds available for use. On the day of the earthquake, the model estimates that only 3 hospital beds (2.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 24.00% of the beds will be back in service. By 30 days, 74.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	2	2	0	0
Schools	34	31	0	0
EOCs	2	0	0	0
PoliceStations	6	1	0	0
FireStations	19	0	0	1

Transportation Lifeline Damage

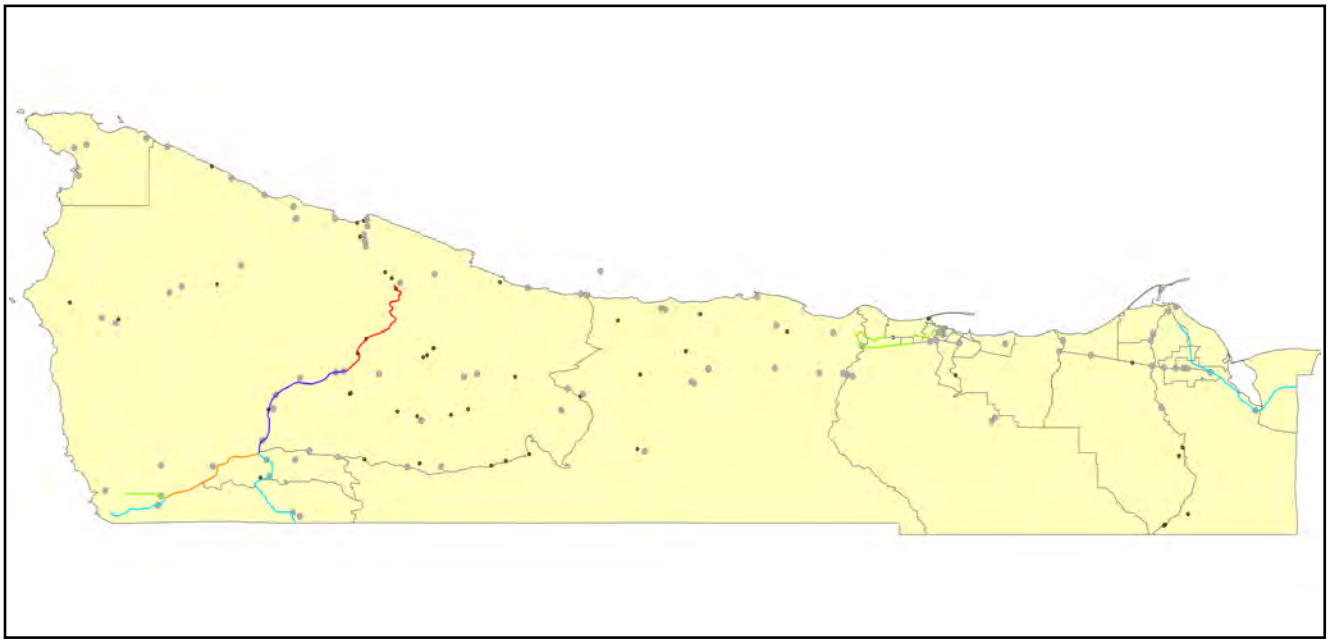


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	44	0	0	44	44
	Bridges	142	21	0	121	129
	Tunnels	3	0	0	3	3
Railways	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	1	1	0	1	1
Port	Facilities	38	28	0	38	38
Airport	Facilities	6	5	0	6	6
	Runways	6	0	0	6	6

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	7	7	0	0	7
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	1	1	0	0	0
Communication	5	5	0	0	5

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	3,490	0	0
Waste Water	2,094	0	0
Natural Gas	1,396	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	34,113	0	0	0	0	0
Electric Power		25,902	16,792	6,952	605	34

Induced Earthquake Damage

Fire Following Earthquake

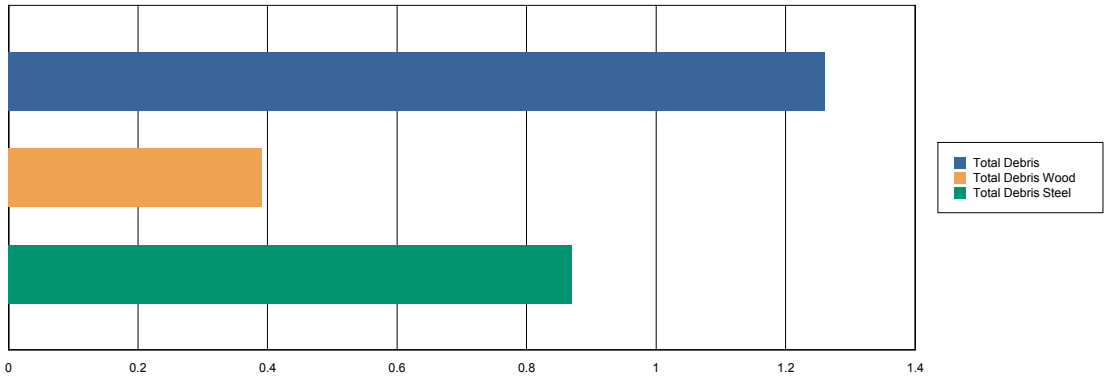
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,261,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 31.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 50,440 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



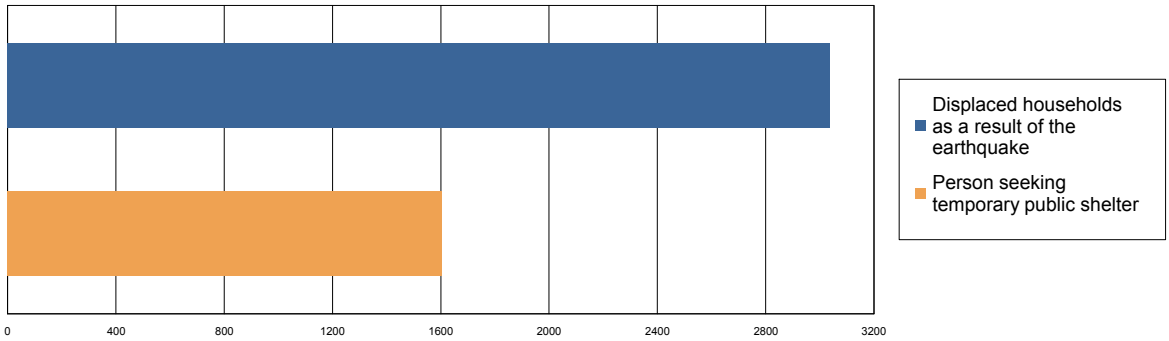
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.39	0.87	1.26	50,440 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 3,037 households to be displaced due to the earthquake. Of these, 1,603 people (out of a total population of 77,155) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
3,037	1,603

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	16.80	5.38	0.92	1.83
	Commuting	0.02	0.04	0.05	0.01
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.49	0.15	0.02	0.05
	Industrial	9.97	3.12	0.52	1.03
	Other-Residential	425.62	103.98	10.93	20.40
	Single Family	67.09	13.67	1.92	3.79
	Total	**520**	**126**	**14**	**27**
2 PM	Commercial	1067.08	339.95	58.49	115.06
	Commuting	0.19	0.32	0.47	0.09
	Educational	597.75	189.02	32.84	64.02
	Hotels	0.10	0.03	0.00	0.01
	Industrial	73.53	22.90	3.83	7.49
	Other-Residential	151.57	37.05	4.00	7.29
	Single Family	24.27	5.13	0.75	1.41
	Total	**1,914**	**594**	**100**	**195**
5 PM	Commercial	667.43	211.83	36.52	71.26
	Commuting	3.06	5.01	7.33	1.48
	Educational	159.65	50.34	8.76	16.97
	Hotels	0.15	0.04	0.01	0.01
	Industrial	45.96	14.31	2.39	4.68
	Other-Residential	156.82	38.46	4.19	7.63
	Single Family	26.08	5.55	0.81	1.53
	Total	**1,059**	**326**	**60**	**104**

Economic Loss

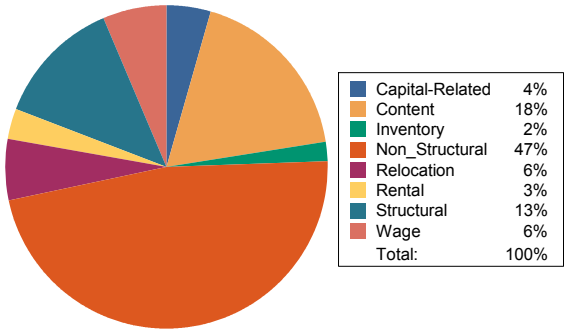
The total economic loss estimated for the earthquake is 5,410.46 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 4,993.86 (millions of dollars); 20 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 31 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

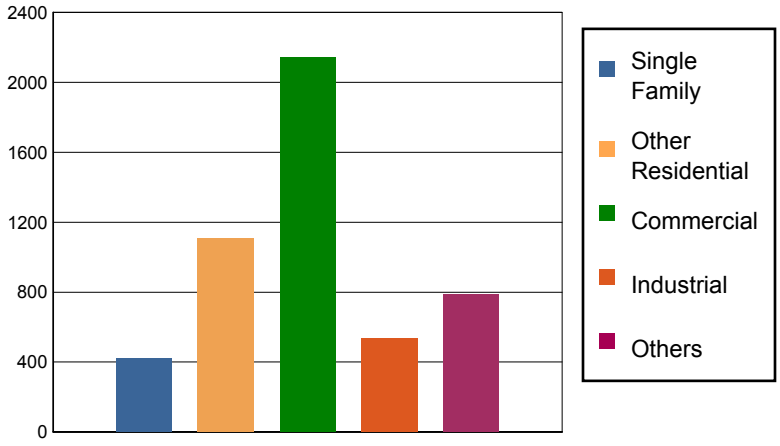


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	43.0069	243.5867	9.3298	22.9401	318.8635
	Capital-Related	0.0000	18.2770	192.5510	5.7099	5.7025	222.2404
	Rental	7.2563	59.7549	69.0955	3.3479	10.8565	150.3111
	Relocation	25.5238	61.1812	116.9497	12.8885	80.5221	297.0653
	Subtotal	**32.7801**	**182.2200**	**622.1829**	**31.2761**	**120.0212**	**988.4803**
Capital Stock Losses							
	Structural	46.8775	172.4796	244.6559	69.8162	111.0454	644.8746
	Non_Structural	247.5080	642.6454	832.5452	249.5874	391.5435	2,363.8295
	Content	95.9352	110.0742	387.4376	156.4470	157.5919	907.4859
	Inventory	0.0000	0.0000	57.7825	26.8388	4.5648	89.1861
	Subtotal	**390.3207**	**925.1992**	**1522.4212**	**502.6894**	**664.7456**	**4005.3761**
	Total	**423.10**	**1107.42**	**2144.60**	**533.97**	**784.77**	**4993.86**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1967.8770	0.0000	0.00
	Bridges	267.0379	23.3739	8.75
	Tunnels	11.5115	0.5534	4.81
	Subtotal	**2246.4264**	**23.9273**	
Railways	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	2.0503	0.6136	29.93
	Subtotal	**2.0503**	**0.6136**	
Ferry	Facilities	1.3310	0.4661	35.02
	Subtotal	**1.3310**	**0.4661**	
Port	Facilities	127.4120	41.3906	32.49
	Subtotal	**127.4120**	**41.3906**	
Airport	Facilities	31.8000	12.6177	39.68
	Runways	35.9167	0.0000	0.00
	Subtotal	**67.7167**	**12.6177**	
	Total	**2,444.94**	**79.02**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	112.3295	0.0003	0.00
	Subtotal	**112.3295**	**0.0003**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	1058.7577	285.7300	26.99
	Distribution Lines	67.3977	0.0001	0.00
	Subtotal	**1126.1554**	**285.7301**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	44.9318	0.0000	0.00
	Subtotal	**44.9318**	**0.0000**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	87.4152	51.5675	58.99
	Subtotal	**87.4152**	**51.5675**	
Communication	Facilities	0.5500	0.2839	51.62
	Subtotal	**0.5500**	**0.2839**	
	Total	**1,371.38**	**337.58**	

Appendix A: County Listing for the Region

Clallam,WA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Washington					
	Clallam	77,155	9,697	5,420	15,117
Total Region		**77,155**	**9,697**	**5,420**	**15,117**

N

Clallam Bay

United States - Canada Border

Salish Sea

Port Townsend

Port Angeles

Sequim

Forks

Pacific Ocean

0 2.5 5 10 Miles

Legend

- County Boundary
- City Limit

Hazus - Earthquake

PGA

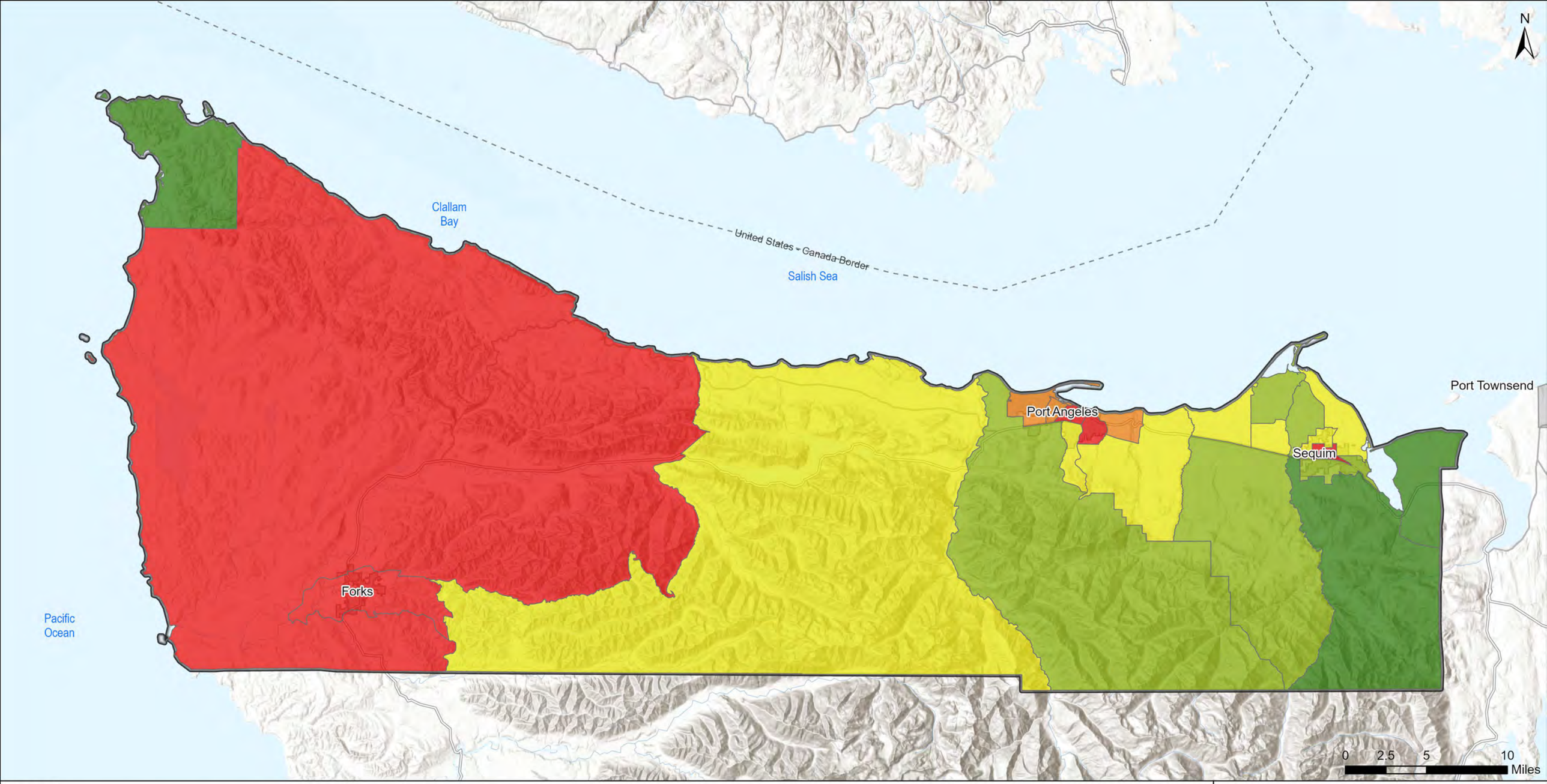
- 0.34 or Less
- 0.34 - 0.37
- 0.37 - 0.41
- 0.41 - 0.44
- 0.44 or More

Clallam County, WA

July 24, 2024

Coordinate System: Washington State Plane North

Data Source: FEMA Hazus 6.1 2024



Legend

- County Boundary
- City Limit

Hazus Total Economic Loss - Earthquake

Census Tracts ($1,000s)

- 33,000 - 50,000
- 50,001 - 100,000
- 100,001 - 200,000
- 200,001 - 300,000
- 300,001 - 760,000

Clallam County, WA

July 24, 2024

Coordinate System: Washington State Plane North

Data Source: FEMA Hazus 6.1 2024

Appendix F: Annex Coordination

Hazard Identification and Methodology Ranking

HAZARD RANKING WORKSHEET - Forks Annex					DATE: 6/15/2024	
Hazard Type	**Probability**	**Impact**			**Total Score**	**Hazard Planning Consideration**
		Location	**Primary Impact**	**Secondary Impacts**		
Human-Caused - Utility Failure/Power Outage	4.00	4.00	2.00	2.00	44.80	High
Wildfire (wildfire smoke)	2.00	4.00	2.00	2.00	22.40	Medium
Drought	2.00	4.00	2.00	2.00	22.40	Medium
Seismic - Cascadia Earthquake	1.00	4.00	4.00	4.00	16.00	Medium
Severe Weather - Windstorm	1.50	2.50	2.50	3.00	15.75	Medium
Severe Weather - Extreme Heat	1.00	4.00	2.00	2.00	11.20	Low
Flood	1.00	3.00	2.50	2.00	10.30	Low
					0.00	Low
					0.00	Low
					0.00	Low
					0.00	Low

Probability	Importance
Based on estimated likelihood of occurrence from historical data	2.0

Probability	Score
Unlikely	1
Occasional	2
Likely	3
Highly Likely	4

Location	Importance
hazard	0.8
Affected Area	Score
Negligible	1
Limited	2
Significant	3
Extensive	4

Maximum Probable Extent (Primary Impact)	Importance
Based on percentage of damage to typical facility in community	0.7
Impact	Score
Weak - little to no damage	1
Moderate - some damage, loss of service for days	2
Severe - devastating damage, loss of service for months	3
Extreme- catastrophic damage, uninhabitable conditions	4

Secondary Impacts	Importance
Based on estimated secondary impacts to community at large	0.5

Impact	Score
Negligible - no loss of function, downtime, and/or evacuations	1
Limited - minimal loss of function, downtime, and/or evacuations	2
Moderate - some loss of function, downtime, and/or	3
High - major loss of function, downtime, and/or	4

Total Score = Probability x Impact, where:

Probability = (Probability Score x Importance)

Impact = (Affected Area + Primary Impact + Secondary Impacts), where:

Affected Area = Affected Area Score x Importance

Primary Impact = Primary Impact Score x Importance

Secondary Impacts = Secondary Impacts Score x Importance

Hazard Planning Consideration

Total Score	Range	Distribution	Hazard Level
0.0	12.0	6	Low
12.1	42.0	4	Medium
42.1	64.0	1	High

The probability of each hazard is determined by assigning a level, from unlikely to highly likely, based on the likelihood of occurrence from historical data. The total impact value includes the affected area, primary impact

CITY OF FORKS – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Directions:
The purpose of this worksheet is to **identify** and **prioritize** the hazards that your jurisdiction is vulnerable to.

Below is the list of hazards that your jurisdiction previously identified in the 2019 MJHMP. Included for reference is the complete list of hazards to be included in the 2024 MJHMP update.

On the next page, you will review and update the hazards list for inclusion in your jurisdictional annex. You will then provide scores for each hazard, which will be used to determine hazard prioritization.

Hazard Identification:

Hazards Previously Included in your 2019 Jurisdictional Annex (ranked by priority):

1. Cascadia Earthquake
2. Windstorm
3. Wildfire Smoke
4. Heat Events
5. Power Outages
6. Drought
7. Storm Surges/Tides
8. Flooding

Hazards Included in the 2024 Clallam County MJHMP:

- Dam/Reservoir Failure
- Disease (Infectious/Vector) and Pandemic
- Drought
- Flood
- Human-Caused Hazards
  - Hazardous Materials Spill
  - Maritime Disasters
  - Active Shooter/Terrorism
  - Utility Failure/Power Outage [secondary hazard]
  - Supply Chain Interruption [secondary hazard]
- Landslide
- Sea Level Rise
  - Coastal/Bluff Erosion
- Seismic Hazards
  - Cascadia Subduction Zone Earthquake
  - Onshore and Offshore Earthquakes, 7.0 Design level
- Severe Weather
  - Windstorm/Tornado
  - Winter Storm (rain, freezing rain, ice, snow, cold temperature
  - Extreme Heat
- Tsunami
- Wildfire (including wildfire smoke)

CITY OF FORKS – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard Prioritization:

Step 1: Review the list of hazards below. Add any hazards from the 2024 list above that apply to your jurisdiction. Including hazards in this list will provide an opportunity for funding for mitigation projects.

Keep in mind: Each hazard profiled for your jurisdiction requires at least one (1) mitigation action, to be generated by each annex. Your jurisdiction will be responsible for updating your annex's mitigation measures next month.

Step 2: Assign a number from 1 - 4 for each criteria based on the scales and description below.

Probability: Likelihood of Occurrence within the Next Year
- 1 = Unlikely: Less than 1% chance within next year
- 2 = Occasional: 1% - 10% chance within next year
- 3 = Likely: 10% - 90% chance within next year
- 4 = Highly Likely: 90% to 100% chance within next year

Location: Size of the Geographical Area Affected by Hazard
- 1 = Negligible: less than 10% of planning area
- 2 = Limited: 10% to 25% of the planning area
- 3 = Significant: 25% to 75% of the planning area
- 4 = Extensive: 75% to 100% of the planning area

Primary Impact: Percentage of Damage to Typical Facility in Community
- 1 = Weak: Slow onset, short duration, little/no damage
- 2 = Moderate: Moderate onset, moderate duration, some damage
- 3 = Severe: Fast onset, long duration, devastating damage
- 4 = Extreme: Immediate onset, extended duration, catastrophic damage

Secondary Impacts: Estimated to the Community at Large
- 1 = Negligible: no loss of function, downtime and/or evacuations
- 2 = Limited: minimal loss of function, downtime and/or evacuations
- 3 = Moderate: some loss of function, downtime and/or evacuations
- 4 = High: major loss of function, downtime and/or evacuations

Hazard	Probability	Location	Primary Impact	Secondary Impact
Cascadia Earthquake	1	4	4	4
Windstorm[1]	3/2	2/3	2/3	2/3-4
Wildfire Smoke	2	4	2	2
Heat Events	1	4	2	2
Power Outages	4	4	2	2

[1] There are really two types of "windstorms" that should be considered. Secondary Impact = BPA outage and that is reflected in "Power Outages"
1) less than 50 mph gusts, sustained winds under 45 mph
2) greater than 50 mph gusts with sustained winds greater 45 mph

CITY OF FORKS – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard	Probability	Location	Primary Impact	Secondary Impact
Drought	2	4	2	2
Storm Surges/Tides	N/A to Forks			
Flooding	1	3	2/3	2
[Add any New Hazard Here]				
[Add any New Hazard Here]				
[Add any New Hazard Here]				
[Add any New Hazard Here]				

HAZARD RANKING WORKSHEET - City of Port Angeles Annex					DATE: 6/15/2024	
Hazard Type	**Probability**	**Impact**			**Total Score**	**Hazard Planning Consideration**
		Location	**Primary Impact**	**Secondary Impacts**		
Drought	4.00	2.00	2.00	2.00	32.00	Medium
Severe Weather - Windstorm	3.00	3.00	2.00	2.00	28.80	Medium
Severe Weather - Winter Storm	3.00	2.00	2.00	2.00	24.00	Medium
Wildfire (wildfire smoke)	3.00	2.00	2.00	2.00	24.00	Medium
Flood	3.00	2.00	2.00	2.00	24.00	Medium
Severe Weather - Extreme Heat	2.00	4.00	1.00	1.00	17.60	Medium
Disease	2.00	2.00	2.00	2.00	16.00	Medium
Wildfire	2.00	2.00	2.00	2.00	16.00	Medium
Human-Caused - Maritime Disaster/Oil Spill	2.00	2.00	2.00	2.00	16.00	Medium
Tsunami	1.00	2.00	2.00	3.00	9.00	Low
Human-Caused - Utility Failure/Power Outage	2.00	1.00	1.00	1.00	8.00	Low
Seismic - Cascadia Earthquake	1.00	2.00	2.00	2.00	8.00	Low
Seismic - Earthquake 7.0 Design Level	1.00	1.00	1.00	2.00	5.00	Low
Landslide	1.00	1.00	1.00	1.00	4.00	Low

Probability	Importance
Based on estimated likelihood of occurrence from historical data	2.0

Probability	Score
Unlikely	1
Occasional	2
Likely	3
Highly Likely	4

Location	Importance
hazard	0.8
Affected Area	Score
Negligible	1
Limited	2
Significant	3
Extensive	4

Maximum Probable Extent (Primary Impact)	Importance
Based on percentage of damage to typical facility in community	0.7
Impact	Score
Weak - little to no damage	1
Moderate - some damage, loss of service for days	2
Severe - devastating damage, loss of service for months	3
Extreme- catastrophic damage, uninhabitable conditions	4

Secondary Impacts	Importance
Based on estimated secondary impacts to community at large	0.5

Impact	Score
Negligible - no loss of function, downtime, and/or evacuations	1
Limited - minimal loss of function, downtime, and/or evacuations	2
Moderate - some loss of function, downtime, and/or	3
High - major loss of function, downtime, and/or	4

Total Score = Probability x Impact, where:

Probability = (Probability Score x Importance)

Impact = (Affected Area + Primary Impact + Secondary Impacts), where:

Affected Area = Affected Area Score x Importance

Primary Impact = Primary Impact Score x Importance

Secondary Impacts = Secondary Impacts Score x Importance

Hazard Planning Consideration

Total Score	Range	Distribution	Hazard Level
0.0	12.0	5	Low
12.1	42.0	9	Medium
42.1	64.0	0	High

The probability of each hazard is determined by assigning a level, from unlikely to highly likely, based on the likelihood of occurrence from historical data. The total impact value includes the affected area, primary impact

CITY OF PORT ANGELES – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Directions:
The purpose of this worksheet is to **identify** and **prioritize** the hazards that your jurisdiction is vulnerable to.

Below is the list of hazards that your jurisdiction previously identified in the 2019 MJHMP. Included for reference is the complete list of hazards to be included in the 2024 MJHMP update.

On the next page, you will review and update the hazards list for inclusion in your jurisdictional annex. You will then provide scores for each hazard, which will be used to determine hazard prioritization.

Hazard Identification:

Hazards Previously Included in your 2019 Jurisdictional Annex (ranked by priority):

1. Utility Failure
2. Disease
3. Earthquake
4. Cascadia Earthquake
5. Winter Storm
6. Windstorm
7. Wildfire Smoke
8. Heat Events
9. Tsunami
10. Wildfire
11. Flooding
12. Landslide
13. Drought

Hazards Included in the 2024 Clallam County MJHMP:

- Dam/Reservoir Failure
- Disease (Infectious/Vector) and Pandemic
- Drought
- Flood
- Human-Caused Hazards
  - Hazardous Materials Spill
  - Maritime Disasters
  - Active Shooter/Terrorism
  - Utility Failure/Power Outage [secondary hazard]
  - Supply Chain Interruption [secondary hazard]
- Landslide
- Sea Level Rise
  - Coastal/Bluff Erosion
- Seismic Hazards
  - Cascadia Subduction Zone Earthquake
  - Onshore and Offshore Earthquakes, 7.0 Design level
- Severe Weather
  - Windstorm/Tornado
  - Winter Storm (rain, freezing rain, ice, snow, cold temperature
  - Extreme Heat
- Tsunami
- Wildfire (including wildfire smoke)

Commented [WH2R1]: I'm not sure! I'll reach out to the consultants

Commented [MH3R1]: I understand that they have a plan for the waterfront which we may wish to reference.

Commented [MH4]: Dam Failure?

Commented [WH5R4]: I *think* they are referring to the old dam up on Morse Creek.. But it could also be standard language they use. In these meetings the members of the task force consistently rate dam failure as very low priority. Maybe it's a hold over from the Elwha Dam days?

Commented [MH6R4]: if it's Morse then great.

Commented [MH7R4]: That's probably it

CITY OF PORT ANGELES – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard Prioritization:

Step 1: Review the list of hazards below. Add any hazards from the 2024 list above that apply to your jurisdiction. Including hazards in this list will provide an opportunity for funding for mitigation projects.

Keep in mind: Each hazard profiled for your jurisdiction requires at least one (1) mitigation action, to be generated by each annex. Your jurisdiction will be responsible for updating your annex's mitigation measures next month.

Step 2: Assign a number from 1 - 4 for each criteria based on the scales and description below.

Probability: Likelihood of Occurrence within the Next Year
- 1 = Unlikely: Less than 1% chance within next year
- 2 = Occasional: 1% - 10% chance within next year
- 3 = Likely: 10% - 90% chance within next year
- 4 = Highly Likely: 90% to 100% chance within next year

Primary Impact: Percentage of Damage to Typical Facility in Community
- 1 = Weak: Slow onset, short duration, little/no damage
- 2 = Moderate: Moderate onset, moderate duration, some damage
- 3 = Severe: Fast onset, long duration, devastating damage
- 4 = Extreme: Immediate onset, extended duration, catastrophic damage

Location: Size of the Geographical Area Affected by Hazard
- 1 = Negligible: less than 10% of planning area
- 2 = Limited: 10% to 25% of the planning area
- 3 = Significant: 25% to 75% of the planning area
- 4 = Extensive: 75% to 100% of the planning area

Secondary Impacts: Estimated to the Community at Large
- 1 = Negligible: no loss of function, downtime and/or evacuations
- 2 = Limited: minimal loss of function, downtime and/or evacuations
- 3 = Moderate: some loss of function, downtime and/or evacuations
- 4 = High: major loss of function, downtime and/or evacuations

Hazard	Probability	Location	Primary Impact	Secondary Impact
Utility Failure	2	1	1	1
Disease	2	2	2	2
Earthquake	1	1	1	2
Cascadia Earthquake	1	2	2	2
Winter Storm	3	2	2	2
Windstorm	3	3	2	2
Wildfire Smoke	3	2	2	2
Heat Events	2	4	1	1

CITY OF PORT ANGELES – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard	Probability	Location	Primary Impact	Secondary Impact
Tsunami	1	2	2	3
Wildfire	2	2	2	2
Flooding	3	2	2	2
Landslide	1	1	1	1
Drought	4	2	2	2
[Water area oil ~~Add~~contamination/spill Add ~~any New Hazard Here~~]	2	2	2	2
[Add any New Hazard Here]				
[Add any New Hazard Here]				
[Add any New Hazard Here]				
[Add any New Hazard Here]				

HAZARD RANKING WORKSHEET - Sequim Annex					DATE: 6/15/2024	
Hazard Type	**Probability**	**Impact**			**Total Score**	**Hazard Planning Consideration**
		Location	**Primary Impact**	**Secondary Impacts**		
Wildfire smoke	4.00	4.00	2.00	3.00	48.80	High
Drought	4.00	4.00	2.00	2.00	44.80	High
Severe Weather - Winter Storm	4.00	3.00	2.00	2.00	38.40	Medium
Severe Weather - Windstorm	3.00	4.00	2.00	3.00	36.60	Medium
Human-Caused - Utility Failure/Power Outage	4.00	2.00	2.00	3.00	36.00	Medium
Disease	3.00	3.00	2.00	3.00	31.80	Medium
Seismic - Cascadia Earthquake	2.00	3.00	3.00	4.00	26.00	Medium
Human-Caused - Active Shooter	3.00	1.00	2.00	4.00	25.20	Medium
Human-Caused - Terrorism (Cyberattack)	2.00	3.00	3.00	2.00	22.00	Medium
Severe Weather - Extreme Heat	2.00	4.00	1.00	2.00	19.60	Medium
Seismic - Earthquake (7.0 Design Level)	3.00	1.00	2.00	2.00	19.20	Medium
Flood - Storm Surges/Tides	3.00	1.00	2.00	2.00	19.20	Medium
Human-Caused - Hazardous Materials	2.00	1.00	2.00	2.00	12.80	Medium
Flood	2.00	1.00	2.00	2.00	12.80	Medium
Wildfire	2.00	1.00	1.00	2.00	10.00	Low
Dam/Reservoir Failure	1.00	2.00	3.00	2.00	9.40	Low
Tsunami	1.00	1.00	3.00	2.00	7.80	Low
Landslide	1.00	1.00	2.00	2.00	6.40	Low
					0.00	Low
					0.00	Low
					0.00	Low
					0.00	Low

Probability	Importance
Based on estimated likelihood of occurrence from historical data	2.0

Probability	Score
Unlikely	1
Occasional	2
Likely	3
Highly Likely	4

Location	Importance
hazard	0.8
Affected Area	Score
Negligible	1
Limited	2
Significant	3
Extensive	4

Maximum Probable Extent (Primary Impact)	Importance
Based on percentage of damage to typical facility in community	0.7
Impact	Score
Weak - little to no damage	1
Moderate - some damage, loss of service for days	2
Severe - devastating damage, loss of service for months	3
Extreme- catastrophic damage, uninhabitable conditions	4

Secondary Impacts	Importance
Based on estimated secondary impacts to community at large	0.5

Impact	Score
Negligible - no loss of function, downtime, and/or evacuations	1
Limited - minimal loss of function, downtime, and/or evacuations	2
Moderate - some loss of function, downtime, and/or	3
High - major loss of function, downtime, and/or	4

Total Score = Probability x Impact, where:

Probability = (Probability Score x Importance)

Impact = (Affected Area + Primary Impact + Secondary Impacts), where:

Affected Area = Affected Area Score x Importance

Primary Impact = Primary Impact Score x Importance

Secondary Impacts = Secondary Impacts Score x Importance

Hazard Planning Consideration

Total Score	Range	Distribution	Hazard Level
0.0	12.0	8	Low
12.1	42.0	12	Medium
42.1	64.0	2	High

The probability of each hazard is determined by assigning a level, from unlikely to highly likely, based on the likelihood of occurrence from historical data. The total impact value includes the affected area, primary impact

CITY OF SEQUIM – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Directions:
The purpose of this worksheet is to **identify** and **prioritize** the hazards that your jurisdiction is vulnerable to.

Below is the list of hazards that your jurisdiction previously identified in the 2019 MJHMP. Included for reference is the complete list of hazards to be included in the 2024 MJHMP update.

On the next page, you will review and update the hazards list for inclusion in your jurisdictional annex. You will then provide scores for each hazard, which will be used to determine hazard prioritization.

Hazard Identification:

Hazards Previously Included in your 2019 Jurisdictional Annex (ranked by priority):

1. Cascadia Earthquake
2. Earthquake
3. Active Shooter
4. Power Outages
5. Wildfire Smoke
6. Heat Events
7. Windstorm
8. Wildfire
9. Hazardous Materials
10. Flooding
11. Winter Storm
12. Tsunami
13. Disease
14. Landslide
15. Drought
16. Storm Surges/Tides

Hazards Included in the 2024 Clallam County MJHMP:

- Dam/Reservoir Failure
- Disease (Infectious/Vector) and Pandemic
- Drought
- Flood
- Human-Caused Hazards
  - Hazardous Materials Spill
  - Maritime Disasters
  - Active Shooter/Terrorism
  - Utility Failure/Power Outage [secondary hazard]
  - Supply Chain Interruption [secondary hazard]
- Landslide
- Sea Level Rise
  - Coastal/Bluff Erosion
- Seismic Hazards
  - Cascadia Subduction Zone Earthquake
  - Onshore and Offshore Earthquakes, 7.0 Design level
- Severe Weather
  - Windstorm/Tornado
  - Winter Storm (rain, freezing rain, ice, snow, cold temperature
  - Extreme Heat
- Tsunami
- Wildfire (including wildfire smoke)

CITY OF SEQUIM – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard Prioritization:

Step 1: Review the list of hazards below. Add any hazards from the 2024 list above that apply to your jurisdiction. Including hazards in this list will provide an opportunity for funding for mitigation projects.

Keep in mind: Each hazard profiled for your jurisdiction requires at least one (1) mitigation action, to be generated by each annex. Your jurisdiction will be responsible for updating your annex's mitigation measures next month.

Step 2: Assign a number from 1 - 4 for each criteria based on the scales and description below.

Probability: Likelihood of Occurrence within the Next Year
- 1 = Unlikely: Less than 1% chance within next year
- 2 = Occasional: 1% - 10% chance within next year
- 3 = Likely: 10% - 90% chance within next year
- 4 = Highly Likely: 90% to 100% chance within next year

Location: Size of the Geographical Area Affected by Hazard
- 1 = Negligible: less than 10% of planning area
- 2 = Limited: 10% to 25% of the planning area
- 3 = Significant: 25% to 75% of the planning area
- 4 = Extensive: 75% to 100% of the planning area

Primary Impact: Percentage of Damage to Typical Facility in Community
- 1 = Weak: Slow onset, short duration, little/no damage
- 2 = Moderate: Moderate onset, moderate duration, some damage
- 3 = Severe: Fast onset, long duration, devastating damage
- 4 = Extreme: Immediate onset, extended duration, catastrophic damage

Secondary Impacts: Estimated to the Community at Large
- 1 = Negligible: no loss of function, downtime and/or evacuations
- 2 = Limited: minimal loss of function, downtime and/or evacuations
- 3 = Moderate: some loss of function, downtime and/or evacuations
- 4 = High: major loss of function, downtime and/or evacuations

Hazard	Probability	Location	Primary Impact	Secondary Impact
Cascadia Earthquake	2	3	3	4
Earthquake	3	1	2	2
Active Shooter	3	1	2	4
Power Outages	4	2	2	3
Wildfire Smoke	4	4	2	3
Heat Events	2	4	1	2
Windstorm	3	4	2	3
Wildfire	2	1	1	2

CITY OF SEQUIM – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard	Probability	Location	Primary Impact	Secondary Impact
Hazardous Materials	2	1	2	2
Flooding	2	1	2	2
Winter Storm	4	3	2	2
Tsunami	1	1	3	2
Disease	3	3	2	3
Landslide	1	1	2	2
Drought	4	4	2	2
Storm Surges/Tides	3	1	2	2
Terrorism (Cyberattack)	2	3	3	2
Water Reservoir Failure	1	2	3	2
[Add any New Hazard Here]				
[Add any New Hazard Here]				
[Add any New Hazard Here]				

HAZARD RANKING WORKSHEET - PUD Annex DATE: 6/15/2024

Hazard Type	Probability	Impact			Hazard Planning Consideration
		Location	Primary Impact	Secondary Impacts	
Severe Weather - Winter Storm	Highly Likely	Limited	Moderate	Limited	Medium
Severe Weather - Windstorm	Highly Likely	Limited	Moderate	Limited	Medium
Disease (Infectious/Vector) and Pandemic	Occasional	Extensive	Weak	High	Medium
Human Caused Hazards	Likely	Negligible	Severe	Limited	Medium
Human-Caused - Utility Failure/Power Outage	Occasional	Significant	Moderate	Moderate	Medium
Wildfire	Occasional	Limited	Moderate	Moderate	Medium
Seismic - Cascadia Earthquake	Unlikely	Extensive	Extreme	High	Medium
Tsunami	Unlikely	Extensive	Extreme	High	Medium
Dam/Reservoir Failure	Unlikely	Extensive	Extreme	High	Medium
Landslide	Occasional	Negligible	Severe	Limited	Medium
Sea-level Rise	Unlikely	Extensive	Severe	High	Medium
Human-Caused - Active Shooter/Terrorism	Unlikely	Extensive	Severe	High	Medium
Seismic - Earthquake 7.0 Design Level	Unlikely	Significant	Severe	High	Medium
Drought	Unlikely	Extensive	Severe	Negligible	Low
Human-Caused - Supply Chain Interruption	Unlikely	Extensive	Moderate	Negligible	Low
Flood	Unlikely	Limited	Moderate	High	Low
Human-Caused - Hazardous Materials	Occasional	Negligible	Weak	Limited	Low
					Low
					Low
					Low

Probability — Importance: 2.0

Based on estimated likelihood of occurrence from historical data

Score	Probability
1	Unlikely
2	Occasional
3	Likely
4	Highly Likely

Maximum Probable Extent (Primary Impact) — Importance: 0.7

Based on percentage of damage to typical facility in community

Score	Impact
1	Weak
2	Moderate
3	Severe
4	Extreme

Location — Importance: 0.8

Based on size of geographical area of community affected by hazard

Score	Affected Area
1	Negligible
2	Limited
3	Significant
4	Extensive

Secondary Impacts — Importance: 0.5

Based on estimated secondary impacts to community at large

Score	Impact
1	Negligible
2	Limited
3	Moderate
4	High

Overall Importance (Based on overall hazard to community)

Low	Minimal impact on the planning area. Hazards have minimal or unknown record of occurrences or minimal
Medium	Event's impacts on the planning area are noticeable but not devastating. Hazards with a high extent rating but very
High	Event is likely/highly likely to occur with sever strength over a significant to extensive portion of the planning area.

CLALLAM COUNTY PUD – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Directions:
The purpose of this worksheet is to **identify** and **prioritize** the hazards that your jurisdiction is vulnerable to.

Below is the list of hazards that your jurisdiction previously identified in the 2019 MJHMP. Included for reference is the complete list of hazards to be included in the 2024 MJHMP update.

On the next page, you will review and update the hazards list for inclusion in your jurisdictional annex. You will then provide scores for each hazard, which will be used to determine hazard prioritization.

Hazard Identification:

Hazards Previously Included in your 2019 Jurisdictional Annex (ranked by priority):

1. Power Outages
2. Earthquake
3. Cascadia Earthquake
4. Winter Storm
5. Windstorm
6. Tsunami
7. Wildfire
8. Hazardous Materials Incident
9. Flooding

Hazards Included in the 2024 Clallam County MJHMP:

- Dam/Reservoir Failure
- Disease (Infectious/Vector) and Pandemic
- Drought
- Flood
- Human-Caused Hazards
  - Hazardous Materials Spill
  - Maritime Disasters
  - Active Shooter/Terrorism
  - Utility Failure/Power Outage [secondary hazard]
  - Supply Chain Interruption [secondary hazard]
- Landslide
- Sea Level Rise
  - Coastal/Bluff Erosion
- Seismic Hazards
  - Cascadia Subduction Zone Earthquake
  - Onshore and Offshore Earthquakes, 7.0 Design level
- Severe Weather
  - Windstorm/Tornado
  - Winter Storm (rain, freezing rain, ice, snow, cold temperature
  - Extreme Heat
- Tsunami
- Wildfire (including wildfire smoke)

CLALLAM COUNTY PUD – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard Prioritization:

Step 1: Review the list of hazards below. Add any hazards from the 2024 list above that apply to your jurisdiction. Including hazards in this list will provide an opportunity for funding for mitigation projects.

Keep in mind: Each hazard profiled for your jurisdiction requires at least one (1) mitigation action, to be generated by each annex. Your jurisdiction will be responsible for updating your annex's mitigation measures next month.

Step 2: Assign a number from 1 - 4 for each criteria based on the scales and description below.

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- 3 = Likely: 10% - 90% chance within next year
- 4 = Highly Likely: 90% to 100% chance within next year

Location: Size of the Geographical Area Affected by Hazard
- 1 = Negligible: less than 10% of planning area
- 2 = Limited: 10% to 25% of the planning area
- 3 = Significant: 25% to 75% of the planning area
- 4 = Extensive: 75% to 100% of the planning area

Primary Impact: Percentage of Damage to Typical Facility in Community
- 1 = Weak: Slow onset, short duration, little/no damage
- 2 = Moderate: Moderate onset, moderate duration, some damage
- 3 = Severe: Fast onset, long duration, devastating damage
- 4 = Extreme: Immediate onset, extended duration, catastrophic damage

Secondary Impacts: Estimated to the Community at Large
- 1 = Negligible: no loss of function, downtime and/or evacuations
- 2 = Limited: minimal loss of function, downtime and/or evacuations
- 3 = Moderate: some loss of function, downtime and/or evacuations
- 4 = High: major loss of function, downtime and/or evacuations

Hazard	Probability	Location	Primary Impact	Secondary Impact
~~**Power Outages**~~	~~4~~	~~2~~	~~2~~	~~2~~
Earthquake	1	3	3	4
Cascadia Earthquake	1	4	4	4
Winter Storm	4	2	2	2
Windstorm	4	2	2	2
Tsunami	1	4	4	4
Wildfire	2	2	2	3
~~**Hazardous Materials Incident**~~	~~1~~	~~3~~	~~2~~	~~2~~

CLALLAM COUNTY PUD – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard	Probability	Location	Primary Impact	Secondary Impact
Flooding	1	2	2	4
Dam/Reservoir Failure	1	4	4	4
Disease (Infectious/Vector) and Pandemic	2	4	1	4
Drought	1	4	3	1
Landslide	2	1	3	2
Sea-level Rise	1	4	3	4
~~**Human-Caused Hazards**~~	~~3~~	~~1~~	~~3~~	~~2~~
Hazardous Materials Spill	2	1	1	2
Maritime Disasters				
Active Shooter/Terrorism	1	4	3	4
Utility Failure/Power Outage	2	3	2	3
Supply Chain Interruption	1	4	2	1

HAZARD RANKING WORKSHEET - Jamestown S'Klallam Annex					DATE: 6/15/2024	
Hazard Type	**Probability**	**Impact**			**Total Score**	**Hazard Planning Consideration**
		Location	**Primary Impact**	**Secondary Impacts**		
Drought	4.00	3.00	3.00	3.00	48.00	High
Wildfire Smoke	4.00	4.00	2.00	1.00	40.80	Medium
Severe Weather - Winter Storm	3.00	3.00	3.00	3.00	36.00	Medium
Wildfire	3.00	2.00	4.00	2.00	32.40	Medium
Severe Weather - Windstorm	3.00	3.00	2.00	2.00	28.80	Medium
Flood	2.00	2.00	3.00	3.00	20.80	Medium
Human-Caused - Power Outages	3.00	2.00	1.00	1.00	16.80	Medium
Human-Caused - Hazardous Materials	2.00	2.00	3.00	1.00	16.80	Medium
Landslide	2.00	1.00	3.00	2.00	15.60	Medium
Seismic - Cascadia Earthquake	1.00	3.00	4.00	4.00	14.40	Medium
Tsunami	1.00	2.00	4.00	4.00	12.80	Medium
Seismic - Earthquake 7.0 Design Level	1.00	3.00	2.00	2.00	9.60	Low
Human-Caused - Active Shooter	1.00	1.00	4.00	1.00	8.20	Low
Disease	1.00	2.00	2.00	1.00	7.00	Low

Probability	Importance
Based on estimated likelihood of occurrence from historical data	2.0

Probability	Score
Unlikely	1
Occasional	2
Likely	3
Highly Likely	4

Location	Importance
hazard	0.8
Affected Area	Score
Negligible	1
Limited	2
Significant	3
Extensive	4

Maximum Probable Extent (Primary Impact)	Importance
Based on percentage of damage to typical facility in community	0.7
Impact	Score
Weak - little to no damage	1
Moderate - some damage, loss of service for days	2
Severe - devastating damage, loss of service for months	3
Extreme- catastrophic damage, uninhabitable conditions	4

Secondary Impacts	Importance
Based on estimated secondary impacts to community at large	0.5

Impact	Score
Negligible - no loss of function, downtime, and/or evacuations	1
Limited - minimal loss of function, downtime, and/or evacuations	2
Moderate - some loss of function, downtime, and/or	3
High - major loss of function, downtime, and/or	4

Total Score = Probability x Impact, where:

Probability = (Probability Score x Importance)

Impact = (Affected Area + Primary Impact + Secondary Impacts), where:

Affected Area = Affected Area Score x Importance

Primary Impact = Primary Impact Score x Importance

Secondary Impacts = Secondary Impacts Score x Importance

Hazard Planning Consideration

Total Score	Range	Distribution	Hazard Level
0.0	12.0	3	Low
12.1	42.0	10	Medium
42.1	64.0	1	High

The probability of each hazard is determined by assigning a level, from unlikely to highly likely, based on the likelihood of occurrence from historical data. The total impact value includes the affected area, primary impact

JAMESTOWN S'KLALLAM TRIBE – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Directions:
The purpose of this worksheet is to **identify** and **prioritize** the hazards that your jurisdiction is vulnerable to.

Below is the list of hazards that your jurisdiction previously identified in the 2019 MJHMP. Included for reference is the complete list of hazards to be included in the 2024 MJHMP update.

On the next page, you will review and update the hazards list for inclusion in your jurisdictional annex. You will then provide scores for each hazard, which will be used to determine hazard prioritization.

Hazard Identification:

Hazards Previously Included in your 2019 Jurisdictional Annex (ranked by priority):

1. Power Outages
2. Winter Storm
3. Tsunami
4. Cascadia Earthquake
5. Flooding
6. Windstorm
7. Earthquake
8. Active Shooter
9. Hazardous Materials
10. Disease
11. Landslide
12. Drought
13. Wildfire

Hazards Included in the 2024 Clallam County MJHMP:

- Dam/Reservoir Failure
- Disease (Infectious/Vector) and Pandemic
- Drought
- Flood
- Human-Caused Hazards
  - Hazardous Materials Spill
  - Maritime Disasters
  - Active Shooter/Terrorism
  - Utility Failure/Power Outage [secondary hazard]
  - Supply Chain Interruption [secondary hazard]
- Landslide
- Sea Level Rise
  - Coastal/Bluff Erosion
- Seismic Hazards
  - Cascadia Subduction Zone Earthquake
  - Onshore and Offshore Earthquakes, 7.0 Design level
- Severe Weather
  - Windstorm/Tornado
  - Winter Storm (rain, freezing rain, ice, snow, cold temperature
  - Extreme Heat
- Tsunami
- Wildfire (including wildfire smoke)

JAMESTOWN S'KLALLAM TRIBE – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard Prioritization:

Step 1: Review the list of hazards below. Add any hazards from the 2024 list above that apply to your jurisdiction. Including hazards in this list will provide an opportunity for funding for mitigation projects.

Keep in mind: Each hazard profiled for your jurisdiction requires at least one (1) mitigation action, to be generated by each annex. Your jurisdiction will be responsible for updating your annex's mitigation measures next month.

Step 2: Assign a number from 1 - 4 for each criteria based on the scales and description below.

Probability: Likelihood of Occurrence within the Next Year
- 1 = Unlikely: Less than 1% chance within next year
- 2 = Occasional: 1% - 10% chance within next year
- 3 = Likely: 10% - 90% chance within next year
- 4 = Highly Likely: 90% to 100% chance within next year

Location: Size of the Geographical Area Affected by Hazard
- 1 = Negligible: less than 10% of planning area
- 2 = Limited: 10% to 25% of the planning area
- 3 = Significant: 25% to 75% of the planning area
- 4 = Extensive: 75% to 100% of the planning area

Primary Impact: Percentage of Damage to Typical Facility in Community
- 1 = Weak: Slow onset, short duration, little/no damage
- 2 = Moderate: Moderate onset, moderate duration, some damage
- 3 = Severe: Fast onset, long duration, devastating damage
- 4 = Extreme: Immediate onset, extended duration, catastrophic damage

Secondary Impacts: Estimated to the Community at Large
- 1 = Negligible: no loss of function, downtime and/or evacuations
- 2 = Limited: minimal loss of function, downtime and/or evacuations
- 3 = Moderate: some loss of function, downtime and/or evacuations
- 4 = High: major loss of function, downtime and/or evacuations

Hazard	Probability	Location	Primary Impact	Secondary Impact
Power Outages	3	2	1	1
Winter Storm	3	3	3	3
Tsunami	1	2	4	4
Cascadia Earthquake	1	3	4	4
Flooding	2	2	3	3
Windstorm	3	3	2	2
Earthquake	1	3	2	2
Active Shooter	1	1	4	1

JAMESTOWN S'KLALLAM TRIBE – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard	Probability	Location	Primary Impact	Secondary Impact
Hazardous Materials	2	2	3	1
Disease	1	2	2	1
Landslide	2	1	3	2
Drought	4	3	3	3
Wildfire	3	2	4	2
Wildfire Smoke	4	4	2	1
[Add any New Hazard Here]				
[Add any New Hazard Here]				

HAZARD RANKING WORKSHEET - Lower Elwha Klallam Annex					DATE: 6/15/2024	
Hazard Type	**Probability**	**Impact**			**Total Score**	**Hazard Planning Consideration**
		Location	**Primary Impact**	**Secondary Impacts**		
Severe Weather - Winter Storm	4.00	4.00	2.00	2.00	44.80	High
Severe Weather - Windstorm	4.00	4.00	2.00	2.00	44.80	High
Human Caused - Utility Failure	3.00	4.00	2.00	2.00	33.60	Medium
Pandemic	2.00	4.00	3.00	3.00	27.20	Medium
Human Caused - Supply Chain Interruption	2.00	4.00	2.00	2.00	22.40	Medium
Wildfire	2.00	2.00	2.00	2.00	16.00	Medium
Seismic - Earthquake 7.0 Design Level	1.00	4.00	3.00	3.00	13.60	Medium
Seismic - Cascadia Earthquake	1.00	4.00	3.00	3.00	13.60	Medium
Tsunami	1.00	3.00	3.00	4.00	13.00	Medium
Landslide	2.00	1.00	2.00	2.00	12.80	Medium
Flood	1.00	1.00	1.00	1.00	4.00	Low
					0.00	Low
					0.00	Low
					0.00	Low

Probability	Importance
Based on estimated likelihood of occurrence from historical data	2.0

Probability	Score
Unlikely	1
Occasional	2
Likely	3
Highly Likely	4

Location	Importance
hazard	0.8
Affected Area	Score
Negligible	1
Limited	2
Significant	3
Extensive	4

Maximum Probable Extent (Primary Impact)	Importance
Based on percentage of damage to typical facility in community	0.7
Impact	Score
Weak - little to no damage	1
Moderate - some damage, loss of service for days	2
Severe - devastating damage, loss of service for months	3
Extreme- catastrophic damage, uninhabitable conditions	4

Secondary Impacts	Importance
Based on estimated secondary impacts to community at large	0.5

Impact	Score
Negligible - no loss of function, downtime, and/or evacuations	1
Limited - minimal loss of function, downtime, and/or evacuations	2
Moderate - some loss of function, downtime, and/or	3
High - major loss of function, downtime, and/or	4

Total Score = Probability x Impact, where:

Probability = (Probability Score x Importance)

Impact = (Affected Area + Primary Impact + Secondary Impacts), where:

Affected Area = Affected Area Score x Importance

Primary Impact = Primary Impact Score x Importance

Secondary Impacts = Secondary Impacts Score x Importance

Hazard Planning Consideration

Total Score	Range	Distribution	Hazard Level
0.0	12.0	4	Low
12.1	42.0	8	Medium
42.1	64.0	2	High

The probability of each hazard is determined by assigning a level, from unlikely to highly likely, based on the likelihood of occurrence from historical data. The total impact value includes the affected area, primary impact

LOWER ELWHA KLALLAM TRIBE – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Directions:
The purpose of this worksheet is to **identify** and **prioritize** the hazards that your jurisdiction is vulnerable to.

Below is the list of hazards that your jurisdiction previously identified in the 2019 MJHMP. Included for reference is the complete list of hazards to be included in the 2024 MJHMP update.

On the next page, you will review and update the hazards list for inclusion in your jurisdictional annex. You will then provide scores for each hazard, which will be used to determine hazard prioritization.

Hazard Identification:

Hazards Previously Included in your 2019 Jurisdictional Annex (ranked by priority):

1. Earthquake
2. Cascadia Earthquake
3. Landslide
4. Winter Storm
5. Windstorm
6. Wildfire
7. Flooding
8. Tsunami

Hazards Included in the 2024 Clallam County MJHMP:

- Dam/Reservoir Failure
- Disease (Infectious/Vector) and Pandemic
- Drought
- Flood
- Human-Caused Hazards
  - Hazardous Materials Spill
  - Maritime Disasters
  - Active Shooter/Terrorism
  - Utility Failure/Power Outage [secondary hazard]
  - Supply Chain Interruption [secondary hazard]
- Landslide
- Sea Level Rise
  - Coastal/Bluff Erosion
- Seismic Hazards
  - Cascadia Subduction Zone Earthquake
  - Onshore and Offshore Earthquakes, 7.0 Design level
- Severe Weather
  - Windstorm/Tornado
  - Winter Storm (rain, freezing rain, ice, snow, cold temperature
  - Extreme Heat
- Tsunami
- Wildfire (including wildfire smoke)

LOWER ELWHA KLALLAM TRIBE – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard Prioritization:

Step 1: Review the list of hazards below. Add any hazards from the 2024 list above that apply to your jurisdiction. Including hazards in this list will provide an opportunity for funding for mitigation projects.

Keep in mind: Each hazard profiled for your jurisdiction requires at least one (1) mitigation action, to be generated by each annex. Your jurisdiction will be responsible for updating your annex's mitigation measures next month.

Step 2: Assign a number from 1 - 4 for each criteria based on the scales and description below.

Probability: Likelihood of Occurrence within the Next Year
- 1 = Unlikely: Less than 1% chance within next year
- 2 = Occasional: 1% - 10% chance within next year
- 3 = Likely: 10% - 90% chance within next year
- 4 = Highly Likely: 90% to 100% chance within next year

Location: Size of the Geographical Area Affected by Hazard
- 1 = Negligible: less than 10% of planning area
- 2 = Limited: 10% to 25% of the planning area
- 3 = Significant: 25% to 75% of the planning area
- 4 = Extensive: 75% to 100% of the planning area

Primary Impact: Percentage of Damage to Typical Facility in Community
- 1 = Weak: Slow onset, short duration, little/no damage
- 2 = Moderate: Moderate onset, moderate duration, some damage
- 3 = Severe: Fast onset, long duration, devastating damage
- 4 = Extreme: Immediate onset, extended duration, catastrophic damage

Secondary Impacts: Estimated to the Community at Large
- 1 = Negligible: no loss of function, downtime and/or evacuations
- 2 = Limited: minimal loss of function, downtime and/or evacuations
- 3 = Moderate: some loss of function, downtime and/or evacuations
- 4 = High: major loss of function, downtime and/or evacuations

Hazard	Probability	Location	Primary Impact	Secondary Impact
Earthquake	1	4	3	3
Cascadia Earthquake	1	4	3	3
Landslide	2	1	2	2
Winter Storm	4	4	2	2
Windstorm	4	4	2	2
Wildfire	2	2	2	2
Flooding	1	1	1	1
Tsunami	1	3	3	4

LOWER ELWHA KLALLAM TRIBE – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard	Probability	Location	Primary Impact	Secondary Impact
[Utility Failure]	3	4	2	2
Supply chain interruption[]	2	4	2	2
[Pandemic]	2	4	3	3

HAZARD RANKING WORKSHEET - Peninsula College Annex					DATE: 6/15/2024	
Hazard Type	**Probability**	**Impact**			**Total Score**	**Hazard Planning Consideration**
		Location	**Primary Impact**	**Secondary Impacts**		
Seismic - Earthquake 7.0 Design Level	3.00	2.00	3.00	2.00	28.20	Medium
Seismic - Cascadia Earthquake	3.00	2.00	3.00	2.00	28.20	Medium
Severe Weather - Winter Storm	3.00	2.00	3.00	2.00	28.20	Medium
Severe Weather - Windstorm	3.00	2.00	3.00	2.00	28.20	Medium
Flood	2.00	2.00	2.00	2.00	16.00	Medium
Wildfire	2.00	2.00	2.00	1.00	14.00	Medium
Human-Caused - Hazardous Materials	2.00	2.00	2.00	1.00	14.00	Medium
Human-Caused - Cyber-terrorism	1.00	3.00	4.00	3.00	13.40	Medium
Human-Caused - Utility Failure/Power Outage	2.00	2.00	1.00	1.00	11.20	Low
Human-Caused - Active Shooter	1.00	2.00	3.00	1.00	8.40	Low
Tsunami	1.00	1.00	1.00	1.00	4.00	Low
					0.00	Low
					0.00	Low
					0.00	Low

Probability	Importance
Based on estimated likelihood of occurrence from historical data	2.0

Probability	Score
Unlikely	1
Occasional	2
Likely	3
Highly Likely	4

Location	Importance
hazard	0.8
Affected Area	Score
Negligible	1
Limited	2
Significant	3
Extensive	4

Maximum Probable Extent (Primary Impact)	Importance
Based on percentage of damage to typical facility in community	0.7
Impact	Score
Weak - little to no damage	1
Moderate - some damage, loss of service for days	2
Severe - devastating damage, loss of service for months	3
Extreme- catastrophic damage, uninhabitable conditions	4

Secondary Impacts	Importance
Based on estimated secondary impacts to community at large	0.5

Impact	Score
Negligible - no loss of function, downtime, and/or evacuations	1
Limited - minimal loss of function, downtime, and/or evacuations	2
Moderate - some loss of function, downtime, and/or	3
High - major loss of function, downtime, and/or	4

Total Score = Probability x Impact, where:

Probability = (Probability Score x Importance)

Impact = (Affected Area + Primary Impact + Secondary Impacts), where:

Affected Area = Affected Area Score x Importance

Primary Impact = Primary Impact Score x Importance

Secondary Impacts = Secondary Impacts Score x Importance

Hazard Planning Consideration

Total Score	Range	Distribution	Hazard Level
0.0	12.0	6	Low
12.1	42.0	8	Medium
42.1	64.0	0	High

The probability of each hazard is determined by assigning a level, from unlikely to highly likely, based on the likelihood of occurrence from historical data. The total impact value includes the affected area, primary impact

PENINSULA COLLEGE – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Directions:
The purpose of this worksheet is to **identify** and **prioritize** the hazards that your jurisdiction is vulnerable to.

Below is the list of hazards that your jurisdiction previously identified in the 2019 MJHMP. Included for reference is the complete list of hazards to be included in the 2024 MJHMP update.

On the next page, you will review and update the hazards list for inclusion in your jurisdictional annex. You will then provide scores for each hazard, which will be used to determine hazard prioritization.

Hazard Identification:

Hazards Previously Included in your 2019 Jurisdictional Annex (ranked by priority):

1. Power Outages
2. Earthquake
3. Cascadia Earthquake
4. Winter Storm
5. Windstorm
6. Tsunami
7. Wildfire
8. Hazardous Materials Incident
9. Flooding

Hazards Included in the 2024 Clallam County MJHMP:

- Dam/Reservoir Failure
- Disease (Infectious/Vector) and Pandemic
- Drought
- Flood
- Human-Caused Hazards
  - Hazardous Materials Spill
  - Maritime Disasters
  - Active Shooter/Terrorism
  - Utility Failure/Power Outage [secondary hazard]
  - Supply Chain Interruption [secondary hazard]
- Landslide
- Sea Level Rise
  - Coastal/Bluff Erosion
- Seismic Hazards
  - Cascadia Subduction Zone Earthquake
  - Onshore and Offshore Earthquakes, 7.0 Design level
- Severe Weather
  - Windstorm/Tornado
  - Winter Storm (rain, freezing rain, ice, snow, cold temperature
  - Extreme Heat
- Tsunami
- Wildfire (including wildfire smoke)

PENINSULA COLLEGE – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard Prioritization:

Step 1: Review the list of hazards below. Add any hazards from the 2024 list above that apply to your jurisdiction. Including hazards in this list will provide an opportunity for funding for mitigation projects.

Keep in mind: Each hazard profiled for your jurisdiction requires at least one (1) mitigation action, to be generated by each annex. Your jurisdiction will be responsible for updating your annex's mitigation measures next month.

Step 2: Assign a number from 1 - 4 for each criteria based on the scales and description below.

Probability: Likelihood of Occurrence within the Next Year
- 1 = Unlikely: Less than 1% chance within next year
- 2 = Occasional: 1% - 10% chance within next year
- 3 = Likely: 10% - 90% chance within next year
- 4 = Highly Likely: 90% to 100% chance within next year

Location: Size of the Geographical Area Affected by Hazard
- 1 = Negligible: less than 10% of planning area
- 2 = Limited: 10% to 25% of the planning area
- 3 = Significant: 25% to 75% of the planning area
- 4 = Extensive: 75% to 100% of the planning area

Primary Impact: Percentage of Damage to Typical Facility in Community
- 1 = Weak: Slow onset, short duration, little/no damage
- 2 = Moderate: Moderate onset, moderate duration, some damage
- 3 = Severe: Fast onset, long duration, devastating damage
- 4 = Extreme: Immediate onset, extended duration, catastrophic damage

Secondary Impacts: Estimated to the Community at Large
- 1 = Negligible: no loss of function, downtime and/or evacuations
- 2 = Limited: minimal loss of function, downtime and/or evacuations
- 3 = Moderate: some loss of function, downtime and/or evacuations
- 4 = High: major loss of function, downtime and/or evacuations

Hazard	Probability	Location	Primary Impact	Secondary Impact
Power Outages	2	2	1	1
Earthquake	3	2	3	2
Cascadia Earthquake	3	2	3	2
Winter Storm	3	2	3	2
Windstorm	3	2	3	2
Tsunami	1	1	1	1
Wildfire	2	2	2	1
Hazardous Materials Incident	2	2	2	1

PENINSULA COLLEGE – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard	Probability	Location	Primary Impact	Secondary Impact
Flooding	2	2	2	2
Mass Casuality Event	1	2	3	1
Cyber Event	1	3	4	3
[Add any New Hazard Here]				
[Add any New Hazard Here]				
[Add any New Hazard Here]				

HAZARD RANKING WORKSHEET - Port of Port Angeles Annex					DATE: 6/15/2024	
Hazard Type	**Probability**	**Impact**			**Total Score**	**Hazard Planning Consideration**
		Location	**Primary Impact**	**Secondary Impacts**		
Wildfire (Wildfire Smoke)	3.00	4.00	2.00	2.00	33.60	Medium
Disease (Infectious/Vector) and Pandemic	2.00	4.00	2.00	3.00	24.40	Medium
Severe Weather - Windstorm/Tornado	3.00	2.00	2.00	2.00	24.00	Medium
Severe Weather - Winter Storm	3.00	2.00	2.00	2.00	24.00	Medium
Severe Weather - Extreme Heat	3.00	2.00	2.00	2.00	24.00	Medium
Landslide	2.00	1.00	4.00	2.00	18.40	Medium
Seismic - Cascadia Earthquake	1.00	4.00	4.00	4.00	16.00	Medium
Seismic - Earthquake 7.0 Design Level	1.00	4.00	4.00	4.00	16.00	Medium
Flood	2.00	1.00	3.00	2.00	15.60	Medium
Drought	2.00	3.00	1.00	1.00	14.40	Medium
Tsunami	1.00	3.00	4.00	4.00	14.40	Medium
Sea Level Rise (Coastal/Bluff Erosion)	2.00	2.00	2.00	1.00	14.00	Medium
Human-Caused - Hazardous Materials	1.00	2.00	4.00	3.00	11.80	Low
Human-Caused - Maritime Disaster	1.00	2.00	4.00	3.00	11.80	Low
Human-Caused - Active Shooter/Terrorism	1.00	2.00	4.00	3.00	11.80	Low
Human-Caused - Utility Failure/Power Outage	1.00	2.00	4.00	3.00	11.80	Low
Human-Caused - Supply Chain Interruption	1.00	2.00	4.00	3.00	11.80	Low

Probability	Importance
Based on estimated likelihood of occurrence from historical data	2.0

Probability	Score
Unlikely	1
Occasional	2
Likely	3
Highly Likely	4

Location	Importance
hazard	0.8
Affected Area	Score
Negligible	1
Limited	2
Significant	3
Extensive	4

Maximum Probable Extent (Primary Impact)	Importance
Based on percentage of damage to typical facility in community	0.7
Impact	Score
Weak - little to no damage	1
Moderate - some damage, loss of service for days	2
Severe - devastating damage, loss of service for months	3
Extreme- catastrophic damage, uninhabitable conditions	4

Secondary Impacts	Importance
Based on estimated secondary impacts to community at large	0.5

Impact	Score
Negligible - no loss of function, downtime, and/or evacuations	1
Limited - minimal loss of function, downtime, and/or evacuations	2
Moderate - some loss of function, downtime, and/or	3
High - major loss of function, downtime, and/or	4

Total Score = Probability x Impact, where:

Probability = (Probability Score x Importance)

Impact = (Affected Area + Primary Impact + Secondary Impacts), where:

Affected Area = Affected Area Score x Importance

Primary Impact = Primary Impact Score x Importance

Secondary Impacts = Secondary Impacts Score x Importance

Hazard Planning Consideration

Total Score	Range	Distribution	Hazard Level
0.0	12.0	3	Low
12.1	42.0	12	Medium
42.1	64.0	0	High

The probability of each hazard is determined by assigning a level, from unlikely to highly likely, based on the likelihood of occurrence from historical data. The total impact value includes the affected area, primary impact

PORT OF PORT ANGELES – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Directions:
The purpose of this worksheet is to **identify** and **prioritize** the hazards that your jurisdiction is vulnerable to.

Below is the list of hazards that your jurisdiction previously identified in the 2019 MJHMP. Included for reference is the complete list of hazards to be included in the 2024 MJHMP update.

On the next page, you will review and update the hazards list for inclusion in your jurisdictional annex. You will then provide scores for each hazard, which will be used to determine hazard prioritization.

Hazard Identification:

Hazards Previously Included in your 2019 Jurisdictional Annex (ranked by priority):

1. Power Outages
2. Earthquake
3. Cascadia Earthquake
4. Winter Storm
5. Windstorm
6. Tsunami
7. Wildfire
8. Hazardous Materials Incident
9. Flooding

Hazards Included in the 2024 Clallam County MJHMP:

- Dam/Reservoir Failure
- Disease (Infectious/Vector) and Pandemic
- Drought
- Flood
- Human-Caused Hazards
  - Hazardous Materials Spill
  - Maritime Disasters
  - Active Shooter/Terrorism
  - Utility Failure/Power Outage [secondary hazard]
  - Supply Chain Interruption [secondary hazard]
- Landslide
- Sea Level Rise
  - Coastal/Bluff Erosion
- Seismic Hazards
  - Cascadia Subduction Zone Earthquake
  - Onshore and Offshore Earthquakes, 7.0 Design level
- Severe Weather
  - Windstorm/Tornado
  - Winter Storm (rain, freezing rain, ice, snow, cold temperature
  - Extreme Heat
- Tsunami
- Wildfire (including wildfire smoke)

PORT OF PORT ANGELES – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard Prioritization:

Step 1: Review the list of hazards below. Add any hazards from the 2024 list above that apply to your jurisdiction. Including hazards in this list will provide an opportunity for funding for mitigation projects.

Keep in mind: Each hazard profiled for your jurisdiction requires at least one (1) mitigation action, to be generated by each annex. Your jurisdiction will be responsible for updating your annex's mitigation measures next month.

Step 2: Assign a number from 1 - 4 for each criteria based on the scales and description below.

Probability: Likelihood of Occurrence within the Next Year
- 1 = Unlikely: Less than 1% chance within next year
- 2 = Occasional: 1% - 10% chance within next year
- 3 = Likely: 10% - 90% chance within next year
- 4 = Highly Likely: 90% to 100% chance within next year

Location: Size of the Geographical Area Affected by Hazard
- 1 = Negligible: less than 10% of planning area
- 2 = Limited: 10% to 25% of the planning area
- 3 = Significant: 25% to 75% of the planning area
- 4 = Extensive: 75% to 100% of the planning area

Primary Impact: Percentage of Damage to Typical Facility in Community
- 1 = Weak: Slow onset, short duration, little/no damage
- 2 = Moderate: Moderate onset, moderate duration, some damage
- 3 = Severe: Fast onset, long duration, devastating damage
- 4 = Extreme: Immediate onset, extended duration, catastrophic damage

Secondary Impacts: Estimated to the Community at Large
- 1 = Negligible: no loss of function, downtime and/or evacuations
- 2 = Limited: minimal loss of function, downtime and/or evacuations
- 3 = Moderate: some loss of function, downtime and/or evacuations
- 4 = High: major loss of function, downtime and/or evacuations

Hazard	Probability	Location	Primary Impact	Secondary Impact
Disease (Infectious/Vector) and Pandemic	2	4	2	3
Drought	2	3	1	1
Flood	2	1	3	2
Human-Caused Hazards	1	2	4	3

PORT OF PORT ANGELES – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard	Probability	Location	Primary Impact	Secondary Impact
• Hazardous Materials Spill • Maritime Disasters • Active Shooter/Terroris • Utility Failure/Power Outage [secondary hazard] • Supply Chain Interruption [secondary hazard]				
Landslide	2	1	4	2
Sea Level Rise • Coastal/Bluff Erosion	2	2	2	1
Seismic Hazards • Cascadia Subduction Zone Earthquake • Onshore and Offshore Earthquakes, 7.0 Design level	1	4	4	4
Severe Weather • Windstorm/Tornado • Winter Storm (rain, freezing rain, ice, snow, cold temperature • Extreme Heat	3	2	2	2
Tsunami	1	3	4	4

PORT OF PORT ANGELES – HAZARD IDENTIFICATION AND PRIORITIZATION WORKSHEET
DUE: June 15, 2024

Hazard	Probability	Location	Primary Impact	Secondary Impact
Wildfire (including wildfire smoke)	3	4	2	2

Capability Assessment Update

CITY OF FORKS – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Directions:
Please review the following capabilities and identify if the capability should be kept as is, removed, or updated; notes can be added in the last column if necessary for clarification, questions, etc. Please also add any new or additional capabilities by populating new rows in track changes/redline.

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

Resource	Department	Tasks and Activities Integrated into Mitigation Planning	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Public Works Director	Public Works & Utilities	Management of water and sewer infrastructure to include emergency repairs, usage monitoring, etc. Traffic management and roadway repair.	updated	
Building Inspector	Buildings & Permits Department	Professionals trained in construction practices relate to buildings and/or infrastructure	updated	
City Attorney/Planner	Legal & Planning Department	Ongoing participation in hazard mitigation planning process. Planner with knowledge of land development, land management, and environmental impact analysis.	updated	
[new resources here]				

CITY OF FORKS – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?	**Mark Capability As:** **KEEP, REMOVE or UPDATE**	**Annex Notes**
Community Development Block Grants	Yes		
Capital Improvement Project Funding	Yes		
Insurance	Yes		
User fees for utility services	Yes, Water & Sewer inside the Forks Urban Growth Area		
Incur debt	Yes		
State-sponsored grant programs	Yes		
[new resources here]			

CITY OF FORKS – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

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

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Plans	City of Forks Capital Improvement Plan (2024-2029)	Identifies capital improvement projects to be undertaken by the City over the next seven-year period. Includes water systems, sewer treatment systems, flood management, city structures, parks & recreation, airports, technology center, transit center, collaboration with other agencies.	▪ Updated plan for 2024 – 2029, including flood management projects.	Flooding	This is updated annually – usually in the late summer/early fall. Current version is 2024-2029.	
	2019 – 2039 Forks Comprehensive Plan	The City's Comprehensive Plan establishes Urban Growth Areas, natural resource lands, rural lands, and public lands.	▪ Updated plan for 2019 - 2039	N/A	State mandated comp plan update underway. Expected adoption is June 2025.	
	Transportation Improvement Plan (Six-Year Street Plan 2023 – 2028)	Lists transportation projects for a six-year period.	▪ Updated for 2023 to 2028.	N/A	This is updated annually – usually in the summer.	
	Forks Comprehensive Flood Management Program	Conducted in tandem with capital improvements planning	▪ N/A	Flooding		
Policies	Forks Municipal Code	Title 14 and 15 relate to Environment (including flood management) and Buildings and Construction (fire district).	▪ Current through Ordinance 673, passed 1 April 2024	Flood, fire	Flood Hazard Chapter was completely updated taking effect 15 May 2024 per Ordinance 673.	

CITY OF FORKS – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
	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		I have no idea what this is referring to.
	Zoning Ordinance	Provides land use regulation in the City of Forks – Title 17 of FMC.	▪ Current code through Ordinance 634, passed 12 Mar 2018	All	Updated	Last amendment passed regarding the zoning code.
	National Flood Insurance Program (NFIP)	NFIP aims to reduce the impact of flooding on private and public structures.	▪ All participating jurisdictions currently participating in NFIP	Flooding	Maps are currently being updated	
[new resources here]			▪			

Table 4-5 Education and Outreach Programs Integrated with Hazard Mitigation (please identify any education/outreach programs and opportunities to communicate risk and mitigation efforts to staff and community members)

Education/Outreach Capability	Description	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
[new resources here]			

CITY OF FORKS – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
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Education/Outreach Capability	Description	**Mark Capability As:** **KEEP, REMOVE or UPDATE**	**Annex Notes**

CITY OF PORT ANGELES – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Directions:
Please review the following capabilities and identify if the capability should be kept as is, removed, or updated; notes can be added in the last column if necessary for clarification, questions, etc. Please also add any new or additional capabilities by populating new rows in track changes/redline.

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

Resource	Department	Tasks and Activities Integrated into Mitigation Planning	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Planning Manager	Department of Community & Economic Development (DCED)	Planners with knowledge of land development and land management practices	keep	
City Engineer~~Planning Manager~~	Public Works~~DCED~~ and Fire Marshal	Engineers or professionals trained in construction practices relate to buildings and/or infrastructure	Update	
Planning Manager	DCED	Planners or engineers with an understanding of natural and/or human-caused hazards	keep	
City Manager/**Fire Chief**	Fire Department	Emergency Manager	keep	
City Engineer~~Planning Manager~~	Publ;ic Works ~~DCED~~	Floodplain Manager	Update	
GIS Analyst	Public Works	Personnel skilled in Geographic Information Systems (GIS)	keep	
Planning Manager/City Engineer	DCED	Resource development staff or grant writers	Update	
Public Works Director	Public Works	Ongoing participation in hazard mitigation planning process	keep	

CITY OF PORT ANGELES – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?	Mark Capability As: KEEP, REMOVE or UPDATE	Annex Notes
Community Development Block Grants	Yes	keep	
Capital Improvement Project Funding	Yes	keep	
Insurance	Yes	keep	
User fees for utility services	Yes	keep	
Incur debt	Yes	keep	
Federal/State-sponsored grant programs	Yes	update	
Partnering arrangements/intergovernmental agreements	Yes	keep	

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

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	Mark Capability As: KEEP, REMOVE or UPDATE	Annex Notes
Plans	County Comprehensive Emergency Management Plan	Outlines roles and responsibilities of government in mitigating potential hazards.	▪ Incorporation of partners into emergency planning into operations	All	keep	

CITY OF PORT ANGELES – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
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Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
	2016 – 2036 Comprehensive Plan	The City's Comprehensive Plan establishes Urban Growth Areas, natural resource lands, rural lands, and public lands.	▪ Completion of Housing Action Plan	All	keep	
	Harbor Resource Management Plan	Provides guidance by providing a coordinated plan for the future utilization of the Port Angeles Harbor.	▪ Approval of this plan provided a framework and baseline for the SMP	Flooding	keep	
	Port Angeles School District Hazard Mitigation Plan	The plan focuses on the hazards that pose the greatest threats to the District's facilities and people: Earthquake, flood, wildlife and urban interface fire and landslide.	▪ Plan development (2015) ▪ Issuance for public comment and adoption (2016)	Earthquake, flood, WUI fire, landslide	keep	
	Shoreline Master Program	Influences uses and future development in shoreline areas and ensures protection of waterfront habitat.	Adoption of the plan on October 21, 2014	Flooding, Hazardous Materials	keep	
	2020-2025 Capital Facilities Plan & Transportation Improvement Plan	Identifies capital improvement projects to be undertaken by the City over the next five-year period.	▪ Inclusion of hazard mitigation and maintenance projects	All	keep	
	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	keep	

CITY OF PORT ANGELES – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
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Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Policies	Zoning Ordinance	Provides land use regulation in the unincorporated portions of the City.	▪ Current code through Ordinance 3619, passed February 19, 2019	All	keep	
	Subdivision Ordinance	Incorporated into zoning ordinance, establishes regulations around subdivision of properties.	▪ Current code through Ordinance 3619, passed February 19, 2019	All	keep	
	Flood Damage Prevention Ordinance	The City floodplain management ordinance incorporated into the Critical Areas ordinance is designed to protect and conserve the environmental attributes of the City and add to the quality of life for residents.	▪ Defines areas of special flood hazard ▪ Requirements for development within an area of special flood hazard	Flooding	keep	
	Critical and Environmentally Sensitive Areas Protection	Define and protect critical areas as required by the Growth Management Act.	▪ Defines areas of geological hazard that are of special concern to the City.	Landslide, Earthquake, Flooding	keep	
	National Flood Insurance Program (NFIP)	NFIP aims to reduce the impact of flooding on private and public structures.	▪ All participating jurisdictions currently participating in NFIP	Flooding	keep	

CITY OF PORT ANGELES – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
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Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
	Building Codes	Building permits are issued by the Department of Community and Economic Development and aligned with ICC 2015 building codes.	▪ Adoption of 2015 ICC codes	All	keep	

Table 4-5 Education and Outreach Programs Integrated with Hazard Mitigation (please identify any education/outreach programs and opportunities to communicate risk and mitigation efforts to staff and community members)

Education/Outreach Capability	Description	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
[new resources here]			

CITY OF SEQUIM – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Directions:
Please review the following capabilities and identify if the capability should be kept as is, removed, or updated; notes can be added in the last column if necessary for clarification, questions, etc. Please also add any new or additional capabilities by populating new rows in track changes/redline.

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

Resource	Department	Tasks and Activities Integrated into Mitigation Planning	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Community Development Director	Community Development	Oversees community development and update of strategic planning relating to land use	Keep	
Community Development Senior Planner	Community Development	Planner with knowledge of land development and land management practices	Keep	unfilled
Director of Public Works	Public Works Department	Engineers and/or professionals trained in construction practices related to City buildings and/or infrastructure	Keep	
City Engineer	Public Works Department		Keep	
Project Engineer	Public Works Department		Keep	
Resource Manager	Public Works Department	~~Geologist with an understanding of natural and/or human-caused hazards in the area. Additionally,~~ Sserves as resource development lead and grant writer.	Keep/ Update	
Police Chief	City of Sequim Police Department	Serves as a liaison for County emergency management and planning.	Keep	
GIS/Engineering Technician II	Public Works Department	Personnel skilled in Geographic Information Systems (GIS)	Keep	
~~**[new resources here]**~~**Police Sargeant**	Police Department	Serves as a liaison for County emergency management and planning.	Update	
Emergency Management Coordinator	Police Department	Coordinates City CEMP & emergency management planning with county & area responders	Update	

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Community Development Block Grants	No	Remove?	Maybe integrate this entry into new entry on grants below
Special Purpose Taxes	Yes, Transportation Benefit District		
Insurance	Yes		
User fees for utility services	No		
Incur debt	Yes		
Development Impact Fees	~~Yes~~No	Update	
General Obligation, Revenue, and/or Special Tax Bonds	Yes		
Partnering arrangements or intergovernmental agreements	Yes		
~~[new resources here]~~Emergency Grants-Various Agencies	Yes	Update	

CITY OF SEQUIM – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

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

Capability Type	Capability	Description	Key Accomplishments (2010-2019)(2019-2025)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Plans	County Comprehensive Emergency Management Plan	Outlines roles and responsibilities of tribal government in mitigating potential hazards.	▪ Incorporation of partners into emergency planning into operations	All		
	2015 – 2035 Comprehensive Plan	The City's Comprehensive Plan establishes Urban Growth Areas, natural resource lands, rural lands, and public lands.	▪ Updated ~~zone mapping~~ comprehensive plan 2024-2025	All	Update?	Undergoing update to 2025-2045
	Stormwater Management Needs Assessment	Sequim Public Works identified "problem areas" and documented physical and operational stormwater management.	▪ Utilized in annual capital improvement planning~~Major findings of the Needs Assessment project were presented to City Council at a study session on March 10, 2014.~~	Flooding	Update	
	Storm & Surface Water Master Plan	The Storm & Surface Water Master Plan is established to improve the quality of stormwater runoff, reduce speed and volume of stormwater flows, and raise public awareness of stormwater issues.	▪ ~~Plan adopted by Council in April 2016~~Utilized in annual capital improvement planning	Flooding	Update	

CITY OF SEQUIM – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Capability Type	Capability	Description	Key Accomplishments (2010-2019)(2019-2025)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
	20~~19 – 2024~~24-29 Capital Improvement Plan	Identifies capital improvement projects to be undertaken by the City over the next five-year period.	▪ Inclusion of hazard mitigation and maintenance projects (updated annually)	All		
	State of Washington Enhanced Hazard Mitigation Plan	Profiles hazards throughout the State, assesses risks, and outlines potential mitigation actions.	▪ Collaboration between State and County	All		
Policies	Zoning Ordinance	Provides land use regulation in the unincorporated portions of the City.	▪ Current code through **Ordinance 2024-019, passed April 22, 2024**~~Ordinance 2019-012, passed July 8, 2019~~	All	Update	
	Subdivision Ordinance	Incorporated into zoning ordinance, establishes regulations around subdivision of properties.	▪ Current code through **Ordinance 2024-019, passed April 22, 2024**~~Ordinance 2019-012,~~	All	Update	

CITY OF SEQUIM – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Capability Type	Capability	Description	Key Accomplishments (2010-2019)(2019-2025)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
			~~passed July 8, 2019~~			
	Flood Damage Prevention Ordinance	The City floodplain management ordinance incorporated into the Critical Areas ordinance is designed to protect and conserve the environmental attributes of the City and add to the quality of life for residents.	▪ Defines areas of special flood hazard ▪ Requirements for development within an area of special flood hazard	Flooding		
	Critical and Environmentally Sensitive Areas Protection	Define and protect critical areas as required by the Growth Management Act.	▪ Defines areas of geological hazard that are of special concern to the City.	Landslide, Earthquake, Flooding		
	National Flood Insurance Program (NFIP)	NFIP aims to reduce the impact of flooding on private and public structures.	▪ All participating jurisdictions currently participating in NFIP	Flooding		
	Building Codes	Building permits are issued by the Department of Community Development and aligned with ICC ~~2015~~ 2021 building codes.	▪ Adoption of ~~2015~~ 2021 ICC codes	All	Update	
	Sustainability and Resiliency Resolution	RA ~~r~~esolution R2016-16 adopting policies that improve the city's sustainability and resiliency	▪ Prioritized city resiliency and sustainability	All	Update	

CITY OF SEQUIM – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Table 4-5 Education and Outreach Programs Integrated with Hazard Mitigation (please identify any education/outreach programs and opportunities to communicate risk and mitigation efforts to staff and community members)

Education/Outreach Capability	Description	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
~~[new resources here]~~2019 City of Sequim Comprehensive Emergency Management Plan	Use by officials to provide emergency management preceding, during and following disasters; the policies, information, recommendations and guidance necessary for the officials making operational decisions	Update	

JAMESTOWN S'KLALLAM TRIBE – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Directions:
Please review the following capabilities and identify if the capability should be kept as is, removed, or updated; notes can be added in the last column if necessary for clarification, questions, etc. Please also add any new or additional capabilities by populating new rows in track changes/redline.

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

Resource	Department	Tasks and Activities Integrated into Mitigation Planning	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Tribal Council	Government Office	Ensure mitigation program is incorporated into the Tribe's daily business	Keep	
Planning ~~Staff~~Director	Operations	Oversee mitigation program and encourage integration of mitigation planning into all Tribal development activities.	Keep	
Natural Resources Director	Natural Resources Department	Manage natural resources within the Tribe's properties. Capacities include environmental planning, habitat programs, and fisheries.	Keep	
Construction Manager & Facilities Manager	Operations – Building Division	Repair and maintain tribal infrastructure. Oversees Tribal construction projects providing permitting, regulations and project management services.	Keep	
Economic Development Authority Board of Directors and Staff	Economic Development Authority	Integrate risk reduction into Tribal economic development corporations and plan for strategic expansion.	Keep	
Grant and Contract Specialist	Finance Department	Manage grant awards, applications and project budgets for tribal programs.	Keep	

Resource	Department	Tasks and Activities Integrated into Mitigation Planning	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
GIS/Data Management Specialist	Natural Resources – Environmental Planning	Integrate hazard data into mapping capabilities of the Tribe.	Keep	
Tribal Historic Preservation Officer	Operations – Tribal Historic Preservation Office	Integrate risk reduction into protection of Tribal cultural resources, archives and collections.	Keep	
Other				
Planners or engineers	Operations	Integrate risk assessments and mitigation tactics into ongoing Tribal projects.	Keep	
Construction professionals	Operations – Building Division	Manage structural mitigation activities for utility services.	Keep	
Hazardous Materials Planning	Clallam County Local Emergency Planning Council	Develop capacity for local jurisdictions to prepare for and respond to hazardous materials incidents.	Keep	
[new resources here]				

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Community Development Block Grants	Yes	Keep	
Capital Improvement Project Funding	Yes	Keep	

JAMESTOWN S'KLALLAM TRIBE – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Financial Resource	Accessible?	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Insurance	Yes	Keep	
User fees for utility services	No	Keep	
Incur debt	Yes	Keep	
State-sponsored grant programs	Yes	Keep	
~~[new resources here]~~BIA Tribal Climate Resilience	Yes	Update	
Other Federal grant programs	Yes	Update	

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

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Plans	County Comprehensive Emergency Management Plan	Outlines roles and responsibilities of tribal government in mitigating potential hazards.	▪ Incorporation of partners into emergency planning into operations	All		
	Comprehensive Plan	The Tribe's Comprehensive Plan establishes community and governance goals that guide the Tribe's self-reliance through future expansion.	▪ Develop plan to establish goals and priorities for Tribal citizens	All		

JAMESTOWN S'KLALLAM TRIBE – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
	Floodplain Management Plan	The County has developed a Dungeness River Comprehensive Flood Hazard Management Plan to study the risk of flooding along the river. The Tribe participated in plan development as co-leaders of the Dungeness River Management Team (DRMT)	▪ Plan was approved by Washington Department of Ecology in 2010	Flooding	Keep	
	Dungeness Watershed Plan: Protecting and Restoring the Waters of the Dungeness	A watershed-based plan prepared in compliance with Section 319 of the Clean Water Act.	▪ Ongoing implementation	Flooding	Keep	
	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	Keep	
	Jamestown S'Klallam Tribe Climate Vulnerability Assessment and Adaptation Plan	Projection of climate change/sea level impacts on Tribal lands and resources	▪	climate change, sea level rise, flooding	Update	New addition 2024 but study is from 2013
Policies	Tribal Code Title 29: Building and Development Code	Provides code to cover the construction, renovation, and removal of buildings on, and the development of, the trust and reservation lands of the Jamestown S'Klallam Tribe.	▪ Current code May 1, 2017.	All	Keep	

JAMESTOWN S'KLALLAM TRIBE – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
	Tribal Code Title 28: Public Health And Safety Code	Provides for a public health and safety code to cover certain activities that occur on the trust and reservation lands of the Jamestown S'Klallam Tribe and for other purposes.	▪ Approved on August 31, 2010 ▪ Most recently aamended on November 2, 2020, by adding a new chapter dealing with Emergency Proclamations by the Tribal government.	All	Update	
	Tribal Code Title 27: Building and Development Code	Tribal Environmental Policy Act (TEPA). Provides code to cover procedures for emergency construction and other activities directly related to emergencies.	▪ TEPA was approved on July 27, 2009.	All	Keep	
	Coastal Zone Management Plan	Regulates development in potentially hazard prone areas.	▪ Ongoing implementation	Flooding	Keep	
	National Flood Insurance Program (NFIP)	NFIP aims to reduce the impact of flooding on private and public structures.	▪ All participating jurisdictions currently participate in NFIP	Flooding	Remove	JST does not participate in the NFIP

Table 4-5 Education and Outreach Programs Integrated with Hazard Mitigation (please identify any education/outreach programs and opportunities to communicate risk and mitigation efforts to staff and community members)

JAMESTOWN S'KLALLAM TRIBE – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Education/Outreach Capability	Description	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
~~[new resources here]~~Dungeness River Nature Center (DRNC)	DRNC works to educate people of all ages on the Dungeness River watershed. This includes information on the river's flood plain and historic channel migration zones.	Update	

LOWER ELWHA KLALLAM TRIBE – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Directions:
Please review the following capabilities and identify if the capability should be kept as is, removed, or updated; notes can be added in the last column if necessary for clarification, questions, etc. Please also add any new or additional capabilities by populating new rows in track changes/redline.

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

Resource	Department	Tasks and Activities Integrated into Mitigation Planning	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Chief Executive Officer	Business Committee	Ensures the mitigation program is incorporated into the Tribe's daily business	Keep	
Director of Emergency Management	Police Department	Oversee mitigation program and encourage integration of mitigation planning into all tribal activities	Keep	
Natural Resources Director	Natural Resources Department	Manage natural resources within the Tribe's properties	Keep	
Geographic Information System (GIS) Mapping Program Manager	Natural Resources Department	Integrate hazard data into mapping capabilities of the Tribe	Keep	
[Public Health Officer	Dept of Public Health	Public health planning and resourcing	Add	

LOWER ELWHA KLALLAM TRIBE – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Community Development Block Grants	Yes	Keep	
Capital Improvement Project Funding	Yes	Keep	
Insurance	Yes	Keep	
Incur debt	Yes	Keep	
State-sponsored grant programs	Yes	Keep	
[new resources here]			

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

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Plans	Lower Elwha Klallam Comprehensive Emergency Operations Plan	Contains information that may be used to protect people and property on or near the Lower Elwha Klallam Reservation.	▪ Hiring of a Director of Emergency Management ▪ Incorporation of emergency planning into tribal operations	All	Keep	

LOWER ELWHA KLALLAM TRIBE – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
	Comprehensive Flood Hazard Management Plan	Examines flood related hazards that exist on the lower Elwha River near its confluence with the Strait of Juan de Fuca.	▪	Flooding		
Policies	Special Flood Hazard Ordinance	A Tribal regulatory tool to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas.	▪ Signed into agreement	Flooding		
Programs	Northwest Tribal Emergency Management Council	Support tribal participation on homeland security and emergency management preparedness efforts.	▪ Joined the consortium	All		
	Elwha River Restoration	Rehabilitation of formerly dammed floodplain.	▪ Removal of the Lower Elwha dams	Flooding		
	National Incident Management System (NIMS) Compliance Training	Training of all tribal police officers, department heads, Board members, and relevant staff in NIMS	▪ Ongoing	All		

Table 4-5 Education and Outreach Programs Integrated with Hazard Mitigation (please identify any education/outreach programs and opportunities to communicate risk and mitigation efforts to staff and community members)

LOWER ELWHA KLALLAM TRIBE – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Education/Outreach Capability	Description	**Mark Capability As:** **KEEP, REMOVE or UPDATE**	**Annex Notes**
[new resources here]			

PENINSULA COLLEGE ANNEX – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Directions:
Please review the following capabilities and identify if the capability should be kept as is, removed, or updated; notes can be added in the last column if necessary for clarification, questions, etc. Please also add any new or additional capabilities by populating new rows in track changes/redline.

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

Resource	Department	Tasks and Activities Integrated into Mitigation Planning	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Peninsula College				
Emergency Manager	Finance & Administration	Emergency management and campus public safety.	KEEP	
Geology Instructor	Geosciences Department	Staff with education or expertise to assess vulnerability to hazards.	KEEP	
[new resources here]				

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Community Development Block Grants	NO	UPDATE	
Capital Improvement Project Funding	Yes	KEEP	
Insurance	Yes	KEEP	
Incur debt	Yes	KEEP	
[new resources here]			

PENINSULA COLLEGE ANNEX – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

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

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
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	KEEP	
	Flood Management	Peninsula College complies with the City of Port Angeles' requirements for permitting and development in flood-prone areas to comply with NFIP requirements (see Municipal Code Section 15.20.060).	▪ N/A	Flooding	KEEP	
[new resources here]			▪			

Table 4-5 Education and Outreach Programs Integrated with Hazard Mitigation (please identify any education/outreach programs and opportunities to communicate risk and mitigation efforts to staff and community members)

Education/Outreach Capability	Description	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
SharePoint	Communication on this platform reaches employees	UPDATE	
Drills	Quarterly drills: Active shooter, Earthquake, Fire, Cyber event	UPDATE	

PORT OF PORT ANGELES ANNEX – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Directions:
Please review the following capabilities and identify if the capability should be kept as is, removed, or updated; notes can be added in the last column if necessary for clarification, questions, etc. Please also add any new or additional capabilities by populating new rows in track changes/redline.

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

Resource	Department	Tasks and Activities Integrated into Mitigation Planning	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Port of Port Angeles				
Director of Engineering	Engineering Department	Engineer trained in construction practices related to Port buildings and/or infrastructure.	KEEP	
Grants & Contracts Manager	Engineering Department	Applies for grant funding and manages grants	UPDATE	
Airport ~~& Real Estate~~ Manager	Operations	Oversees management ~~of real estate associated with~~ of the airport and facilities.	UPDATE	Updated to detail that airport manager no longer manages real estate
Operations Supervisor	Operations	Oversees management and day-to-day operations.	KEEP	
Marine Terminal Manager	Operations	Oversees management of the Port's marine terminals	UPDATE	
Director of Finance & Administration	Admin	Oversees finance department and manages insurance claims	UPDATE	

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Community Development Block Grants	Yes	KEEP	
Capital Improvement Project Funding	Yes	KEEP	
Insurance	Yes	KEEP	
Incur debt	Yes	KEEP	
[new resources here]			

Table 4-4 Port of Port Angeles Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
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	KEEP	
	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	KEEP	
	Storm Water Management Planning	Port has maps of stormwater infrastructure along waterfront and airport property per Industrial Stormwater General Permit	▪ Update of stormwater	Flooding	KEEP	

PORT OF PORT ANGELES ANNEX – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
			management practices			
	Flood Management	The Port complies with the City of Port Angeles' requirements for permitting and development in flood-prone areas to comply with NFIP requirements (see Municipal Code Section 15.20.060).	▪ N/A	Flooding	KEEP	
	Capital Project Prioritization	Current plan detailing Port improvements is in place.	▪ Updated within the last 5 years, with capital projects focused on hazard mitigation	All	KEEP	
[new resources here]			▪			

Table 4-5 Education and Outreach Programs Integrated with Hazard Mitigation (please identify any education/outreach programs and opportunities to communicate risk and mitigation efforts to staff and community members)

Education/Outreach Capability	Description	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
[new resources here]			None at this time.

PORT OF PORT ANGELES ANNEX – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

CLALLAM COUNTY PUD – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Directions:
Please review the following capabilities and identify if the capability should be kept as is, removed, or updated; notes can be added in the last column if necessary for clarification, questions, etc. Please also add any new or additional capabilities by populating new rows in track changes/redline.

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

Resource	Department	Tasks and Activities Integrated into Mitigation Planning	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
PUD				
Commissioners	Board of Commissioners	Publicly elected Board overseeing PUD activities, including hazard mitigation planning.	Keep	
Safety Manager	PUD	Liaison with the County to oversee hazard mitigation planning.	Keep	
[new resources here]				

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
Community Development Block Grants	Yes	Keep	
Capital Improvement Project Funding	Yes	Keep	
Insurance	Yes	Keep	

CLALLAM COUNTY PUD – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Financial Resource	Accessible?	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
User fees for utility services	Yes	Keep	
Incur debt	Yes	Keep	
[new resources here]			

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

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
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	Keep	
	Clallam County Flood Management	PUD complies with Clallam County flood management practices, including County Code requirements outlined in Chapters 21 (Building and Construction) and 27 (Environment).	▪ N/A	Flooding	Keep	
	~~2019~~ Strategic Plan	Outlines actions to continue serving PUD customers.	▪ ~~Plan~~ Updated vision statement to pledge reliability of services through climate change	~~N/A~~All	Update	2019 Strategic Plan changed to PUD Strategic Plan

CLALLAM COUNTY PUD – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
	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	Keep	
	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	Keep	
	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	Keep	
	Emergency Response and Restoration Plan	Outlines responsible preplanning, and the response and restoration of power, water, fiber, and sewer services	▪ N/A	All	Update	
[new resources here]			▪			

Table 4-5 Education and Outreach Programs Integrated with Hazard Mitigation (please identify any education/outreach programs and opportunities to communicate risk and mitigation efforts to staff and community members)

CLALLAM COUNTY PUD – CAPABILITIES ASSESSMENT ANNEX WORKSHEET
DUE: June 15, 2024

Education/Outreach Capability	Description	**Mark Capability As: KEEP, REMOVE or UPDATE**	**Annex Notes**
~~[new resources here]~~Clallam County Fair	A booth at the County Fair provides an opportunity for a larger outreach.	Update	
Sequim Sunshine Festival	PUD's presence at the festival allows for targeted outreach to Sequim related matters	Update	
Home Show	PUD's presence at the showallows for targeted outreach to Port Angeles related matters	Update	
NPBA Builder's Expo	PUD's presence at the expo allows for targeted outreach to engage the builder/construction community	Update	
Sequim River Festival	PUD's presence at the festival allows for targeted outreach to Sequim related matters	Update	
Makah Day	PUD's presence at the festival allows for targeted outreach to Makah related matters	Update	
Quileute Day	PUD's presence at the festival allows for targeted outreach to Quileute related matters	Update	

Mitigation Actions Update

PENINSULA COLLEGE – PREVIOUS MITIGATION ACTIONS WORKSHEET
DUE: July 15, 2024

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  - Mark **Yes** if action is still relevant, will keep in MJHMP Update
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New mitigation actions will be developed as part of a later data request.

Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
PC01	Renovate/Replace N Building, Main Campus	2010 Action – Ongoing	Not Completed	Yes	Finance and Administration	Ongoing	Ongoing	All hazards	FEMA, Capital Funds	
PC02	Renovate/Replace J Building, Main Campus	2010 Action – Ongoing	Not Completed	Yes	Finance and Administration	Ongoing	Ongoing	All hazards	FEMA, Capital Funds	
PC03	Renovate/Replace Q Building, Main Campus	2010 Action – Ongoing	Not Completed	Yes	Finance and Administration	3-5 years Approx.	2027	All hazards	FEMA, Capital Funds	
PC04	Renovate/Replace P Building, Main Campus	2010 Action – Ongoing	Not Completed	Yes	Finance and Administration	Ongoing	Ongoing	All hazards	FEMA, Capital Funds	
PC05	Incorporate hazard mitigation into Master Plan	2010 Action – Ongoing	Not Completed	Yes	Finance and Administration	Ongoing	Ongoing	All hazards	FEMA, Capital Funds	
Adopt the Hazard Mitigation Plan		Completed – Re-adopting updated 2019 HMP			Planning Department	1 year		All hazards	N/A	

PORT OF PORT ANGELES – PREVIOUS MITIGATION ACTIONS WORKSHEET
DUE: July 15, 2024

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Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
POPA01	Strengthen airport runway to facilitate landing of large emergency aircraft.	New	Not Completed	Yes	Port of Port Angeles	1-3 years	5-10 years	Earthquakes, Tsunami, Water Shortages, Windstorm	FEMA Grant, Operating Budget (Larger cost savings will be realized by completing this project in conjunction with the 2022 runway rehab project)	
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	Not Completed	Yes	Planning Department	<1 year	1-3 year	Earthquakes, Winter Storm, Tsunami, Windstorm	FEMA Grant, Operating Budget	
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	Not Completed	Yes	Facilities Maintenance - Port of Port Angeles	1-3 years	1-3 year	Utility Failure, Winter Storm, Tsunami	Operating Budget, Grant	
POPA04	Build a portable emergency water supply.	New	Not Completed	Yes	Facilities Maintenance - Port of Port Angeles	1-3 years	1-3 year	All Hazards, Drought	Operating Budget	
POPA05	Strengthen airport taxiway to increase weightbearing capacities for emergency aircraft.	New	Not Completed	Yes	Port of Port Angeles	1-3 years	1-3 year	Earthquakes, Tsunami, Water Shortages, Windstorm	FEMA Grant, Operating Budget (Larger cost savings will be realized by completing this project in conjunction with the 2022 runway rehab project)	
Adopt the Hazard Mitigation Plan			Completed	Yes	Planning Department	1 year	1 year	All hazards	N/A	

CITY OF FORKS – PREVIOUS MITIGATION ACTIONS WORKSHEET
DUE: July 15, 2024

Directions:
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Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
FR01	City of Forks Culvert Assessment Study/Report	2010 Action –Ongoing	*Not Completed*	Yes	Public Works and Planning Departments	2010-2011	2024-2026	Flooding	Grant funding, Street Department funding	After the Nov 21 flood events, the City did sight inspection of various culverts. Some where replaced and improvements made to the associated ditchworks. Others were noted as being worth further evaluation. The City does not have an engineer or hydrologist so additional work is needed here.
FR02	Storm-related Roof Damage Mitigation Assessment	2010 Action –Ongoing	Ongoing	Maybe with explanation	Planning Department	2010-2011	2024-2029	Flooding, Winter Storms, Windstorms	FEMA HMA, CDBG, Energy conservation dollars	This was placed to address post storm events where high winds might occur and technical inspections and assistance would be necessary to address facilities needing to make

Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
										roof improvements but that were not damaged by the storm event.
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.	This additional stormwater drainage system is still needed and still needs to be developed.	Yes	Utilities Department	1-3 years	2025-2029	Flooding	City of Forks, Clallam County Public Works, FCAAP (Ecology)	This is completely contingent upon the City receiving some grant funding to acquire consultants or donated technical assistance to further develop this ditch channel from Calawah into a yet to be constructed holding and infiltration pond on the City owned property.
Adopt the Hazard Mitigation Plan (HMP)	Adopt the HMP	Completed – Re-adopting updated 2019 HMP	We also adopted the more recent HMP as I recall.	Yes	Planning Department	1 year		All hazards	N/A	It's a place holder and one that should be kept.

CITY OF SEQUIM – PREVIOUS MITIGATION ACTIONS WORKSHEET
DUE: July 15, 2024

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Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
SQ01	Build fuel station at City Public Works Yard to supply fuel to City departments and all emergency responders.	New	Not Completed	Yes	City Public Works, Police Department	1-3 years		Earthquake, Flood, Utility Failure, Winter Storm, Tsunami, Windstorm	Federal Emergency Management Agency (FEMA)	
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	Not Completed	Yes	Public Works Department	1 – 3 years	5-7 years	Floods, Utility Failure, Winter Storm,	FEMA, Drinking Water State Revolving Fund (DWSRF)	
SQ03	Purchase a portable water purification system and small tanks. Prepare multiple sites and equipment to operate water purification	New	Not Completed	Yes	Public Works Department	2 years	3-5 years	Earthquake, flooding, tsunami	Drinking Water State Revolving Fund (DWSRF), FEMA	
SQ04	Locate site for new potable water reservoir, purchase property, design and construct.	New	Not Completed	Yes	Public Works Department	3-5 years	5-7 years	Winter storms, flooding	City of Sequim general fund, property owners, developers, Public Utility District (PUD	
SR05	Reroute/reconfigure electrical supply to the City of Sequim Water Reclamation Facility at 247 Schmuck Road by bringing new power source into the facility and using existing supply as backup.	2010 Action –Ongoing	Not Completed	Yes	Public Works Department, PUD	3-5 years		Utility Failure	Drinking Water State Revolving Fund (DWSRF), FEMA	
SR06	Construct deep water well (>600 feet) to increase resiliency and reliability within water system.	New	One underway; one additional planned	Yes	Public Works Department	1-3 years	5-7 years	Utility Failure, Drought, Water Shortage	Drinking Water State Revolving Fund (DWSRF), FEMA	
SR07	Connect and extend City water mains to improve looping, during water main replacements and developer projects.	New	Ongoing	Yes	Public Works Department	3-5 years		Earthquakes, Excessive Heat, Utility Failure, Water Shortages, Wildfires	Drinking Water State Revolving Fund (DWSRF), Developers	

CITY OF SEQUIM – PREVIOUS MITIGATION ACTIONS WORKSHEET
DUE: July 15, 2024

Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
SQ08	Purchase Additional Heavy Equipment for Use during Severe Storms	2010 Action –Ongoing	Not Completed	Yes	Public Works Department	0-5 years		Winter storms, flooding	City of Sequim general fund	
SQ09	Develop Reliable Backup Program for Critical City Data Entry Post-Disaster	2010 Action –Ongoing	Ongoing	Yes	Finance Department (Information Technology)	2 years		All hazards	City of Sequim general fund	
SQ10	Capture stormwater in the County southwest of Sequim city limits and re-infiltrate using green stormwater infrastructure to benefit the watershed.	New	Not Completed	Yes	City of Sequim Public Works, Clallam County Public Works	<1 year	1-2 years	Flooding, Drought, Wildfire	Application submitted to FEMA Hazard Mitigation Program	Funding obtained through FEMA grant
SQ11	Install an energy storage microgrid for storing solar energy for use in the EOC and Civic Center during power outage emergencies.	New	Not Completed	Yes	Public Works Department	1-3 years		All hazards	Washington State Department of Commerce	
SQ12	Replace mid-1900s AC pipe running through the City with earthquake-resistant pipe.	New	Ongoing	Yes	Public Works Department	3-5 years		Earthquake, Utility Failure	City Budget, Grant	
SQ13	Protect/reinforce Johnson Creek Trestle for the Olympic Discovery Trail west of Whitefeather Way	New	Not Completed	Yes	Public Works Department	3-5 years		Earthquake, Flooding, Landslide, Winter Storm	City Budget, Grant	Design funding obtained through FHWA RAISE grant
SQ14	Train City staff to perform seismic assessments of City properties	New	Ongoing	Yes	Public Works Department	1-3 years		Earthquakes	Staff time	Water Reservoirs in progress
SQ15	Conduct wildfire risk assessment for City of Sequim and Fire District 3	New	Not Completed by Public Works	Yes	Public Works Department and Clallam Co. Fire District 3	1-3 years		Wildfire	Grant	
SQ16	Implement asset management using GIS for all capital facilities	New	Ongoing	Yes	Public Works Department	1-3 years		All Hazards	Existing Budget	
SQ17	Coordinate Emergency Management/Incident Response trainings for North Olympic Peninsula jurisdictions	New	Ongoing	Yes	Sequim Police Department	<1 year		All Hazards	Existing Budget	
SQ18	Public education of potential hazards, local agency response, and preparedness	New	Not Completed	Yes	Sequim Police Department	<1 year		All Hazards	Existing Budget	
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	Not Completed	Yes	Sequim Police Department	<1 year		All Hazards	Existing Budget, Grant	
Adopt the Hazard Mitigation Plan		Completed – Re-adopting updated 2019 HMP			Planning Department	1 year		All hazards	N/A	Not sure if this is referring to the 2025 plan?

CLALLAM COUNTY PUBLIC UTILITIES DISTRICT NO.1 (PUD) – PREVIOUS MITIGATION ACTIONS WORKSHEET
DUE: July 15, 2024

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Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
PUD01	Evaluate options to make new hotel in Port Angeles tsunami resistant.	2010 Action	Not Complete	Yes	PUD, Battelle	3-5 years		Winter Storms, Flooding	City of Sequim general fund, property owners, developers, PUD	The new hotel construction plans in Port Angeles are on-hold. Retain until further evaluation and pending determination of the project owner's appetite for public-private partneship
PUD02	Identify Elders and other vulnerable populations to prioritize for mitigation and disaster assistance	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	Complete -Ongoing	Yes	PUD	1-5 years		Severe Weather, Winter Storms	PUD operating budget	Vulnerable population determination is carried out under the Clean Energy Transformation Act stipulation to identify underserved and vulnerable population. PUD has hired a fellow via Clean Energy Implementation Fellowship grant to review the program and design a new

Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
										program to ensure continuous identification and update of underserved and vulnerable population.
PUD03	Create new, and expand existing Evacuation Routes, including better signage	2010 Action – Ongoing	Not Complete	Yes	PUD	1-5 years	1-5 years	Earthquake	PUD operating budget	Internal review found that these are not deployed across all PUD facilities
PUD04	Acquire properties in low hazard areas in order to locate new development or relocate existing vulnerable structures and critical facilities	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~~ Ennis Creek crossing to Lower LUD #3 Pump Station.	Not Complete (Partially Complete)	Yes	PUD	Ongoing	5-10 years	Landslide	PUD operating budget	1. Water main from Hoko-Ozette Road to Eagle Point Road – COMPLETE 2.Preliminary Engineering for buried creek crossing at Ennis Creek - COMPLETE
PUD05	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	2010 Action – Ongoing as conditions worsen at Morse Creek.	Not Complete/ Not applicable	No	PUD	Ongoing		Drought	PUD operating budget	A temporary system was put in place in 2015 in case the Morse Creek Falls below 25 cfs flow rate. It was replaced in 2019 with a permanent Deer Park pump station that conveys ground water in lieu of Morse Creek surface

CLALLAM COUNTY PUBLIC UTILITIES DISTRICT NO.1 (PUD) – PREVIOUS MITIGATION ACTIONS WORKSHEET
DUE: July 15, 2024

Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
										water during conditions of less than 25 cfs flow rate. Historically, morse creek fell below 25 cfs for 2-3 weeks in a year. In calendar year 2023, the creek remained below 25cfs for over 4 months. Declining surface water availability puts more pressure on ground water system. Hence, ground water availability is becoming a critical issue for the PUD
PUD06	Develop and/or improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Continuity of Operations Plan etc.	2010 Action - Ongoing	Complete	Yes	PUD	Ongoing	1 – 5 years	Severe Weather, Windstorms	PUD operating budget	1. Emergency Response and Restoration Plan updated in 2018. Review in 2023 2. Drought Response Plan in 2018 3. All of the PUD site specific SPCC plans for Tier I & II substations revised and updated in 2021.
Adopt the Hazard Mitigation Plan	Partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions	2010 Action	Not Complete (Partially complete)	Yes	Planning Department	1 year	1 – 5 years	All hazards	N/A	Discussions with City of Port Angeles regarding a Service Area agreement. Bi-lateral agreements with Dept of Ecology and Dept of Health

JAMESTOWN S'KLALLAM TRIBAL ANNEX – PREVIOUS MITIGATION ACTIONS WORKSHEET
DUE: July 15, 2024

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JSK01	Seismic assessment of Tribal facilities	New	Not Complete	Yes	Tribe	1-3 years	same	Tsunami, Earthquakes	FEMA	
JSK02	Improve communications in Blyn Basin, including building cellular tower and installing fiber internet.	New	Completed	No	Tribe	1 year	Constructed in 2019-20	All hazards	Tribe	Located in Blyn, Verizon, T-mobile, County EM repeater
JKS03	Lower Dungeness River Floodplain Restoration, including 3 Crabs Rd.	2015 Action – Ongoing, funding secured, and removal of dikes and levees continues.	More completed, and more to come	Yes	Tribe, Clallam County, Washington Department of Fish and Wildlife	5 years	same	Flooding	WA Floodplains by Design, Construction funding from ACOE	River's edge project completed in 2022
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.	Underway	Yes	Tribe	Variable	Same	Flooding, Tsunami	HMGP/BIA Climate Resiliency	Awarded funding to relocated Natural Resource Lab
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.	Underway, but not finalized	Yes	FEMA, Tribe, County	Ongoing	Same	Flooding	FEMA, Tribe	
JSK06	Encourage native vegetation on shorelines and formation of dunes	2015 Action – Ongoing, Three Crabs area has been revegetated (2018). This is an	Ongoing	Yes	Tribe	Ongoing	Same	Flooding	Pre-Disaster Mitigation Fund, U.S. Department of Agriculture	

JAMESTOWN S'KLALLAM TRIBAL ANNEX – PREVIOUS MITIGATION ACTIONS WORKSHEET
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		ongoing focus for future flood plain restoration projects.								
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.	Ongoing	Yes	Tribe	Ongoing		Flooding	PDM	
JSK08	Limit removal of vegetation in areas prone to ground failure. Plan ground cover where appropriate.	2015 Action – Ongoing.	Ongoing	Yes	Tribe, County	Variable		Landslide	Tribe	
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.	Ongoing	Yes	Tribe	Variable		Landslide	Tribe	
JSK10	StormReady	2015 Action – Complete		no	Clallam County, State, Tribe	Ongoing		Windstorm, Winter Storm	Tribe	I don't think this belongs in the hazard mitigation plan
JSK11	Conduct severe weather awareness activities.	2015 Action – Ongoing. Main objective of creating home emergency kit was completed. Public communication is ongoing.	Ongoing	yes	Clallam County, Tribe	Ongoing		Windstorm, Winter Storm	Tribe	
JSK12	Develop alternate water supplies to provide reserve water sources to be used in event of drought or water shortage.	2011/2015 Action – New for this 2019 Plan because of recent rapid population growth in Blyn.	Ongoing	Yes	Tribe	1-3 years		Windstorm, Winter Storm, Drought	HUD Indian Community Development Grand Program	Mitsubishi Well is being developed to the East of Blyn, with potential to produce 1000GPM
JSK13	Create and expand water efficiency/conservation programs.	2015 Action – Ongoing and Active.	Ongoing	Yes	Tribe	5 years		Drought	Tribe, Grants	Invested in Cedars at Dungeness irrigation system. Installed water efficient fixture

JAMESTOWN S'KLALLAM TRIBAL ANNEX – PREVIOUS MITIGATION ACTIONS WORKSHEET
DUE: July 15, 2024

Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
										and auto faucets in Tribal facilities
JSK14	Continue to participate in TsunamiReady with Clallam County	2015 Action – Ongoing			Clallam County, Tribe	Ongoing		Tsunami	Minimal	
JSK15	Develop advanced warning systems	2015 Action – Ongoing, continue to communicate with WEMD, Great Shakeout Official Partners, locations of AHAB have been determined.	Completed – Ongoing	Yes	Clallam County, Tribe	Ongoing		Tsunami	Minimal	AHAB sirens installed in Blyn and Jamestown beach in 2021
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.	Completed-need to decommission old well close to shoreline	No	Tribe	1 year		Flooding, Tsunami	CDBG-GP Grand, EPA Grants, USDA Rural Development Loans or Grants	New well has been developed and water storage constructed. Well will soon serve community system
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.	Ongoing	Yes	Tribe	5 years		Flooding, Tsunami	FEMA	
JSK18	Fuel reduction projects and defensible space around structures	2015 Action – Ongoing	Ongoing	Yes	Tribe and County	1-5 years		Wildfire	U.S. Forest Service Grants	
JSK19	Promote FireWise building design for construction in the Vision Master Plan and Housing Programs	2015 Action – Ongoing	Ongoing	Yes	Tribe and County	Ongoing		Wildfire	ICDBG, US Forest Service, BLM	
Adopt the Hazard Mitigation Plan		Completed – Re-adopting updated 2019 HMP			Planning Department	1 year		All hazards	N/A	

LOWER ELWHA KLALLAM TRIBAL ANNEX – PREVIOUS MITIGATION ACTIONS WORKSHEET
DUE: July 15, 2024

Directions:
Below is the list of previous Mitigation Actions for your jurisdictional annex. Please review the previous Mitigation Actions and provide any updates. Specifically, we are looking for

- **Updated Action Status** (i.e., if an action has been **Completed** or **Not Completed**)
  - If an action has been completed, please include the date or year it was completed.
- **Retain Action?**
  - Mark **Yes** if action is still relevant, will keep in MJHMP Update
    - please provide an updated timeframe for actions that are ongoing
  - Mark **No** if action is no longer relevant/feasible

Notes can be added in the last column if necessary for clarification, questions, etc., any changes to other columns should be done in track changes/redline strikeout.

New mitigation actions will be developed as part of a later data request.

Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
LEK01	Move the tribal center from the tsunami inundation zone where it is currently located.	New	Not Completed	Yes	Lower Elwha Police Department, Emergency Management Division	3-5 years		Tsunami	Federal Emergency Management Agency (FEMA)	
LEK02	Widen and strengthen Lower Elwha Road from Stratton Road to Kacee Way.	New	Not Completed	Yes	Lower Elwha Police Department, Emergency Management Division	3-5 years		Earthquake, Flood, Landslide, Winter Storm, Tsunami, Wildfire	FEMA	
LWK03	Evaluate options to make new hotel in Port Angeles tsunami resistant.	New	Not Completed	Yes	Lower Elwha Police Department, Emergency Management Division	1-3 years		Earthquake, Flood, Tsunami	FEMA	
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	Completed	No	Lower Elwha Klallam Emergency Management, Tribal Police, Enrollment, Tribal Clinic	1 year		All hazards	Operating Budgets	
LEK05	Create new, and expand existing Evacuation Routes, including better signage	2011 Action – Ongoing. Kacee Way has been completed and one new Tsunami Evacuation	Not Completed	Yes	Lower Elwha Klallam Emergency Management	1 year		Tsunami, Earthquake	Operating Budget	

LOWER ELWHA KLALLAM TRIBAL ANNEX – PREVIOUS MITIGATION ACTIONS WORKSHEET
DUE: July 15, 2024

Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
		Route sign was added on Lower Elwha Road.								
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.	Completed	No	Lower Elwha Klallam Emergency Management	1 -5 years		Flooding	Pre-Disaster Mitigation grant, Housing and Urban Development grants, U.S. Department of Agriculture (USDA) development grants	
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.	Completed	No	Lower Elwha Klallam Emergency Management	Annual		All hazards	Emergency Management Performance grants, regional homeland security grants, Citizens Corps funding and other sources	
LEK08	Develop and/or improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Continuity of Operations Plan etc.	2011 Action – Ongoing. The Evacuation Plan is complete. Tribal Records Protection Plan and continuity of operations (COOP) will be developed.	Not Completed	Yes	Tribal Council, Lower Elwha Klallam Emergency Management	1-5 years		All hazards	Emergency Mgt Performance Grants, Dept of Health Grants, Regional Homeland Security funds and other sources	
LEK09	Partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions	2011 Action – Ongoing.	ongoing	yes	Lower Elwha Klallam Emergency Management	Ongoing		All hazards	FEMA, Tribal Operating Budget	
LEK10	Develop a system to protect and maintain historical and archival Tribal records	2011 Action – Ongoing. Work on COOP will commence in 2020.	Not Completed	Yes	Tribal Council	1-3 years		All hazards	Tribal Operating Budget	
LEK14	Implement Vegetation and other natural resource management practices to reduce landslides and coastal erosion	2011 Action – Status unknown.	Completed	No						
Adopt the Hazard Mitigation Plan		Completed – Re-adopting updated 2019 HMP			Planning Department	1 year		All hazards	N/A	

CITY OF PORT ANGELES – PREVIOUS MITIGATION ACTIONS WORKSHEET
DUE: July 15, 2024

Directions:
Below is the list of previous Mitigation Actions for your jurisdictional annex. Please review the previous Mitigation Actions and provide any updates. Specifically, we are looking for

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Notes can be added in the last column if necessary for clarification, questions, etc., any changes to other columns should be done in track changes/redline strikeout.

New mitigation actions will be developed as part of a later data request.

Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
CC02	Move EOC from seismically unstable area to new location	Ongoing	Not completed, in design stage	Yes	EMD, PA Fire Department, City Parks, Port of PA	1-3 years	2030	All hazards	FEMA, Community Fund-matching	The Lead Dept are PW and PD
PA01	Protect/Reinforce Sole Source Water Main from Elwha River against slide failure	2010 Action - Ongoing	Not Complete, Funded (IN CFP)	Yes	Public Works	1-3 years		Flooding, Utility Failure, Landslide	FEMA, CFP	
PA02	Protect/Reinforce Sole Source Water Main from City to Eastern Customers and to PUD's Roundtree Reservoir	2010 Action –Ongoing	Not Completed, under bid for design	Yes	Public Works	1-3 years		Flooding, Utility Failure, Landslide	FEMA, CFP	
PA03	Peabody Heights Reservoir Earthen Dam Reinforcement	2010 Action –Ongoing	Inspections ongoing, unsure if action req'd.		Public Works	1-3 years		Earthquake	FEMA, CFP	Contact P.W department for more information
PA04	Sewer Pump Station Power Upgrades	2010 Action – Ongoing	Ongoing, partially complete	Yes	Public Works Wastewater	1-3 years		All hazards/Utility Failure	FEMA, CFP	
PA05	Update Flood Assessment	2010 Action –Ongoing	Waiting for FIRM maps to be released from preliminary		Community & Economic Development Department	1-5 years		Flooding	FEMA/Ecology	COPA has updated floodplain development code going to council in Sep. 2024
PA06	Upgrade to Shorelines	2010 Action – Ongoing	Partially complete	Yes, ongoing	Community & Economic Development Department/Public Works and Utilities	1-5 years		Flooding, winter storms	FEMA/Department of Natural Resources/Grants/ Private funding	
PA07	Tumwater Street Bridge Approach Improvement	2010 Action - Ongoing	Complete	No	Public Works	1-5 years		Earthquake	FEMA/ Department of Transportation	Contact P.W for more information
PA08	Install Backup Power for City Corp Yard	2010 Action – Ongoing	Ongoing	Yes	Public Works Utilities	1-5 years		All hazards, utility failure	FEMA, CFP	
PA09	Install Backup Power for Light Operations Facility	2010 Action –Ongoing	Ongoing		Public Works Electric Utility	1-3 years		All hazards, utility failure	FEMA, CFP	Light ops is currently renting a

CITY OF PORT ANGELES – PREVIOUS MITIGATION ACTIONS WORKSHEET
DUE: July 15, 2024

Action ID#	Mitigation Action Description	Previous Action Status	UPDATED ACTION STATUS Mark action as Completed or Not Completed	Retain Action in MJHMP Update? Yes / No	Lead Department	Timeframe	UPDATED TIMEFRAME	Hazards Addressed	Funding Sources	Annex Notes
										facility, looking into a more permanent solution
PA10	Fiber Optic Network Upgrade	2010 Action –Ongoing	Partially Complete	Yes	IT Public Works Utilities	1-5 years		All hazards, utility failure	FEMA, National Telecommunications and Information Administration Grant	
Adopt the Hazard Mitigation Plan		Completed – Re-adopting updated 2019 HMP			Planning Department	1 year		All hazards	N/A	

Past Growth – Future Growth

PENINSULA COLLEGE – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

PAST GROWTH:

- Please verify the description and enrollment data from the previous MJHMP in the table below and provide a current enrollment estimate. We will use this data to determine a growth rate.
- Please let us know if you have any comments/concerns.

Peninsula College District Profile from 2019 MJHMP: "The only resident institution of higher education on the North Olympic Peninsula, Peninsula College is a comprehensive community college with a district that encompasses both Clallam and Jefferson Counties (Peninsula College 2019). The main campus is located in Port Angeles on 75 acres of land at the foot of the Olympic Mountains. Extension sites are located in Forks and Port Townsend (Peninsula College 2019).

As of the 2017–2018 school year, there were 4,454 enrolled students, 58 percent of which were full time (Peninsula College 2019)."

	2017 - 2018 Enrollment (as reported in the 2019 MJHMP)	Current Enrollment
Students	4,421 students	**4071**
% Full Time	44% full time	**36%**
Faculty/Staff	**472**	**461**

1. **Any substantial changes in land use occur within your jurisdiction during the PAST five years? (i.e., facilities master plan updates, etc.):**

N/A

2. **Any substantial changes in development occur within your jurisdiction during the PAST five years? (i.e., major facility upgrades/facility projects at a scale that could increase/change vulnerability to natural disasters).**

N/A

PENINSULA COLLEGE – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

FUTURE GROWTH:

- If possible, please provide an estimate of future growth. Our aim is to estimate growth out to the year 2030, which is the planning period for this MJHMP.
- If applicable, please provide an estimated enrollment faculty size for 2030.
- **We can discuss future growth qualitatively if estimates cannot be determined.**

	Projected 2030 Enrollment
Students	5,000
Faculty/Staff	500

1. **Any substantial changes in land use to occur within your jurisdiction during the NEXT five years?**

N/A

2. **Any substantial changes in development to occur within your jurisdiction during the NEXT five years?**

We will be replacing our Q Building (Automotive, Welding, Construction) with a brand-new facility.

CITY OF PORT ANGELES – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

PAST GROWTH:

- Please verify the population data and percent growth of your jurisdiction in the table below and let us know if you have any comments/concerns.

2018 Population (as reported in the 2019 MJHMP)	2022 Population (Census Bureau 2022 ACS)	Percent Growth
19,370	20,007	3.29%

1. **Any substantial changes in land use occur within your jurisdiction during the PAST five years? (i.e., comprehensive plan updates, zoning updates, etc.):**

Housing for all update, allowing for higher densities, and greater adoption of middle housing.

2. **Any substantial changes in development occur within your jurisdiction during the PAST five years? (i.e., major residential, commercial or industrial projects at a scale that could increase/change vulnerability to natural disasters)?**

   a. No, industrial growth has slowed or reversed.

CITY OF PORT ANGELES – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

FUTURE GROWTH:

- Please verify the projected population growth based on GMA projections for Clallam County in the table below and let us know if you have any comments/concerns.

2022 Population (Census Bureau 2022 ACS)	GMA Percent Population Increase (2022 to 2030)*	Projected 2030 Population
20,007	5.37%	21,081
*For future growth we looked at the Growth Management Act (GMA) population projections for Clallam County, noting that they show a projected population increase of 5.37% from 2022 to 2030. We then applied that percentage increase to the City 2022 census population to come up with a projected 2030 population.		

1. **Any substantial changes in land use to occur within your jurisdiction during the NEXT five years?**

No

2. **Any substantial changes in development to occur within your jurisdiction during the NEXT five years?**

EOC relocation project, increased density due to housing programs.

CITY OF FORKS – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

PAST GROWTH:

- Please verify the population data and percent growth of your jurisdiction in the table below and let us know if you have any comments/concerns.

2018 Population (as reported in the 2019 MJHMP)	2022 Population (Census Bureau 2022 ACS)	Percent Growth
3,748	3,380	- 9.82%

DCD's 'HAPT Method A Projections and Growth Trends Comparison,' July 2024, was developed for the purposes of the GMA related planning associated with the County's and the City's comprehensive plan update. That analysis showed a 2010 population for Forks of 3,532 with that dropping to 3,335 in 2020. It is believed that this represents a significant undercount of the Latino population within the City of Forks due to the manner in which Census 2020 was conducted at the outside of the COVID epidemic. Further, during that specific decade, the City saw the closure of the Interfor mill in Forks and Beaver. In the HAPT analysis, DCD utilized an average annual growth rate of 0.58% to project a 2045 population of 3,826 people.

1. **Any substantial changes in land use occur within your jurisdiction during the PAST five years? (i.e., comprehensive plan updates, zoning updates, etc.):**

City is currently in the process of updating its comprehensive plan. Minor zoning code amendments associated with zoning designations have occurred over the past five years. Three years ago, the City adopted an accessory dwelling ordinance for those properties with both water and sewer services. The hope is that such a zoning change will be beneficial for the development of 'in-fill' residential housing.

2. **Any substantial changes in development occur within your jurisdiction during the PAST five years? (i.e., major residential, commercial or industrial projects at a scale that could increase/change vulnerability to natural disasters).**

No.

CITY OF FORKS – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

FUTURE GROWTH:

- Please verify the projected population growth based on GMA projections for Clallam County in the table below and let us know if you have any comments/concerns.

2022 Population (Census Bureau 2022 ACS)	GMA Percent Population Increase (2022 to 2030)*	Projected 2030 Population
3,748	5.37%	3,949
*For future growth we looked at the Growth Management Act (GMA) population projections for Clallam County, noting that they show a projected population increase of 5.37% from 2022 to 2030. We then applied that percentage increase to the City 2022 census population to come up with a projected 2030 population.		

See the discussion on the previous page. That population increase does not match the worksheet DCD provided mid-July.

ALTERNATIVE GROWTH ALLOCATIONS IN HAPT METHOD A

	2023 Population	2023 % of total	HAPT A Modified (% of new growth allocation)	Total Population Growth HAPT A (2045)	Projected 2045 Population per HAPT A	HAPT A Percent Growth over Existing Population	Average Annual Rate under HAPT A
Port Angeles	20,240	25.9%	26.0%	2,243	22,483	11.08%	0.50%
Sequim	8,350	10.7%	28.7%	2,475	10,825	29.65%	1.35%
Forks	3,395	4.3%	5.0%	431	3,826	12.70%	0.58%
Unicorporated CC	46,090	59.0%	40.3%	3,476	49,566	7.54%	0.34%
Total:	**78,075**	**100.0%**	**100.0%**	**8,625**	**86,700**		

1. **Any substantial changes in land use to occur within your jurisdiction during the NEXT five years?**

At present, no major changes to land use are projected for the next five years.

2. **Any substantial changes in development to occur within your jurisdiction during the NEXT five years?**

The City continues to explore and pursue means of (re)developing the Forks Industrial Park with the goal of recreating in that area the roughly 80-120 manufacturing and trucking jobs associated with the former Interfor mill site. Such a development would potentially address the loss of population in Forks.

CITY OF SEQUIM – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

PAST GROWTH:

- Please verify the population data and percent growth of your jurisdiction in the table below and let us know if you have any comments/concerns.

2018 Population (as reported in the 2019 MJHMP)	2022 Population (Census Bureau 2022 ACS)	Percent Growth
7,481	8,073	7.91%

1. **Any substantial changes in land use occur within your jurisdiction during the PAST five years? (i.e., comprehensive plan updates, zoning updates, etc.):**

No – City's last Comp Plan was adopted and amended. No major rezones or land use designation changes have occurred.

2. **Any substantial changes in development occur within your jurisdiction during the PAST five years? (i.e., major residential, commercial or industrial projects at a scale that could increase/change vulnerability to natural disasters).**

The City of Sequim has been proactive in environmental review under the Washington State SEPA, additionally, the shoreline has not seen substantial development to date.

CITY OF SEQUIM – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

FUTURE GROWTH:

- Please verify the projected population growth based on GMA projections for Clallam County in the table below and let us know if you have any comments/concerns.

2022 Population (Census Bureau 2022 ACS)	GMA Percent Population Increase (2022 to 2030)*	Projected 2030 Population
8,073	5.37%	8,506

*For future growth we looked at the Growth Management Act (GMA) population projections for Clallam County, noting that they show a projected population increase of 5.37% from 2022 to 2030. We then applied that percentage increase to the City 2022 census population to come up with a projected 2030 population.

1. **Any substantial changes in land use to occur within your jurisdiction during the NEXT five years?**

Yes, City is currently developing the next comprehensive plan under the State Growth Management Act. We anticipate additional housing and employment capacity in the coming 5 years. However, the zoning and area for their siting will not change.

2. **Any substantial changes in development to occur within your jurisdiction during the NEXT five years?**

Yes, current review process has approximately 400 units in subdivision and an additional 600 units of resort development are anticipated. This is current activity that would vest for a minimum of 5 years. We have yet to see a large development under industrial or commercial development but have the appropriate zoning and UGA areas to accommodate future interest.

CLALLAM COUNTY PUD NO. 1 – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

PAST GROWTH:

- Please verify the description from the previous MJHMP and if possible, provide an estimated jurisdiction size in the table below (i.e., service area size, number of customers serviced, length of distribution/transmission lines). Our goal is to identify any growth in the past 5 years.
- Please let us know if you have any comments/concerns.

Clallam County PUD No. 1 District Profile from 2019 MJHMP: "The Clallam County PUD No. 1 is located in Port Angeles, Sequim, and Forks. It is a not-for-profit organization that provides electric, water, internet, and sewer services to the communities and citizens of Clallam County. PUD is based in the Port Angeles.

PUD is directed by a three-member Board of Commissioners elected by citizens of Clallam County (PUD 2014a)."

	2019 Service Area	2024 Service Area
Jurisdiction Size (area)	~~[please provide a past estimate if applicable]~~ 2000 sq. Miles Electric 44.5 sq miles Water	~~[please provide a current estimate if applicable]~~2000 sq. Miles Electric 44.5 sq miles Water
# of Customers	~~[please provide a past estimate if applicable]~~26,525Electric 4,500 Water	~~[please provide a current estimate if applicable]~~33,600 Electric 4,800 Water
Total Distribution Lines	~~[please provide a past estimate if applicable]~~1,806 miles Electric	~~[please provide a current estimate if applicable]~~1,833 miles Electric

1. **Any substantial changes in land use occur within your jurisdiction during the PAST five years? (i.e., annexations/expansions of service, etc.):**

No

2. **Any substantial changes in development occur within your jurisdiction during the PAST five years? (i.e., major utility projects at a scale that could increase/change vulnerability to natural disasters).**

No

CLALLAM COUNTY PUD NO. 1 – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

CLALLAM COUNTY PUD NO. 1 – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

FUTURE GROWTH:

1. **The MJHMP is required to document projected district growth out to 2030. How does PUD plan for growth/ expansion of facilities/services? (could be expansion of size, scale, footprint)**

Electric: 2023 Electric System Planning study is a summary of electric system characteristics and analysis with expected system improvements needed to ensure safe and reliable power for Clallam PUD customers for the present and the future. It is intended to serve as a guide for the design, construction, operation and management of electric system transmission, distribution and substation resources. Comprehensive planning studies are completed every three years evaluating the current system status and the anticipated status five years in the future. Detailed load analysis looks forward 5 years with respect to voltage control, capacity and equipment thermal limits. The system study also reviews scenarios for up to 10 years regarding high-level Strategic Plan objectives associated with Substations, feeder ties, and aging infrastructure.

Water: 2024 (on-going) Water System Planning update will provide a comprehensive inventory of existing facilities for each system, establishing criteria for the water system analysis and analyzing the hydraulic capacity of each system. The PUD has a duty to provide service to new customers within the retail service area, which is used to develop water demand projections and analyze water system capacity for the 6-year and 20- year planning horizons.

2. **Any substantial changes in land use to occur within your jurisdiction during the NEXT five years?**

No.

3. **Any substantial changes in development to occur within your jurisdiction during the NEXT five years?**

Electric: No

Water: Carlsborg is projected to be the fastest growing system in next 5 years. Clallam County has indicated that the County anticipates the PUD to be the water purveyor for the unincorporated Urban Growth Area of Port Angeles.

JAMESTOWN S'KLALLAM TRIBE – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

PAST GROWTH:

- Please verify the population data for your jurisdiction in the table below and provide a current population estimate. We will use this data to determine a population growth rate. Please let us know if you have any comments/concerns.

	2016 Population (as reported in the 2019 MJHMP)	Current Population Estimate
Local Population	207 (enrolled citizens living inside the tribe area)	217
Global Population	569 (enrolled citizens living inside and outside the tribe area)	519

1. **Any substantial changes in land use occur within your jurisdiction during the PAST five years? (i.e., comprehensive plan updates, etc.):**

The Tribe has been actively requiring its ancestral lands. As of 2024, the Tribe has approximately 1,762 acres of land (about 1,110 acres is in Trust or Reservation). We are initiating a comprehensive plan update next year.

2. **Any substantial changes in development occur within your jurisdiction during the PAST five years? (i.e., major residential, commercial or industrial projects at a scale that could increase/change vulnerability to natural disasters).**

The Tribe has made significant investments in its medical facilities in the City of Sequim, as well as at the Dungeness River Nature Center, Jamestown Beach, and Blyn. We are relocating some of our facilities to higher ground, away from the shoreline of Sequim Bay. The Jamestown S'Klallam Tribe is mindful of where it builds but Tribes have a unique relationship with the shoreline and are often situated more proximal for cultural reasons.

JAMESTOWN S'KLALLAM TRIBE – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

FUTURE GROWTH:

1. **The MJHMP is required to document projected population growth out to 2030. How does Jamestown S'Klallam Tribe plan for population growth/ expansion of tribal services? (could be housing, utility, social services)**

Tribal enrollment is based on blood quantum which is a system that inevitably leads to a diminishing population (number enrolled of Tribal Citizens). Many Tribes are contemplating how to address declining populations. Jamestown establishes its own enrollment criteria and there will likely be a change in criteria that would expand enrollment within the next decade. Many considerations are given when contemplating any adjustment to enrollment criteria and there is no clear path regarding this complex topic currently.

2. **Any substantial changes in land use to occur within your jurisdiction during the NEXT five years?**

The Jamestown S'Klallam Tribe will continue to reacquire land within the area outlined in our Land Consolidation Plan (East Clallam and Jefferson), a federally approved area in which the Tribe takes jurisdiction through the fee-to-trust process.

3. **Any substantial changes in development to occur within your jurisdiction during the NEXT five years?**

The Tribe will continue to develop its medical facilities in the City of Sequim, Community facilities at Jamestown Beach, Government facilities in Blyn, and other economic development activities throughout East Clallam and East Jefferson counties.

LOWER ELWHA KLALLAM TRIBE – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

PAST GROWTH:

- Please verify the population data for your jurisdiction in the table below and provide a current population estimate. We will use this data to determine a population growth rate. Please let us know if you have any comments/concerns.

	2011 Population (as reported in the 2019 MJHMP)	2022 Population (Census Bureau 2022 ACS)	Current Population Estimate
Local Population	508 (members living on reservation lands)	671 (Lower Elwha Reservation and Off-Reservation Trust Land)	**447**
Global Population	887 (enrolled members living inside and outside the tribe area)	N/A	**903**

1. **Any substantial changes in land use occur within your jurisdiction during the PAST five years? (i.e., comprehensive plan updates, etc.):**

2. **Any substantial changes in development occur within your jurisdiction during the PAST five years? (i.e., major residential, commercial or industrial projects at a scale that could increase/change vulnerability to natural disasters).**

Childrens House of Learning moved out of the Tsunami Zone

LOWER ELWHA KLALLAM TRIBE – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

FUTURE GROWTH:

1. **The MJHMP is required to document projected population growth out to 2030. How does Lower Elwha Klallam Tribe plan for population growth/ expansion of tribal services? (could be housing, utility, social services)**

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2. **Any substantial changes in land use to occur within your jurisdiction during the NEXT five years?**

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3. **Any substantial changes in development to occur within your jurisdiction during the NEXT five years?**

PORT OF PORT ANGELES – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

PAST GROWTH:

- Please verify the description from the previous MJHMP and marina size in the table below and provide a current estimate. Please let us know if you have any comments/concerns.

Port of Port Angeles District Profile from 2019 MJHMP: "The Port of Port Angeles, the Olympic Peninsula's only deepwater port, provides support for Clallam County industry and employs administrative and trades staff. The Port operates a ~~16.1-acre~~ two marinas (Port Angeles Boat Haven and John Wayne Marina), with approximately ~~375~~600 boat slips and 3,~~000~~500 feet of dock for tie-ups, as well as a marine terminal and trades area, a log yard, and rental properties (Figure 2-1). The Boat Haven Marina was upgraded in 2007-2008. The Port operates the William R. Fairchild International Airport. ~~The Port also currently houses a composites training institute (WA ESD 2017).~~"

	Port of Port Angeles Size (as reported in 2019 MJHMP)	Current Size
Marina Size	16.1-acre marina	**Port Angeles Boat Haven – 23 acres** **John Wayne Marina – 13 acres**
Boat Slips	375 boat slips	**Port Angeles Boat Haven – 400 slips** **John Wayne Marina – 300 slips**
Dock Length	3,000 feet of dock tie-ups	**Port Angeles Boat Haven – 3,000-ft of dock tie-ups** **John Wayne Marina – 500-ft of dock tie-ups**
Employees	**44 Full-time equivalent (FTEs)**	**48 FTEs**

1. **Any substantial changes in land use occur within your jurisdiction during the PAST five years? (i.e., facility master plan updates, etc.):**

No substantial changes in land use.

2. **Any substantial changes in development occur within your jurisdiction during the PAST five years? (i.e., major facility upgrades/projects at a scale that could increase/change vulnerability to natural disasters).**

No substantial changes

PORT OF PORT ANGELES – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

PORT OF PORT ANGELES – PAST AND FUTURE GROWTH WORKSHEET
DUE: July 15, 2024

FUTURE GROWTH:

1. **The MJHMP is required to document projected district growth out to 2030. How does Port of Port Angeles plan for growth/ expansion of facilities/services? (could be expansion of size, scale, footprint)**

Beginning this summer the Port has begun the development of the 18-acre Marine Trade Center. This waterfront site will be for boat construction and repair.

2. **Any substantial changes in land use to occur within your jurisdiction during the NEXT five years?**

None anticpated.

3. **Any substantial changes in development to occur within your jurisdiction during the NEXT five years?**

None anticipated.

New Mitigation Actions

PORT OF PORT ANGELES – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

Directions: Please populate the blank mitigation actions table below with new mitigation actions for your jurisdiction. Reference the table below showing types and examples of mitigation actions.

Mitigation Type	Description	Examples
Local Plans and Regulations	These actions include government authorities, policies or codes that influence the way land and buildings are developed and built.	• Building codes • Open space preservation • Capital improvement plan
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure.	• Floodwalls • Utility undergrounding • Safe rooms
Natural Systems Protection and Nature-based Solutions	This type of action can include green infrastructure and low impact development, nature-based solutions, Engineering with Nature and bioengineering to incorporate natural features or processes into the built environment.	• Watershed restoration • Living shorelines • Forest management
Education and Awareness Programs	These types of actions keep residents informed about potential natural disasters. Many of these types of actions are eligible for funding through the FEMA HMA program.	• Real estate disclosures

For each mitigation action you develop, please 1) identify which hazard(s) the action addresses, 2) identify responsible departments (internal and external), 3) determine priority and 4) determine timeline for implementation.

1) You will need to identify **at least one mitigation action per hazard identified** in your jurisdictional annex. Your jurisdiction has identified the hazards below, in order of priority. Hazards highlighted in yellow do not have identified mitigation actions.

Port of Port Angeles Hazard List

1) Wildfire (and Wildfire Smoke)
2) Disease and Pandemic
3) Severe Weather – (Windstorm/Tornado, Winter Storm, Extreme Heat)
4) Landslide
5) Seismic – Cascadia Earthquake
6) Flood
7) Drought
8) Tsunami
9) Sea Level Rise (coastal/bluff erosion)
10) Human-caused – Hazardous Materials
11) Human-caused – Maritime Disaster
12) Active Shooter/Terrorism
13) Utility Failure/Power Outage
14) Supply Chain Interruption

NOTE: If mitigation actions are not identified for all identified hazards by your jurisdiction, the consultant team may recommend eliminating the hazard from your annex. Please contact Noelle Anderson is you need support in crafting mitigation actions for any missing hazards. Mitigation actions may respond to more than one natural and/or human-caused hazard.

3) Assign a priority for each mitigation action based on the following:

- **High Priority**: Top organizational priority and is generally a well-detailed project idea. Protects population, resource, facility, or property at high risk. Uses feasible methods, techniques.

PORT OF PORT ANGELES – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

- **Medium Priority**: A good idea that needs more information; action that addresses a moderate hazard.
- **Low Priority**: An idea that needs more information or will take preliminary action to build support.

4) Assign a timeline for implementation for each mitigation action. Consider the following time frames:
   - Ongoing: currently in process; or 1-2 years and ongoing thereafter
   - Short-Term: 1 to 2 years
   - Medium-Term: 3 to 4 years
   - Long-Term: 5+ years

You may want to refer to your previous mitigation actions, but you do not need to include previous actions in the table below: Mitigation Actions Due July 15th - Port of Port Angeles.docx

PORT OF PORT ANGELES – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

Identify new mitigation actions in the table below. The first three actions are provided as examples only.

Suggested mitigation actions are included below, highlighted in yellow. These mitigation action ideas were generated for your consideration during our steering committee meetings, community survey/outreach, and HMP workshop.

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
Ex. 1	Participate in regular safety and public awareness campaigns regarding natural and human-caused hazards, and partner with local stakeholders to distribute awareness materials. Consider outreach that engages socially vulnerable populations, such as senior citizens and disabled persons.	All Hazards	**Internal:** Fire Department, Police Department, Administration Department	Medium	Ongoing
Ex. 2	Seek grant funding to purchase permanent and emergency generators in coordination with community stakeholders.	Multiple Hazards: Severe Weather, Power Outage, Wildfire	**Internal:** Public Works Department, Administration Department.	High	Medium-Term
Ex. 3	Establish a comprehensive vegetation management and fuel reduction program applicable to the entirety of the jurisdiction. Work with public safety agencies to identify areas with high wildfire hazard risk as top priority for fuel clearance and reduction. Work with a contractor to estimate fuel reduction pricing to apply for grant funding.	Wildfire	**Internal:** Fire Department, Public Works Department, Community Development Department.	High	Long-Term
1	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	Wildfire	**Internal:** Environmental	Medium	Short-Term
2	Maintain a culture of preparedness by facilitating ongoing emergency response and security training, allowing staff to respond to evolving human-caused threats and risks.	Human-Caused Hazards (Hazardous Materials, Maritime Disaster, Active Shooter/Terrorism, Supply Chain Interruption, Disease/Pandemic)	**Internal:** Operations	Medium	Ongoing
3	Procure a consultant to study sea level rise and associated secondary impacts (such as flood, storm surge, king tides) on Port of Port Angeles assets and facilities. Evaluate infrastructure protection systems such as seawalls, levees, floodgates, or pumps to reduce risk to storm surge, flooding, and sea level rise.	Flood, Sea Level Rise	**Internal:** Engineering	Medium	Long-Term
4	Continue to monitor sea level rise projections as related to Port of Port Angeles assets and critical facilities. Integrate considerations for sea level rise projections into capital improvement plans/programs.	Sea Level Rise	**Internal:** Engineering	Medium	Ongoing
5	Coordinate with Clallam County Emergency Management on preparedness plans for use of Port barges for potential transport of supplies/equipment during significant events where roadway transportation systems fail.	Seismic, Supply Chain Interruption	**Internal:** Operations	Medium	Ongoing
6	Shoreline and bank re-armoring and retrofits at Port facilities at Tumwater Creek, Port Angeles Harbor and Sequim Bay.	Severe Weather, Flood, Tsunami, Sea-Level Rise, Seismic	**Internal:** Engineering	Medium	Long-Term

PORT OF PORT ANGELES – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
7	Terminal 1 Warehouse retrofit, reconstruction or relocation.	Severe Weather, Flood, Tsunami, Sea-Level Rise, Seismic	**Internal:** Engineering	Medium	Long-Term
8	Emergency Generators for Port Facilities/Community Members: Install, upgrade or replace backup power generators at Port facilities including two airports, industrial parks, and two marinas. Framework and training for emergency shelters for community members at Port facilities locations enhanced with generators, supplies, and communication plans.	Severe Weather, Flood, Tsunami, Sea-Level Rise, Seismic	**Internal:** Engineering	High	Medium-Term
9	Severe Weather Repairs at Two Marinas: Proactive reinforcements, repairs, and reconstruction to the marina facilities due to weather impacts.	Severe Weather, Flood, Tsunami, Sea-Level Rise, Seismic	**Internal:** Engineering	Medium	Long-Term
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CITY OF SEQUIM – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

Directions: Please populate the blank mitigation actions table below with new mitigation actions for your jurisdiction. Reference the table below showing types and examples of mitigation actions.

Mitigation Type	Description	Examples
Local Plans and Regulations	These actions include government authorities, policies or codes that influence the way land and buildings are developed and built.	• Building codes • Open space preservation • Capital improvement plan
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure.	• Floodwalls • Utility undergrounding • Safe rooms
Natural Systems Protection and Nature-based Solutions	This type of action can include green infrastructure and low impact development, nature-based solutions, Engineering with Nature and bioengineering to incorporate natural features or processes into the built environment.	• Watershed restoration • Living shorelines • Forest management
Education and Awareness Programs	These types of actions keep residents informed about potential natural disasters. Many of these types of actions are eligible for funding through the FEMA HMA program.	• Real estate disclosures

For each mitigation action you develop, please 1) identify which hazard(s) the action addresses, 2) identify responsible departments (internal and external), 3) determine priority and 4) determine timeline for implementation.

1) 1) You will need to identify **at least one mitigation action per hazard identified** in your jurisdictional annex. Your jurisdiction has identified the hazards below, in order of priority. Hazards highlighted in yellow do not have identified mitigation actions.

City of Sequim Hazard List

1) Wildfire (and wildfire smoke)
2) Drought
3) Severe Weather – Winter Storm/Windstorm
4) Utility Failure/Power Outage
5) Disease
6) Seismic – Cascadia Earthquake
7) Active Shooter/Terrorism
8) Severe Weather – Extreme Heat
9) Flood & Storm Surges/Tides
10) Hazardous Materials
11) Dam/Reservoir Failure
12) Tsunami
13) Landslide

NOTE: If mitigation actions are not identified for all identified hazards by your jurisdiction, the consultant team may recommend eliminating the hazard from your annex. Please contact Noelle Anderson is you need support in crafting mitigation actions for any missing hazards. Mitigation actions may respond to more than one natural and/or human-caused hazard.

CITY OF SEQUIM – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

Assign a priority for each mitigation action based on the following:

- **High Priority**: Top organizational priority and is generally a well-detailed project idea. Protects population, resource, facility, or property at high risk. Uses feasible methods, techniques.
- **Medium Priority**: A good idea that needs more information; action that addresses a moderate hazard.
- **Low Priority**: An idea that needs more information or will take preliminary action to build support.

4) Assign a timeline for implementation for each mitigation action. Consider the following time frames:

- Ongoing: currently in process; or 1-2 years and ongoing thereafter
- Short-Term: 1 to 2 years
- Medium-Term: 3 to 4 years
- Long-Term: 5+ years

You may want to refer to your previous mitigation actions but you do not need to include previous actions in the table below: Mitigation Actions Due July 15th - City of Sequim Annex.docx

CITY OF SEQUIM – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

Identify new mitigation actions in the table below. The first three actions are provided as examples only.

Suggested mitigation actions are included below, highlighted in yellow. These mitigation action ideas were generated for your consideration during our steering committee meetings, community survey/outreach, and HMP workshop.

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
Ex. 1	Participate in regular safety and public awareness campaigns regarding natural and human-caused hazards, and partner with local stakeholders to distribute awareness materials. Consider outreach that engages socially vulnerable populations, such as senior citizens and disabled persons.	All Hazards	**Internal:** Fire Department, Police Department, Administration Department	Medium	Ongoing
Ex. 2	Seek grant funding to purchase permanent and emergency generators in coordination with community stakeholders.	Multiple Hazards: Severe Weather, Power Outage, Wildfire	**Internal:** Public Works Department, Administration Department.	High	Medium-Term
Ex. 3	Establish a comprehensive vegetation management and fuel reduction program applicable to the entirety of the City. Work with the City Fire Department to identify areas with high wildfire hazard risk as top priority for fuel clearance and reduction. Work with a contractor to estimate fuel reduction pricing to apply for grant funding.	Wildfire	**Internal:** Fire Department, Public Works Department, Community Development Department.	High	Long-Term
1	Identify and prioritize critical facilities within Sequim in need of back-up generators. Prioritize procurement for a permanent generator at the Emergency Command Center (ECC). Establish a procurement plan and seek grant funding.	Severe Weather, Power Outage	**Internal:** Public Works Department	Medium	Long-Term
2	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	Wildfire	**Internal:** Community Development Department Public Works (GIS) **Ext**: Fire District 3, Clallam Co. Emergency Management	Medium	Short-Term
3	Fund and construct capital improvement projects on West Sequim Bay Road to serve as an alternative evacuation route for Highway 101. Evaluate solutions for Pitship Bridge to protect the asset from flooding and storm surge.	Flood, Sea Level Rise	Public Works, **Ext**: Clallam County	Medium	Long-Term
4	Update risk assessments, including GIS analysis, for landslides, dam/reservoir failures, tsunamis with substantial changes	Landslides, Tsunamis, Dam/Reservoir Failure	Public Works (GIS)	High	Ongoing
5	Identify temperature-controlled storage needs for emergency supplies and a plan for procurement of both storage and supplies for the essential function of government	Disease, Active Shooter/Terrorism, All Hazards	Police Department **Ext**: Clallam County Emergency Management, Fire District 3, Community Emergency Response Team, Red Cross,	Medium	Long-term
6	Continue to participate in local and regional hazardous materials spills preparation and response exercises. Maintain coordination between the Sequim Police Department and Clallam County Department of Emergency Management for hazardous materials tabletop exercises.	Hazardous Materials	**Internal**: Police Department **Ext**: Clallam County Emergency Management		

CITY OF SEQUIM – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
7	As part of the ongoing Sequim Comprehensive Plan update, consider land use or zoning restrictions on industrial land uses and sources of hazardous materials to reduce risk to surrounding areas.	Hazardous Materials	**Internal:** Department of Community Development		Ongoing
8	As part of the ongoing Sequim Comprehensive Plan update and related climate resilience planning, evaluate policies related to climate change and related hazards. Consider the findings of this MJHMP and the Comprehensive Plan climate resilience planning to develop ongoing policies to mitigate climate impacts.	Flood, Sea Level Rise, Climate Change	**Internal:** Department of Community Development		Ongoing
9	As part of the ongoing Sequim Comprehensive Plan update, evaluate housing and other land uses and consider land use/zoning restrictions in hazard areas and environmentally sensitive areas.	Wildfire, Seismic Hazards, Flood, Tsunami, Landslide	**Internal:** Department of Community Development		Ongoing
10	Construct wastewater collection system & lift station to serve residential and commercial development in east Sequim to reduce and prevent septic systems in critical areas in order to protect water quality in Sequim Bay	Hazard Materials			
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CITY OF SEQUIM – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

Directions: Please populate the blank mitigation actions table below with new mitigation actions for your jurisdiction. Reference the table below showing types and examples of mitigation actions.

Mitigation Type	Description	Examples
Local Plans and Regulations	These actions include government authorities, policies or codes that influence the way land and buildings are developed and built.	• Building codes • Open space preservation • Capital improvement plan
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure.	• Floodwalls • Utility undergrounding • Safe rooms
Natural Systems Protection and Nature-based Solutions	This type of action can include green infrastructure and low impact development, nature-based solutions, Engineering with Nature and bioengineering to incorporate natural features or processes into the built environment.	• Watershed restoration • Living shorelines • Forest management
Education and Awareness Programs	These types of actions keep residents informed about potential natural disasters. Many of these types of actions are eligible for funding through the FEMA HMA program.	• Real estate disclosures

For each mitigation action you develop, please 1) identify which hazard(s) the action addresses, 2) identify responsible departments (internal and external), 3) determine priority and 4) determine timeline for implementation.

1) 1) You will need to identify **at least one mitigation action per hazard identified** in your jurisdictional annex. Your jurisdiction has identified the hazards below, in order of priority. Hazards highlighted in yellow do not have identified mitigation actions.

City of Sequim Hazard List

1) Wildfire (and wildfire smoke)
2) Drought
3) Severe Weather – Winter Storm/Windstorm
4) Utility Failure/Power Outage
5) Disease
6) Seismic – Cascadia Earthquake
7) Active Shooter/Terrorism
8) Severe Weather – Extreme Heat
9) Flood & Storm Surges/Tides
10) Hazardous Materials
11) Dam/Reservoir Failure
12) Tsunami
13) Landslide

NOTE: If mitigation actions are not identified for all identified hazards by your jurisdiction, the consultant team may recommend eliminating the hazard from your annex. Please contact Noelle Anderson is you need support in crafting mitigation actions for any missing hazards. Mitigation actions may respond to more than one natural and/or human-caused hazard.

CITY OF SEQUIM – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

Assign a priority for each mitigation action based on the following:

- **High Priority**: Top organizational priority and is generally a well-detailed project idea. Protects population, resource, facility, or property at high risk. Uses feasible methods, techniques.
- **Medium Priority**: A good idea that needs more information; action that addresses a moderate hazard.
- **Low Priority**: An idea that needs more information or will take preliminary action to build support.

4) Assign a timeline for implementation for each mitigation action. Consider the following time frames:

- Ongoing: currently in process; or 1-2 years and ongoing thereafter
- Short-Term: 1 to 2 years
- Medium-Term: 3 to 4 years
- Long-Term: 5+ years

You may want to refer to your previous mitigation actions but you do not need to include previous actions in the table below: Mitigation Actions Due July 15th - City of Sequim Annex.docx

CITY OF SEQUIM – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

Identify new mitigation actions in the table below. The first three actions are provided as examples only.

Suggested mitigation actions are included below, highlighted in yellow. These mitigation action ideas were generated for your consideration during our steering committee meetings, community survey/outreach, and HMP workshop.

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
Ex. 1	Participate in regular safety and public awareness campaigns regarding natural and human-caused hazards, and partner with local stakeholders to distribute awareness materials. Consider outreach that engages socially vulnerable populations, such as senior citizens and disabled persons.	All Hazards	**Internal:** Fire Department, Police Department, Administration Department	Medium	Ongoing
Ex. 2	Seek grant funding to purchase permanent and emergency generators in coordination with community stakeholders.	Multiple Hazards: Severe Weather, Power Outage, Wildfire	**Internal:** Public Works Department, Administration Department.	High	Medium-Term
Ex. 3	Establish a comprehensive vegetation management and fuel reduction program applicable to the entirety of the City. Work with the City Fire Department to identify areas with high wildfire hazard risk as top priority for fuel clearance and reduction. Work with a contractor to estimate fuel reduction pricing to apply for grant funding.	Wildfire	**Internal:** Fire Department, Public Works Department, Community Development Department.	High	Long-Term
1	Identify and prioritize critical facilities within Sequim in need of back-up generators. Prioritize procurement for a permanent generator at the Emergency Command Center (ECC). Establish a procurement plan and seek grant funding.	Severe Weather, Power Outage	**Internal:** Public Works Department	Medium	Long-Term
2	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	Wildfire	**Internal:** Community Development Department Public Works (GIS) **Ext**: Fire District 3, Clallam Co. Emergency Management	Medium	Short-Term
3	Fund and construct capital improvement projects on West Sequim Bay Road to serve as an alternative evacuation route for Highway 101. Evaluate solutions for Pitship Bridge to protect the asset from flooding and storm surge.	Flood, Sea Level Rise~~All Hazards~~	Public Works, **Ext**: Clallam County	Medium	Long-Term
4	~~Evaluate solutions for Ship Bridge to protect the asset from flooding and storm surge.~~	~~Flood, Sea Level Rise~~	Internal: Public Works Department	Medium	Long-Term
5	Update risk assessments, including GIS analysis, for landslides, dam/reservoir failures, tsunamis with substantial changes	Landslides, Tsunamis, Dam/Reservoir Failure	Public Works (GIS)	High	Ongoing
6	Identify temperature-controlled storage needs for emergency supplies and a plan for procurement of both storage and supplies for the essential function of government	Disease, Active Shooter/Terrorism, All Hazards	Police Department **Ext**: Clallam County Emergency Management, Fire District 3, Community Emergency Response Team, Red Cross,	Medium	Long-term
7	Continue to participate in local and regional hazardous materials spills preparation and response exercises. Maintain coordination between the Sequim Police Department and Clallam County Department of Emergency Management for hazardous materials tabletop exercises.	Hazardous Materials	**Internal**: Police Department **Ext**: Clallam County Emergency Management		

Commented [AN1]: @Meggan - can you confirm the name of this bridge/asset we were discussing during the JSKT meeting? Wasn't able to locate this bridge on a map, I might have written the name down incorrectly. Thanks!

Commented [AN2]: @Meggan - can you confirm the name of this bridge/asset we were discussing during the JSKT meeting? Wasn't able to locate this bridge on a map, I might have written the name down incorrectly. Thanks!

CITY OF SEQUIM – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
8	As part of the ongoing Sequim Comprehensive Plan update, consider land use or zoning restrictions on industrial land uses and sources of hazardous materials to reduce risk to surrounding areas.	Hazardous Materials	**Internal:** Department of Community Development		Ongoing
9	As part of the ongoing Sequim Comprehensive Plan update and related climate resilience planning, evaluate policies related to climate change and related hazards. Consider the findings of this MJHMP and the Comprehensive Plan climate resilience planning to develop ongoing policies to mitigate climate impacts.	Flood, Sea Level Rise, Climate Change	**Internal:** Department of Community Development		Ongoing
10	As part of the ongoing Sequim Comprehensive Plan update, evaluate housing and other land uses and consider land use/zoning restrictions in hazard areas and environmentally sensitive areas.	Wildfire, Seismic Hazards, Flood, Tsunami, Landslide	**Internal:** Department of Community Development		Ongoing
11	Construct wastewater collection system & lift station to serve residential and commercial development in east Sequim to reduce and prevent septic systems in critical areas in order to protect water quality in Sequim Bay	Hazard Materials			
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CLALLAM COUNTY PUD – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

Directions: Please populate the blank mitigation actions table below with new mitigation actions for your jurisdiction. Reference the table below showing types and examples of mitigation actions.

Mitigation Type	Description	Examples
Local Plans and Regulations	These actions include government authorities, policies or codes that influence the way land and buildings are developed and built.	• Building codes • Open space preservation • Capital improvement plan
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure.	• Floodwalls • Utility undergrounding • Safe rooms
Natural Systems Protection and Nature-based Solutions	This type of action can include green infrastructure and low impact development, nature-based solutions, Engineering with Nature and bioengineering to incorporate natural features or processes into the built environment.	• Watershed restoration • Living shorelines • Forest management
Education and Awareness Programs	These types of actions keep residents informed about potential natural disasters. Many of these types of actions are eligible for funding through the FEMA HMA program.	• Real estate disclosures

For each mitigation action you develop, please 1) identify which hazard(s) the action addresses, 2) identify responsible departments (internal and external), 3) determine priority and 4) determine timeline for implementation.

1) You will need to identify **at least one mitigation action per hazard identified** in your jurisdictional annex. Your jurisdiction has identified the hazards below, in order of priority. Hazards highlighted in yellow do not have identified mitigation actions.

Clallam PUD Hazard List

1) Severe Weather – Winter Storm
2) Severe Weather – Windstorm
3) Disease (infectious/Vector) and Pandemic
4) Utility Failure/Power Outage
5) Wildfire
6) Seismic – Cascadia Earthquake
7) Tsunami
8) Dam/Reservoir Failure
9) Landslide
10) Sea Level Rise
11) Active Shooter/Terrorism
12) Drought
13) Supply Chain Interruption
14) Flood
15) Hazardous Materials

NOTE: If mitigation actions are not identified for all identified hazards by your jurisdiction, the consultant team may recommend eliminating the hazard from your annex. Please contact Noelle Anderson is you need support in crafting mitigation actions for any missing hazards. Mitigation actions may respond to more than one natural and/or human-caused hazard.

CLALLAM COUNTY PUD – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

3) Assign a priority for each mitigation action based on the following:

- **High Priority**: Top organizational priority and is generally a well-detailed project idea. Protects population, resource, facility, or property at high risk. Uses feasible methods, techniques.
- **Medium Priority**: A good idea that needs more information; action that addresses a moderate hazard.
- **Low Priority**: An idea that needs more information or will take preliminary action to build support

4) Assign a timeline for implementation for each mitigation action. Consider the following time frames:

- Ongoing: currently in process; or 1-2 years and ongoing thereafter
- Short-Term: 1 to 2 years
- Medium-Term: 3 to 4 years
- Long-Term: 5+ years

You may want to refer to your previous mitigation actions, but you do not need to include previous actions in the table below: Mitigation Actions Due July 15th - Clallam County PUD No.1 .docx

CLALLAM COUNTY PUD – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

Identify new mitigation actions in the table below. The first three actions are provided as examples only.

Suggested mitigation actions are included below, highlighted in yellow. These mitigation action ideas were generated for your consideration during our steering committee meetings, community survey/outreach, and HMP workshop.

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
Ex. 1	Participate in regular safety and public awareness campaigns regarding natural and human-caused hazards, and partner with local stakeholders to distribute awareness materials. Consider outreach that engages socially vulnerable populations, such as senior citizens and disabled persons.	All Hazards	**Internal:** Fire Department, Police Department, Administration Department	Medium	Ongoing
Ex. 2	Seek grant funding to purchase permanent and emergency generators in coordination with community stakeholders.	Multiple Hazards: Severe Weather, Power Outage, Wildfire	**Internal:** Public Works Department, Administration Department.	High	Medium-Term
Ex. 3	Establish a comprehensive vegetation management and fuel reduction program applicable to the entirety of the City. Work with the City Fire Department to identify areas with high wildfire hazard risk as top priority for fuel clearance and reduction. Work with a contractor to estimate fuel reduction pricing to apply for grant funding.	Wildfire	**Internal:** Fire Department, Public Works Department, Community Development Department.	High	Long-Term
1	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	Wildfire	Clallam PUD	Medium	Short-Term
2	Deploy Generator backup for all critical facilities. Enhance Fuel Inventory	Multiple Hazards: Severe Weather- Winter Storm, Windstorm, Utility Failure/Power Failure	Clallam PUD	High	Medium - Term
3	Maintain clearance around critical electrical infrastructure (substation, transmission, and distribution lines) and water storage facilities	Severe Weather - Windstorm	Clallam PUD	High	Short-Term
4	Build and retain mask and other PPE inventory, create work from home protocols, crew rotation policy, testing and quarantine protocols. Address relevant issues in Collective Bargaining Agreement to ensure Continuity of Operations	Disease and Pandemic	Clallam PUD	Medium	Medium-Tern
5	Upgrade critical facilities to handle increased storage, generators at water sources and pumpstation. Maintain defensible perimeters at critical facilities	Multiple Hazards: Severe Weather- Winter Storm, Windstorm, Utility Failure/Power Failure, Wildfire	Clallam PUD	Medium	Medium-Term
6	Seismic Retrofitting of Existing Critical Electrical and Water Infrastructure	Seismic- Cascadia Earthquake	Clallam PUD	Medium	Long-Term
7	Periodically assess critical facilities location in relation to NOAA/USGS Tsunami Model. Evaluate options for mitigating risk (i.e. Relocation, Redundancy, etc)	Tsunami	Clallam PUD	Medium	Long-Term
8	Assess appropriate grid-scale “Behind the Meter” Generation technologies that are sufficient to provide continuous power to all critical services, government functions, healthcare	Multiple Hazards: Dam/Reservoir Failure,	Clallam PUD/ Electric	Medium	Long-Term

CLALLAM COUNTY PUD – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
	facilities in Clallam County. Construct and commission grid scale generation (Scenario: BPA Dam failure, Wildfire Public Safety Power Shutoff by BPA, BPA Transmission Line failure)	Wildfire, Severe Weather, Power Outages			
9	Study, identify and acquire properties required to serve portions of water service area and electric service area that may be relocated due to sea level rise	Sea Level Rise	Clallam PUD	Medium	Long-Term
10	Assess security measures and evacuation protocols in light of active shooter threat. Bolster physical security measures at office locations	Active Shooter/ Terrorism	Clallam PUD	High	Short-Term
11	Assess and improve security measures at electric and water infrastructure	Active Shooter/ Terrorism	Clallam PUD	Medium	Medium-Term
12	Prepare a water system plan to account for new groundwater sources and identify additional tie-ins with other potable water systems (such as the City of Port Angeles). Enhance access to groundwater sources of supply, aquifer recharge projects	Drought	Clallam PUD/ Water	Medium	Short-Term
13	Maintain minimum quantities of critical inventory. Increase inventory warehousing capacity at all water and electric operations facilities	Supply Chain Interruption	Clallam PUD	High	Medium-Term
14	Check critical facilities location in relation to FEMA flood maps, evaluate and implement options for mitigating risk (i.e relocation, elevation, armoring, waterproofing, etc)	Flood	Clallam PUD	Medium	Short-Term
15	Evaluate long-term opportunities to move and upgrade substations (transformers and breakers) out of known hazard zones as load density increases due to population growth and increased energy needs.	All Hazards	Clallam PUD/ Electric	High	Long-Term
16	Prepare a Wildland Fire Mitigation Plan and create/assemble/hire/contract a "Wildfire Mitigation Crew"	Wildfire	Clallam PUD/ Electric	High	Short-Term
17	Identify and execute "Wildfire Targeted projects" (i.e Poles/crossarms upgraded from wood to fiberglass; overhead to underground conversion; evaluate and install wildfire resistant technology and other prevention systems, tree wires, etc)	Wildfire	Clallam PUD/ Electric	High	Short-Term
18	Expansion/ Relocation of operational facilities with resilient construction methods to serve inland population shift, increased energy needs, and to facilitate staff support when responding to larger emergencies in conjunction with Clallam County EOC (rest facilities, food storage, etc for crews responding to large scale outages)	Multiple Hazards: Wildfire, Seismic, Tsunami, Severe Weather	Clallam PUD/ Electric	High	Short-Term
19	Replacement of old, direct-buried conductor with a jacketed cable in schedule 40 or higher conduit	Landslide	Clallam PUD/ Electric	High	Medium-Term
20	Enhance HDD capabilities	Landslide	Clallam PUD/ Water	Medium	Long-Term
21	Create and promote accessible and affordable programs for vulnerable and low-income populations to enhance whole house heating and cooling capabilities. Seek funding mechanism to expand program to all eligible customers	All Hazards	Clallam PUD/ Electric	High	Short-Term
22	Enhance water storage capabilities to mitigate change in precipitation patterns	Multiple Hazards: Drought, Flood	Clallam PUD/ Water	Medium	Long-Term
23	Create and promote accessible and affordable programs to provide extended electric backup for medical devices for vulnerable and low-income populations with medical needs. Seek funding mechanism to expand program to additional customers.	All Hazards	Clallam PUD/ Electric	High	Short-Term
24	Evaluate and implement advanced modeling and adaptive protection technologies to predict and avoid outages, wildfire, and expedite restoration efforts (i.e. Advanced Metering Infrastructure, Outage Mangement Systems, etc)	All Hazards	Clallam PUD/ Electric	Medium	Short-Term

CLALLAM COUNTY PUD – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
25	Promote community awareness on Public Safety Power Shutoffs (PSPS).	Wildfire	Clallam PUD/ Electric	High	Short-Term
26	Participate in regular safety and public awareness campaigns regarding natural and human-caused hazards, and partner with local stakeholders to distribute awareness materials. Consider outreach that engages socially vulnerable populations, such as senior citizens and disabled persons.	All Hazards	Clallam PUD	High	Short-Term
27	Establish a comprehensive vegetation management and fuel reduction program applicable to the entirety of the electric service area. Identify areas with high wildfire hazard risk as top priority for fuel clearance and reduction. Estimate fuel reduction pricing to apply for grant funding.	Wildfire	Clallam PUD/ Electric	High	Short-Term
28	Seek and apply for grant funding towards all identified mitigation actions	All Hazards	Clallam PUD	High	Short-Term

JAMESTOWN S'KLALLAM TRIBE – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

Directions: Please populate the blank mitigation actions table below with new mitigation actions for your jurisdiction. Reference the table below showing types and examples of mitigation actions.

Mitigation Type	Description	Examples
Local Plans and Regulations	These actions include government authorities, policies or codes that influence the way land and buildings are developed and built.	• Building codes • Open space preservation • Capital improvement plan
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure.	• Floodwalls • Utility undergrounding • Safe rooms
Natural Systems Protection and Nature-based Solutions	This type of action can include green infrastructure and low impact development, nature-based solutions, Engineering with Nature and bioengineering to incorporate natural features or processes into the built environment.	• Watershed restoration • Living shorelines • Forest management
Education and Awareness Programs	These types of actions keep residents informed about potential natural disasters. Many of these types of actions are eligible for funding through the FEMA HMA program.	• Real estate disclosures

For each mitigation action you develop, please 1) identify which hazard(s) the action addresses, 2) identify responsible departments (internal and external), 3) determine priority and 4) determine timeline for implementation.

1) 1) You will need to identify **at least one mitigation action per hazard identified** in your jurisdictional annex. Your jurisdiction has identified the hazards below, in order of priority. Hazards highlighted in yellow do not have identified mitigation actions.

Jamestown S'Klallam Tribe Hazard List

1) Drought
2) Wildfire (and Wildfire Smoke)
3) Severe Weather – Winter Storm
4) Severe Weather – Windstorm
5) Flood
6) Power Outage
7) Hazardous Materials
8) Landslide
9) Seismic – Cascadia Earthquake
10) Tsunami
11) Active Shooter
12) Disease

NOTE: If mitigation actions are not identified for all identified hazards by your jurisdiction, the consultant team may recommend eliminating the hazard from your annex. Please contact Noelle Anderson is you need support in crafting mitigation actions for any missing hazards. Mitigation actions may respond to more than one natural and/or human-caused hazard.

33) Assign a priority for each mitigation action based on the following:

- **High Priority**: Top organizational priority and is generally a well-detailed project idea. Protects population, resource, facility, or property at high risk. Uses feasible methods, techniques.
- **Medium Priority**: A good idea that needs more information; action that addresses a moderate hazard.
- **Low Priority**: An idea that needs more information or will take preliminary action to build support.

JAMESTOWN S'KLALLAM TRIBE – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

4) Assign a timeline for implementation for each mitigation action. Consider the following time frames:
   - Ongoing: currently in process; or 1-2 years and ongoing thereafter
   - Short-Term: 1 to 2 years
   - Medium-Term: 3 to 4 years
   - Long-Term: 5+ years

You may want to refer to your previous mitigation actions, but you do not need to include previous actions in the table below: Mitigation Actions Due July 15th - Jamestown S'Klallam Tribal Annex LSC.docx

JAMESTOWN S'KLALLAM TRIBE – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

Identify new mitigation actions in the table below. The first three actions are provided as examples only.

Suggested mitigation actions are included below, highlighted in yellow. These mitigation action ideas were generated for your consideration during our steering committee meetings, community survey/outreach, and HMP workshop.

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
Ex. 1	Participate in regular safety and public awareness campaigns regarding natural and human-caused hazards, and partner with local stakeholders to distribute awareness materials. Consider outreach that engages socially vulnerable populations, such as senior citizens and disabled persons.	All Hazards	**Internal:** Fire Department, Police Department, Administration Department	Medium	Ongoing
Ex. 2	Seek grant funding to purchase permanent and emergency generators in coordination with community stakeholders.	Multiple Hazards: Severe Weather, Power Outage, Wildfire	**Internal:** Public Works Department, Administration Department.	High	Medium-Term
Ex. 3	Establish a comprehensive vegetation management and fuel reduction program applicable to the entirety of the jurisdiction. Work with public safety agencies to identify areas with high wildfire hazard risk as top priority for fuel clearance and reduction. Work with a contractor to estimate fuel reduction pricing to apply for grant funding.	Wildfire	**Internal:** Fire Department, Public Works Department, Community Development Department.	High	Long-Term
1	Identify which Tribal facilities could serve as a neighborhood cooling/warming center or emergency shelter during extreme weather events or natural disasters.	Severe Weather, Power Outage, Earthquake	Tribal Government	Medium	Medium - term
2	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	Wildfire	Tribal Government, Resort, or Jamestown Family Health	Medium	Short-Term
3	Identify, plan, and construct redundant routing around the known weakest links on Highway 101 (such as around Jimmycomelately Creek). Where redundancy already exists, publish alternative routes for evacuation and emergency preparedness/awareness. Where redundancy does not exist, identify grant funding resources for alternative	Earthquake/Tsunami	Tribal Government, WSDOT, Clallam County	High	Long-term
4	Evaluate and prioritize Jamestown S'Klallam Tribe owned residential properties for weatherization, prioritizing energy efficiency and preventing damage from water, moisture, and sunlight. Assess and document needed weatherization improvements required per property, considering insulation, windows/doors, air sealing, heating and cooling systems, and ventilation system improvements. Seek grant funding to fund weatherization improvements.	All Hazards	Tribal Government (Housing Program)	Medium	Short-term
5	Engage with tribal elders and other socially vulnerable tribal members who may need extra support during an emergency incident. Prioritize communication, awareness, and messaging targeted to encourage preparedness.	All Hazards	Tribal Government (Social and Community Services)	High	Ongoing
6	Seismic assessment of Tribal facilities	Earthquake	Tribal Government, sturctual engineer	High	Ongoing
7	Lower Dungeness River Floodplain Restoration	Flooding	Tribe, Clallam County, Washington Department of Fish and Wildlife	High	Ongoing
8	Structure elevation and/or relocation of Tribal facilities and infrastructure	Flooding/tsunami	Tribal Government		

JAMESTOWN S'KLALLAM TRIBE – NEW MITIGATION ACTIONS WORKSHEET
DUE: September 13, 2024

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
9	Develop alternate water supplies to provide reserve water sources to be used in event of drought or water shortage in Blyn, WA	Drought	Tribal Government, Indian Health Services, HUD	Medium	Long-term
10	Create and expand water efficiency/conservation programs.	Drought	Tribal Government	Medium	Ongoing
11	Vegetation management, fuel reduction projects and defensible space around structures	Wind storrm, winter storm, wildfire	Tribal Government, PUD	Medium	Ongoing
12	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).	Earthquake/Tsunami, Flooding	Tribal Government	Medium	Long-term
13	Rehab/maintain Howe Truss Railroad Bridge at Dungeness River Nature Center	Earthquake, Wind storm, winter storm Flooding	Tribal Government	High	Short-term/Ongoing
14	Create additional pedestrian crossing on HWY101 in low lying areas to allow trail users to move to higher ground in case of an Earthquake/tsunami	Earthquake/Tsunami	Tribal Government	Medium	Medium term
15	Construct and maintain emergency supplies warehouse to support recovery	All Hazards	Tribal Government, Clallam County EOC	Medium	Long-term
16					
17					
18					
19					
20					

Hazard Mitigation Ranking and Prioritization

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?	

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

Mitigation Action No.	Mitigation Action	Socially acceptable	Technically feasible	Administrative capacity	Politcally acceptable	Legal authority	Economically beneficial	Environmental benefit	STAPLEE Score	Lives saved?	Reduction of disaster damage?	Mitigation Effectiveness Score	Total Priority Score
FR01	City of Forks Culvert Assessment Study/Report	-	-	-	-	-	-	-	20	-	-	8	28
FR02	Storm-related Roof Damage Mitigation Assessment	-	-	-	-	-	-	-	18	-	-	4	22
FR03	Palmer Road Stormwater Detention Pond and Conveyance System	-	-	-	-	-	-	-	16	-	-	4	20
FR04	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	3	3	3	3	3	2	2	19	3	3	6	25
FR05	Identify and prioritize critical facilities within Forks in need of back-up generators. Establish a procurement plan and seek grant funding.	3	3	3	3	3	2	2	19	3	3	6	25
FR06	As part of the ongoing Forks Comprehensive Plan update and related climate resilience planning, evaluate policies related to climate change and related hazards. Evaluate housing and other land uses, and consider additional land use/zoning regulations in hazard areas and environmentally sensitive areas. Consider the findings of this MJHMP and the Comprehensive Plan climate resilience planning to develop ongoing policies to mitigate climate impacts.	3	3	3	2	3	2	3	19	3	5	8	27
FR07	Continue to promote a culture of emergency preparedness and hazard mitigation by distributing and promoting outreach materials/programs produced by Clallam County Emergency Management Department.	3	3	3	3	3	2	2	19	3	3	6	25
FR08	Initiate discussion and collaboration with Washington Department of Natural Resources (DNR) regarding wildfire and burn risk associated with permitted timber harvest and debris storage on both DNR and private forest land. Identify opportunities to reduce wildfire risk and vulnerability this practice poses to the City of Forks and Forks UGA.	3	2	2	3	3	3	3	19	3	5	8	27
FR09	Conduct periodic assessments and maintenance of drainages, ditches and outfalls to ensure adequate drainage capacity for both current and future use.	3	3	3	3	3	2	2	19	1	3	4	23
FR10	Work with local community groups and NGOs to determine adequate locations throughout the City to serve as both warming and cooling centers. Establish a plan to coordinate services, volunteers and other resources required to facilitate warming and cooling centers.	3	3	3	3	3	2	2	19	3	1	4	23
FR11	Evaluate existing back-up power capacity for the local potable water system; identify any gaps and establish a method to prioritize existing needs. Establish a procurement plan and seek grant funding.	3	3	2	3	3	2	2	18	1	1	2	20
FR12	Evaluate microgrid concepts such as solar arrays and battery energy storage systems (BESS) to offer alternative power sources at the Quillayute Airport.	3	2	2	3	3	3	3	19	1	1	2	21

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?	
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Will historic structures or key cultural resources be saved or protected?	
Could it be implemented quickly?	

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

Mitigation Action No.	Mitigation Action	Socially acceptable	Technically feasible	Administrative capacity	Politcally acceptable	Legal authority	Economically beneficial	Environmental benefit	STAPLEE Score	Lives saved?	Reduction of disaster damage?	Mitigation Effectiveness Score	Total Priority Score
PA01	Protect/Reinforce Sole Source Water Main from Elwha River against slide failure	-	-	-	-	-	-	-	18	-	-	6	24
PA02	Protect/Reinforce Sole Source Water Main from City to Eastern Customers and to PUD's Roundtree Reservoir	-	-	-	-	-	-	-	18	-	-	6	24
PA03	Peabody Heights Reservoir Earthen Dam Reinforcement	-	-	-	-	-	-	-	13	-	-	10	23
PA04	Sewer Pump Station Power Upgrades	-	-	-	-	-	-	-	18	-	-	6	24
PA05	Update Flood Assessment	-	-	-	-	-	-	-	17	-	-	6	23
PA06	Upgrade to Shorelines	-	-	-	-	-	-	-	15	-	-	6	21
PA08	Install Backup Power for City Corp Yard	-	-	-	-	-	-	-	19	-	-	6	25
PA09	Install Backup Power for Light Operations Facility	-	-	-	-	-	-	-	19	-	-	6	25
PA10	Fiber Optic Network Upgrade	-	-	-	-	-	-	-	19	-	-	4	23

STAPLEE Criteria

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Mitigation Effectiveness Criteria

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Will the implemented action result in lives saved?	High = 5 Medium = 3 Low = 1
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Mitigation Action No.	Mitigation Action	Socially acceptable	Technically feasible	Administrative capacity	Politcally acceptable	Legal authority	Economically beneficial	Environmental benefit	STAPLEE Score	Lives saved?	Reduction of disaster damage?	Mitigation Effectiveness Score	Total Priority Score
SQ01	Build fuel station at City Public Works Yard to supply fuel to City departments and all emergency responders.	-	-	-	-	-	-	-	19	-	-	6	25
SQ02	Replace 3-mile 12" water main from Ranney Will (infiltration gallery) beginning near the Dungeness River and ending at the Reservoir Road Reservoirs.	-	-	-	-	-	-	-	12	-	-	6	18
SQ03	Purchase a portable water purification system and small tanks. Prepare multiple sites and equipment to operate water purification	-	-	-	-	-	-	-	18	-	-	6	24
SQ04	Locate site for new potable water reservoir, purchase property, design and construct.	-	-	-	-	-	-	-	15	-	-	8	23
SQ05	Reroute/reconfigure electrical supply to the City of Sequim Water Reclamation Facility at 247 Schmuck Road by bringing new power source into the facility and using existing supply as backup.	-	-	-	-	-	-	-	19	-	-	4	23
SQ06	Construct deep water well (>600 feet) to increase resiliency and reliability within water system.	-	-	-	-	-	-	-	17	-	-	4	21
SQ07	Connect and extend City water mains to improve looping, during water main replacements and developer projects.	-	-	-	-	-	-	-	17	-	-	4	21
SQ08	Purchase Additional Heavy Equipment for Use during Severe Storms	-	-	-	-	-	-	-	19	-	-	8	27
SQ09	Develop Reliable Backup Program for Critical City Data Entry Post-Disaster	-	-	-	-	-	-	-	19	-	-	6	25
SQ10	Capture stormwater in the County southwest of Sequim city limits and re-infiltrate using green stormwater infrastructure to benefit the watershed.	-	-	-	-	-	-	-	18	-	-	6	24
SQ11	Install an energy storage microgrid for storing solar energy for use in the EOC and Civic Center during power outage emergencies.	-	-	-	-	-	-	-	19	-	-	4	23
SQ12	Replace mid-1900s AC pipe running through the City with earthquake-resistant pipe.	-	-	-	-	-	-	-	18	-	-	8	26
SQ13	Protect/reinforce Johnson Creek Trestle for the Olympic Discovery Trail west of Whitefeather Way	-	-	-	-	-	-	-	19	-	-	4	23
SQ14	Train City staff to perform seismic assessments of City properties	-	-	-	-	-	-	-	19	-	-	8	27
SQ15	Conduct wildfire risk assessment for City of Sequim and Fire District 3	-	-	-	-	-	-	-	19	-	-	6	25
SQ16	Implement asset management using GIS for all capital facilities	-	-	-	-	-	-	-	19	-	-	8	27
SQ17	Coordinate Emergency Management/Incident Response trainings for North Olympic Peninsula jurisdictions	-	-	-	-	-	-	-	19	-	-	8	27
SQ18	Public education of potential hazards, local agency response, and preparedness	-	-	-	-	-	-	-	17	-	-	8	25
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	-	-	-	-	-	-	-	19	-	-	8	27
SQ20	Identify and prioritize critical facilities within Sequim in need of back-up generators. Prioritize procurement for a permanent generator at the Emergency Command Center (ECC). Establish a procurement plan and seek grant funding.	3	3	3	3	3	2	1	18	3	1	4	22
SQ21	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	3	3	3	3	3	2	2	19	3	3	6	25
SQ22	Fund and construct capital improvement projects on West Sequim Bay Road to serve as an alternative evacuation route for Highway 101. Evaluate solutions for Pitship Bridge to protect the asset from flooding and storm surge.	3	3	2	3	3	2	1	17	3	3	6	23
SQ23	Update risk assessments, including GIS analysis, for landslides, dam/reservoir failures, tsunamis with substantial changes	3	3	3	3	3	2	1	18	1	3	4	22
SQ24	Identify temperature-controlled storage needs for emergency supplies and a plan for procurement of both storage and supplies for the essential function of government	3	3	3	3	3	2	1	18	3	1	4	22
SQ25	Continue to participate in local and regional hazardous materials spills preparation and response exercises. Maintain coordination between the Sequim Police Department and Clallam County Department of Emergency Management for hazardous materials tabletop exercises.	3	3	3	3	3	2	2	19	1	1	2	21
SQ26	As part of the ongoing Sequim Comprehensive Plan update, consider land use or zoning restrictions on industrial land uses and sources of hazardous materials to reduce risk to surrounding areas.	2	3	3	3	3	2	2	18	3	1	4	22
SQ27	As part of the ongoing Sequim Comprehensive Plan update and related climate resilience planning, evaluate policies related to climate change and related hazards. Consider the findings of this MJHMP and the Comprehensive Plan climate resilience planning to develop ongoing policies to mitigate climate impacts.	2	3	3	3	3	2	3	19	3	3	6	25
SQ28	As part of the ongoing Sequim Comprehensive Plan update, evaluate housing and other land uses and consider land use/zoning restrictions in hazard areas and environmentally sensitive areas.	2	3	3	3	3	2	3	19	1	1	2	21
SQ29	Construct wastewater collection system & lift station to serve residential and commercial development in east Sequim to reduce and prevent septic systems in critical areas in order to protect water quality in Sequim Bay	3	3	3	3	3	2	2	19	1	3	4	23

STAPLEE Criteria

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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

Mitigation Action No.	Mitigation Action	Socially acceptable	Technically feasible	Administrative capacity	Politcally acceptable	Legal authority	Economically beneficial	Environmental benefit	STAPLEE Score	Lives saved?	Reduction of disaster damage?	Mitigation Effectiveness Score	Total Priority Score
CC01	Relocate Public Works/Roads from tsunami zone	-	-	-	-	-	-	-	17	-	-	6	**23**
CC02	Move EOC from seismically unstable area to new location	-	-	-	-	-	-	-	20	-	-	10	**30**
CC03	Identify and organize County hazard GIS data so that it is readily available in the event of a hazard.	-	-	-	-	-	-	-	18	-	-	4	**22**
CC04	Establish a system of real-time hazard mapping to communicate conditions on the ground to staff and public.	-	-	-	-	-	-	-	17	-	-	6	**23**
CC05	Reinforce/retrofit Fire District 2 facilities for seismic stability.	-	-	-	-	-	-	-	18	-	-	10	**28**
CC06	Hire a consultant to conduct a wildfire risk assessment profile of Fire District 2 facilities.	-	-	-	-	-	-	-	19	-	-	6	**25**
CC07	Build new Fire District 4 station that is seismically sound.	-	-	-	-	-	-	-	18	-	-	10	**28**
CC09	Inventory dikes, levees, and flood protection structures on Clallam County Rivers	-	-	-	-	-	-	-	21	-	-	8	**29**
CC10	Inventory public utilities including water supplies, sewer systems, and solid-waste handling facilities.	-	-	-	-	-	-	-	21	-	-	8	**29**
CC12	Seismic study of newer portion of Clallam County Courthouse	-	-	-	-	-	-	-	19	-	-	6	**25**
CC13	Re-locate Fire Station 33, which is currently located in a liquefaction zone.	-	-	-	-	-	-	-	16	-	-	8	**24**
CC14	Re-locate Fire Station 31, which is currently located in a tsunami hazard zone.	-	-	-	-	-	-	-	16	-	-	8	**24**
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.	-	-	-	-	-	-	-	17	-	-	8	**25**
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.	-	-	-	-	-	-	-	17	-	-	8	**25**
CC17	Investigate alternative water sources in areas where water quantity and quality have declined due to climate change.	-	-	-	-	-	-	-	17	-	-	8	**25**
CC18	Advocate to Washington EMD and FEMA to construct a FEMA Distribution Center with generator capabilities within Clallam County, to proactively stage emergency supplies and materials within the planning area.	3	2	3	3	3	2	1	17	3	1	4	**21**
CC19	Collaborate and promote multi-jurisdictional transportation improvement project amongst plan annexes. Work with WSDOT to advocate for transportation improvement funding for larger scale improvement projects. Continue assessing climate vulnerabilities of the transportation sector and advocate to expand the WSDOT climate vulnerability assessment to include non-state roads and other transportation systems.	3	2	2	3	3	2	2	17	1	3	4	**21**
CC20	Coordinate with public safety agencies to identify staging locations for emergency response equipment and materials, including food, water, deployable shelters, and medical/first aid. Expand training for health and social services providers to address mental and physical health issues following extreme climate events or other emergencies.	3	3	3	3	3	2	1	18	3	1	4	**22**
CC21	Promote education on natural hazards and empower community members to form neighborhood plans and preparedness groups. Highlight the importance of self-reliance and planning for a minimum of 30 days, and work with residents to create home emergency kits containing backup medications, food rations, and secondary communication technologies.	3	3	3	3	3	3	1	19	3	1	4	**23**
CC22	Seek funding resources and mechanisms for low-income communities and individuals to purchase emergency supplies and equipment.	3	3	3	3	3	3	1	19	3	1	4	**23**
CC23	Through the Comprehensive Plan Update, evaluate zoning regulations and land use controls that reflect projected climate risk and reduce development in known or projected hazard zones. Review land use designations to identify opportunities and barriers for responding to rapid population changes and rebuilding after climate disasters and impacts, and prioritize post-disaster programs in overburdened communities.	2	3	2	2	3	2	2	16	3	3	6	**22**
CC24	Partner with the Washington State University (WSU) Extension – Clallam County and the Clallam Conservation District to promote the Drought Relief Education Outreach Program. Encourage community members to adopt waterwise practices on their property. Coordinate with the Department of Ecology to develop and implement a comprehensive drought resilience strategy that considers projected climate impacts and sets action levels for different drought stages. Incorporate climate projections into drought planning to enhance preparedness and mitigate the impacts of drought on water resources.	3	3	2	3	3	3	3	20	1	1	2	**22**
CC25	Evaluate feasibility for Highway 112 long-term relocation and resilience solutions, including redundant routing solutions, to reduce ongoing landslide and localized flooding issues. Consider projected sea level rise scenarios when considering roadway relocation and elevation. NOAA grant infrastructure to fix portions of 112 – infrastructure improvements for parts of 112 at specific mileposts. Explore additional funding and financing mechanisms for improvements at other weak points on 112.	3	2	3	3	3	2	2	18	3	5	8	**26**
CC26	Secure grant funding from the United States Department of Agriculture (USDA) to fund a Community Wildfire Protection Plan (CWPP) update, and model wildfire behavior to identify risk reduction solutions. Encourage participation in incentive-based emergency preparedness programs such as Firewise (National Fire Protection Association). Invite local community stakeholders and MJHMP annex jurisdictions to participate in the CWPP planning process.	3	3	3	3	3	2	2	19	3	5	8	**27**
CC27	Conduct an inventory on current medical care and services, including the number of doctors, nurses, and paramedics within the County. Evaluate response during different emergency scenarios, where cities, tribes and unincorporated communities may be isolated from each other due to roadway system failures. Identify opportunities to expand community capacity through partnership through Community Emergency Response Teams (CERT) and American Red Cross training programs. Incorporate climate impacts into the planning and coordination of preparedness, response, and recovery activities among first responders and partners, including public health, law enforcement, fire, school, and EMS personnel. This involves updating communications equipment, enhancing training, regularly assessing emergency facility needs (e.g., home emergency kits, cooling centers and temporary shelters), and improving the adaptive capacity of vulnerable populations such as low-income communities, Elders, or people living in high climate risk areas. Identify opportunities for medical transport that does not rely on roadway transportation systems such as boats, helicopters and airplanes.	3	2	3	3	3	2	2	18	5	1	6	**24**
CC28	Incorporate consideration for seasonal visitors, tourists and national park visitors as a socially vulnerable population that will require additional response support during emergency scenarios. When procuring emergency supplies and equipment, consider locations where populations increase due to tourism season or special events. Coordinate emergency preparedness and emergency response with the National Park Service and DNR.	3	3	3	3	3	2	1	18	3	1	4	**22**
CC29	Advocate in the County's Operational Area meetings to encourage local school districts to perform seismic inventory for assets in need of retrofits.	3	3	3	3	3	2	1	18	3	3	6	**24**
CC30	Prepare a detailed Channel Migration Zone (CMZ) delineation analyses and mapping along the Lower Elwha River to inform shoreline management and land use planning for life-safety hazards, critical freshwater and riparian habitat, public infrastructure and private property in Clallam County.	3	2	2	3	3	2	3	18	1	3	4	**22**
CC31	Identify community disaster resilience hubs for each of the County's twenty micro-islands, seek funding to make these sites resilient, communicate the locations of these sites for public use during an emergency, and coordinate all plans to serve these hubs effectively in an emergency.	3	3	2	3	3	2	1	17	3	3	6	**23**
CC32	Create health and safety messaging on climate change impacts and other hazards, providing residents with guidance to plan and protect themselves, while involving overburdened communities through diverse engagement formats. Collaborate with Clallam County communities, particularly Tribes, to ensure their input on climate and health impacts, and needed emergency resources, focusing on culturally relevant transcreation to reach specific communities.	3	3	3	3	3	2	2	19	1	1	2	**21**
CC33	Implement climate-smart building policies and disincentivize construction in areas highly susceptible to climate hazards such as erosion, landslides, and flooding. This may include requiring low-impact development and stormwater runoff mitigation systems, designing buildings for passive survivability in case of extended power loss, adopting fire resilience standards such as venting and features designed to prevent ember ignition, and promoting "green" or "cool" roofs.	2	3	3	2	3	2	3	18	3	3	6	**24**

CC34	Coordinate with WSDOT on the comprehensive strategy to map vulnerable transportation infrastructure, including Highways 101, 110, 112 and 113. Incorporate sea level rise and tsunami hazard data into vulnerability mapping for future infrastructure siting. Prioritize identifying or designating alternative routes for critical corridors to enhance transportation redundancy.	3	2	3	3	3	2	1	17	3	5	8	**25**
CC35	Procure a consultant to utilize green LiDAR technology along the Clallam County coastline to accurately map and document existing coastal conditions. Use data to identify vulnerable areas and develop strategies to enhance coastal resilience against environmental changes, climate change, and natural disasters.	3	2	3	3	3	2	3	19	1	3	4	**23**
CC36	Establish a Memorandum of Understanding (MOU) with the Port of Port Angeles, for use of recently procured barges post-disasters. Barges can be used to distribute food and supplies post-disaster in areas where roadways or bridges have failed.	3	3	3	3	3	2	1	18	3	1	4	**22**

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?	
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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?	

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

Mitigation Action No.	Mitigation Action	Socially acceptable	Technically feasible	Administrative capacity	Politcally acceptable	Legal authority	Economically beneficial	Environmental benefit	STAPLEE Score	Lives saved?	Reduction of disaster damage?	Mitigation Effectiveness Score	Total Priority Score
PUD01	Evaluate options to make new hotel in Port Angeles tsunami resistant.	-	-	-	-	-	-	-	13	-	-	6	19
PUD02	Identify Elders and other vulnerable populations to prioritize for mitigation and disaster assistance	-	-	-	-	-	-	-	15	-	-	10	25
PUD03	Create new, and expand existing Evacuation Routes, including better signage	-	-	-	-	-	-	-	18	-	-	10	28
PUD04	Acquire properties in low hazard areas in order to locate new development or relocate existing vulnerable structures and critical facilities	-	-	-	-	-	-	-	18	-	-	8	26
PUD07	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	3	3	3	3	3	2	3	20	3	3	6	26
PUD08	Deploy Generator backup for all critical facilities. Enhance Fuel Inventory	3	2	3	3	3	2	2	18	3	1	4	22
PUD09	Maintain clearance around critical electrical infrastructure (substation, transmission, and distribution lines) and water storage facilities	3	2	3	3	3	2	2	18	1	3	4	22
PUD10	Build and retain mask and other PPE inventory, create work from home protocols, crew rotation policy, testing and quarantine protocols. Address relevant issues in Collective Bargaining Agreement to ensure Continuity of Operations	2	3	3	3	3	2	2	18	3	1	4	22
PUD11	Upgrade critical facilities to handle increased storage, generators at water sources and pumpstation. Maintain defensible perimeters at critical facilities	3	3	2	3	3	2	2	18	1	3	4	22
PUD12	Seismic Retrofitting of Existing Critical Electrical and Water Infrastructure	3	3	2	3	3	2	2	18	3	5	8	26
PUD13	Periodically assess critical facilities location in relation to NOAA/USGS Tsunami Model. Evaluate options for mitigating risk (i.e. Relocation, Redundancy, etc)	3	3	3	3	3	2	2	19	1	5	6	25
PUD14	Assess appropriate grid-scale "Behind the Meter" Generation technologies that are sufficient to provide continuous power to all critical services, government functions, healthcare facilities in Clallam County. Construct and commission grid scale generation (Scenario: BPA Dam failure, Wildfire Public Safety Power Shutoff by BPA, BPA Transmission Line failure)	3	2	2	3	3	3	2	18	5	1	6	24
PUD15	Study, identify and acquire properties required to serve portions of water service area and electric service area that may be relocated due to sea level rise	3	3	3	3	3	2	2	19	1	1	2	21
PUD16	Assess security measures and evacuation protocols in light of active shooter threat. Bolster physical security measures at office locations	3	3	3	3	3	2	2	19	5	3	8	27
PUD17	Assess and improve security measures at electric and water infrastructure	3	3	3	3	3	2	2	19	3	3	6	25
PUD18	Prepare a water system plan to account for new groundwater sources and identify additional tie-ins with other potable water systems (such as the City of Port Angeles). Enhance access to groundwater sources of supply, aquifer recharge projects	3	3	3	2	3	2	3	19	1	1	2	21
PUD19	Maintain minimum quantities of critical inventory. Increase inventory warehousing capacity at all water and electric operations facilities	3	3	3	3	3	2	2	19	1	1	2	21
PUD20	Check critical facilities location in relation to FEMA flood maps, evaluate and implement options for mitigating risk (i.e relocation, elevation, armoring, waterproofing, etc)	3	3	3	3	3	2	2	19	3	5	8	27
PUD21	Evaluate long-term opportunities to move and upgrade substations (transformers and breakers) out of known hazard zones as load density increases due to population growth and increased energy needs.	3	2	2	3	3	2	2	17	1	3	4	21
PUD22	Prepare a Wildland Fire Mitigation Plan and create/assemble/hire/contract a "Wildfire Mitigation Crew"	3	3	3	3	3	2	3	20	3	5	8	28
PUD23	Identify and execute "Wildfire Targeted projects" (i.e Poles/crossarms upgraded from wood to fiberglass; overhead to underground conversion; evaluate and install wildfire resistant technology and other prevention systems, tree wires, etc)	3	3	3	3	3	2	2	19	3	3	6	25
PUD24	Expansion/ Relocation of operational facilities with resilient construction methods to serve inland population shift, increased energy needs, and to facilitate staff support when responding to larger emergencies in conjunction with Clallam County EOC (rest facilities, food storage, etc for crews responding to large scale outages)	3	3	2	3	3	3	2	19	3	3	6	25
PUD25	Replacement of old, direct-buried conductor with a jacketed cable in schedule 40 or higher conduit	3	3	3	3	3	2	2	19	1	3	4	23
PUD26	Enhance HDD capabilities	3	3	3	3	3	2	3	20	1	3	4	24
PUD27	Create and promote accessible and affordable programs for vulnerable and low-income populations to enhance whole house heating and cooling capabilities. Seek funding mechanism to expand program to all eligible customers	2	3	3	3	3	3	2	19	3	1	4	23
PUD28	Enhance water storage capabilities to mitigate change in precipitation patterns	3	3	3	3	3	2	3	20	1	1	2	22
PUD29	Create and promote accessible and affordable programs to provide extended electric backup for medical devices for vulnerable and low-income populations with medical needs. Seek funding mechanism to expand program to additional customers.	2	2	3	3	3	3	2	18	5	1	6	24
PUD30	Evaluate and implement advanced modeling and adaptive protection technologies to predict and avoid outages, wildfire, and expedite restoration efforts (i.e. Advanced Metering Infrastructure, Outage Management Systems, etc.)	3	2	3	3	3	2	2	18	3	3	6	24
PUD31	Promote community awareness on Public Safety Power Shutoffs (PSPS).	3	3	3	3	3	2	2	19	1	1	2	21
PUD32	Participate in regular safety and public awareness campaigns regarding natural and human-caused hazards, and partner with local stakeholders to distribute awareness materials. Consider outreach that engages socially vulnerable populations, such as senior citizens and disabled persons.	3	3	3	3	3	2	2	19	3	1	4	23
PUD33	Establish a comprehensive vegetation management and fuel reduction program applicable to the entirety of the electric service area. Identify areas with high wildfire hazard risk as top priority for fuel clearance and reduction. Estimate fuel reduction pricing to apply for grant funding.	3	3	2	3	3	2	3	19	3	5	8	27
PUD34	Seek and apply for grant funding towards all identified mitigation actions	3	3	3	3	3	3	2	20	3	3	6	26

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?	
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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?	

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

Mitigation Action No.	Mitigation Action	Socially acceptable	Technically feasible	Administrative capacity	Politcally acceptable	Legal authority	Economically beneficial	Environmental benefit	STAPLEE Score	Lives saved?	Reduction of disaster damage?	Mitigation Effectiveness Score	Total Priority Score
JSK01	Seismic assessment of Tribal facilities	-	-	-	-	-	-	-	19	-	-	6	25
JKS03	Lower Dungeness River Floodplain Restoration, including 3 Crabs Rd.	-	-	-	-	-	-	-	20	-	-	8	28
JSK04	Structure elevation and/or relocation of Tribal facilities and infrastructure	-	-	-	-	-	-	-	19	-	-	8	27
JSK05	Coordinate with County on the implementation of the NFIP Program	-	-	-	-	-	-	-	12	-	-	8	20
JSK06	Encourage native vegetation on shorelines and formation of dunes	-	-	-	-	-	-	-	21	-	-	4	25
JSK07	Public education around flood mitigation, floodplain functions, emergency service procedures, and potential hazards.	-	-	-	-	-	-	-	18	-	-	6	24
JSK08	Limit removal of vegetation in areas prone to ground failure. Plan ground cover where appropriate.	-	-	-	-	-	-	-	18	-	-	4	22
JSK09	Encourage residents and landowners to leave natural erosion barriers, such as driftwood logs on the shore, in place to reduce shoreline erosion.	-	-	-	-	-	-	-	18	-	-	4	22
JSK11	Conduct severe weather awareness activities.	-	-	-	-	-	-	-	20	-	-	6	26
JSK12	Develop alternate water supplies to provide reserve water sources to be used in event of drought or water shortage in Blyn, WA.	-	-	-	-	-	-	-	18	-	-	4	22
JSK13	Create and expand water efficiency/conservation programs.	-	-	-	-	-	-	-	18	-	-	4	22
JSK14	Continue to participate in TsunamiReady with Clallam County	-	-	-	-	-	-	-	20	-	-	6	26
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).	-	-	-	-	-	-	-	20	-	-	10	30
JSK18	Vegetation management, fuel reduction projects and defensible space around structures	-	-	-	-	-	-	-	19	-	-	10	29
JSK19	Promote FireWise building design for construction in the Vision Master Plan and Housing Programs	-	-	-	-	-	-	-	17	-	-	6	23
JSK20	Identify which Tribal facilities could serve as a neighborhood cooling/warming center or emergency shelter during extreme weather events or natural disasters.	3	3	3	3	3	2	2	19	5	3	8	27
JSK21	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	3	3	3	3	3	3	3	21	5	5	10	31
JSK22	Identify, plan, and construct redundant routing around the known weakest links on Highway 101 (such as around Jimmycomelately Creek). Where redundancy already exists, publish alternative routes for evacuation and emergency preparedness/awareness. Where redundancy does not exist, identify grant funding resources for alternative	3	2	2	3	2	2	2	16	5	3	8	24
JSK23	Evaluate and prioritize Jamestown S'Klallam Tribe owned residential properties for weatherization, prioritizing energy efficiency and preventing damage from water, moisture, and sunlight. Assess and document needed weatherization improvements required per property, considering insulation, windows/doors, air sealing, heating and cooling systems, and ventilation system improvements. Seek grant funding to fund weatherization improvements.	3	3	2	3	3	3	2	19	3	5	8	27
JSK24	Engage with tribal elders and other socially vulnerable tribal members who may need extra support during an emergency incident. Prioritize communication, awareness, and messaging targeted to encourage preparedness.	3	3	3	3	3	2	2	19	5	3	8	27
JSK25	Rehab/maintain Howe Truss Railroad Bridge at Dungeness River Nature Center	3	3	3	3	2	2	2	18	3	5	8	26
JSK26	Create additional pedestrian crossing on HWY101 in low lying areas to allow trail users to move to higher ground in case of an Earthquake/tsunami	3	3	2	3	2	2	2	17	5	3	8	25
JSK27	Construct and maintain emergency supplies warehouse to support recovery	3	3	3	3	3	2	2	19	5	3	8	27

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Mitigation Effectiveness Criteria

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LEK01	Move the tribal center from the tsunami inundation zone where it is currently located.	-	-	-	-	-	-	-	14	-	-	10	24
LEK02	Widen and strengthen Lower Elwha Road from Stratton Road to Kacee Way.	-	-	-	-	-	-	-	17	-	-	6	23
LEK03	Evaluate options to make new hotel in Port Angeles tsunami resistant.	-	-	-	-	-	-	-	20	-	-	10	30
LEK05	Create new, and expand existing Evacuation Routes, including better signage	-	-	-	-	-	-	-	20	-	-	6	26
LEK08	Develop and/or improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Continuity of Operations Plan etc.	-	-	-	-	-	-	-	19	-	-	10	29
LEK09	Partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions	-	-	-	-	-	-	-	18	-	-	6	24
LEK10	Develop a system to protect and maintain historical and archival Tribal records	-	-	-	-	-	-	-	18	-	-	6	24

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PC01	Renovate/Replace N Building, Main Campus	-	-	-	-	-	-	-	17	-	-	10	27
PC02	Renovate/Replace J Building, Main Campus	-	-	-	-	-	-	-	17	-	-	10	27
PC03	Renovate/Replace Q Building, Main Campus	-	-	-	-	-	-	-	17	-	-	10	27
PC04	Renovate/Replace P Building, Main Campus	-	-	-	-	-	-	-	17	-	-	10	27
PC05	Incorporate hazard mitigation into Master Plan	-	-	-	-	-	-	-	17	-	-	10	27

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Mitigation Action No.	Mitigation Action	Socially acceptable	Technically feasible	Administrative capacity	Politcally acceptable	Legal authority	Economically beneficial	Environmental benefit	STAPLEE Score	Lives saved?	Reduction of disaster damage?	Mitigation Effectiveness Score	Total Priority Score
POPA01	Strengthen airport runway to facilitate landing of large emergency aircraft.	-	-	-	-	-	-	-	20	-	-	8	28
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.	-	-	-	-	-	-	-	19	-	-	6	25
POPA03	Purchase fuel tanks and build a fuel transfer station at the Port's newly constructed and located shop outside of the tsunami zone.	-	-	-	-	-	-	-	18	-	-	8	26
POPA04	Build a portable emergency water supply.	-	-	-	-	-	-	-	18	-	-	6	24
POPA05	Strengthen airport taxiway to increase weightbearing capacities for emergency aircraft.	-	-	-	-	-	-	-	20	-	-	8	28
POPA06	Participate in the County-wide Community Wildfire Protection Plan as a stakeholder. Utilize technical findings to understand areas of local vulnerability and relevant risk reduction strategies.	3	3	3	3	3	2	3	20	3	3	6	26
POPA07	Maintain a culture of preparedness by facilitating ongoing emergency response and security training, allowing staff to respond to evolving human-caused threats and risks.	3	3	3	3	3	2	2	19	5	1	6	25
POPA08	Procure a consultant to study sea level rise and associated secondary impacts (such as flood, storm surge, king tides) on Port of Port Angeles assets and facilities. Evaluate infrastructure protection systems such as seawalls, levees, floodgates, or pumps to reduce risk to storm surge, flooding, and sea level rise.	3	2	2	3	3	3	3	19	3	5	8	27
POPA09	Continue to monitor sea level rise projections as related to Port of Port Angeles assets and critical facilities. Integrate considerations for sea level rise projections into capital improvement plans/programs.	3	2	2	3	3	3	3	19	3	3	6	25
POPA10	Coordinate with Clallam County Emergency Management on preparedness plans for use of Port barges for potential transport of supplies/equipment during significant events where roadway transportation systems fail.	3	3	3	3	3	2	2	19	5	1	6	25
POPA11	Shoreline and bank re-armoring and retrofits at Port facilities at Tumwater Creek, Port Angeles Harbor and Sequim Bay.	3	2	2	3	3	2	3	18	3	5	8	26
POPA12	Terminal 1 Warehouse retrofit, reconstruction or relocation.	3	3	3	3	3	2	2	19	1	3	4	23
POPA13	Emergency Generators for Port Facilities/Community Members: Install, upgrade or replace backup power generators at Port facilities including two airports, industrial parks, and two marinas. Framework and training for emergency shelters for community members at Port facilities locations enhanced with generators, supplies, and communication plans.	3	2	2	3	3	2	2	17	3	1	4	21
POPA14	Severe Weather Repairs at Two Marinas: Proactive reinforcements, repairs, and reconstruction to the marina facilities due to weather impacts.	3	3	3	3	3	2	2	19	1	3	4	23

Appendix G: Participation Agreements

APPENDIX G

Participation Agreements

APPENDIX G.1

Multi-Agency Interlocal Agreement between City of Forks, City of Port Angeles, City of Sequim and Clallam County

Contract #
334.24.013

JUN 1 1 2024

MULTI-AGENCY INTERLOCAL AGREEMENT FOR HAZARD MITIGATION AND CLIMATE PLANNING TO SATISFY CERTAIN FEMA AND GMA PERIODIC UPDATE REQUIREMENTS

THIS INTERLOCAL AGREEMENT ("ILA") is made and entered into among the City of Forks, the City of Port Angeles, and the City of Sequim (hereinafter referred to as the "Cities") and Clallam County (the Cities and Clallam County are collectively referred to herein as the "Parties"), all of which are governmental entities duly organized and operated under and through the laws of the State of Washington.

WHEREAS, public agencies are authorized by RCW Chapter 39.34 to enter into ILAs to cooperate and jointly exercise their powers in ways that provide the most efficient use of resources, and

WHEREAS, the Parties currently have a multi-jurisdictional hazard mitigation plan which expires January 28, 2025, and the Parties wish to create and administer a regional multi-district hazard mitigation plan update (the "Hazard Plan Update") for the benefit of said jurisdictions and in compliance with all of the planning requirements set forth by FEMA in 44 CFR Parts 201 and 206 and further articulated in FEMA's newly released Local Mitigation Planning Policy Guide (effective April 19, 2023), including assessing how climate changes will alter the jurisdictions' vulnerabilities to future hazard events, and

WHEREAS, the Parties understand they must each formally adopt the Hazard Plan Update in order to meet state and federal requirements and be eligible to apply for certain federal hazard mitigation grant funding, and

WHEREAS, each of the Parties are also required under the HB 1181 (Chapter 228, 2023 Laws) to plan for climate change and resiliency by adopting a resiliency sub-element to each jurisdictions comprehensive planning under RCW 36.70A.040, and

WHEREAS, the Washington State Commerce Department ("Commerce") has indicated in its Climate Element Planning Guidance (December 2023) that "[a] natural hazard mitigation plan that is in substantial conformance with the guidance could be adopted, by reference, to satisfy the resilience sub-element requirements" under HB 1181, and

WHEREAS, Commerce has offered to provide certain grant funding to local governments in Washington State subject to HB 1181 for activities related to implementing climate change planning and the Parties wish to apply for such grant funding (the "Commerce Grant Monies") and pool certain of that grant funding to perform the hazard mitigation planning and the climate resilience sub-element planning required under state and federal laws, regulations and guidance, and to use any remaining pooled Commerce Grant Monies pursuant to the terms of this ILA to perform future scoping implementation activities permitted under HB 1181.

NOW, THEREFORE, in consideration of the terms, conditions, and covenants stated herein and the performance to be rendered hereunder, the Parties agree as follows:

1. PURPOSE: The purpose of this ILA is to provide a framework for mutual cooperation of the Parties so as to accomplish the following objectives in a coordinated and economically efficient manner: (1) creation of a Hazard Plan Update that meets FEMA requirements and can be utilized to satisfy the climate resilience sub-element in substantial conformance with Commerce guidance; (2) applying for Commerce grant funding available to the Parties, agreeing to the pooling of certain of these Commerce Grant Monies and specifying how such pooled funds shall be utilized; and (3) setting forth the Parties responsibilities and the deliverables in connection with this ILA.

2. INTERAGENCY COOPERATION: The Parties to this ILA agree that Clallam County shall act as the lead agency for purposes of administering the planning, implementation, and completion of the Hazard Plan Update for the benefit of all Parties hereto. The Cities authorize Clallam County to manage and facilitate the planning process in accordance with the Work Program, herein attached and incorporated in its entirety as Exhibit A. All Parties agree that time is of the essence with regard to the purposes of this ILA. Each of the Parties to this ILA shall participate and provide prompt response to appropriate information requests made to implement the Work Program, so that the Hazard Plan Update can be developed in a timely manner and the Parties can coordinate on the climate measures and climate policies sought to be adopted by each Parties comprehensive planning under the resilience sub-element.

3. SPECIFIC RESPONSIBILITIES OF THE COUNTY: The County agrees to:

A. Designate a Project Lead employed by Clallam County who shall be responsible for establishing a Hazard Mitigation Climate Resiliency Committee (the "HMCR") and act as the Chair of the HMCR. The HMCR shall act as the Steering Committee to guide the overall planning process. The HMCR shall be comprised of the Chair, a designated representative from each of the Cities and representatives invited by the Chair from other agencies, Tribes, businesses, non-profits, school districts, and fire districts. The Chair shall be responsible for setting the meeting schedule and will attend each scheduled meeting. There shall be minutes created for each HMCR meeting.

B. Apply for the Commerce Grant Monies on behalf of the County and the City of Forks, which grant application request was made to Commerce on October 31, 2023. Clallam County understands that the City of Sequim and the City of Port Angeles have each made a separate grant application request to Commerce for the Commerce Grant Monies. Clallam County will inform Commerce through its grant application request that the Cities and the County intend to pool certain of the Commerce Grant Monies that each of the Parties expect to be allocated from Commerce to be utilized under this ILA. From the Commerce Grant Monies, the Parties agree to contribute the following: Clallam County ($300,000), City of Forks ($100,000), City of Port Angeles ($60,000), City of Sequim ($ 24,200), hereinafter the "Pooled Commerce Grant Monies."

No Party shall be obligated to provide any additional monies beyond the amount stated in this paragraph 3.B.

C. Hire a qualified Hazard Mitigation/Climate Planning consultant or consultant team (hereinafter, the "Consultant") through an RFP process and a written contract and make payments to the Consultant for services rendered utilizing the Commerce Grant Monies consistent with the budget amounts provided for in Exhibit B.

D. Have the Project Lead and other Clallam County staff as needed manage the Hazard Plan Update planning process, the required Climate planning under the resilience sub-element utilizing Commerce guidance and manage the work to be performed by the Consultant so as to provide the Deliverables described in Section 7 herein.

4. SPECIFIC RESPONSIBILITIES OF THE CITIES: Each of the Cities:

A. Authorizes Clallam County to submit this executed ILA to Commerce as part of the Commerce grant application process.

B. Agree to the pooling of its Commerce Grant Monies in the amount specified in Section 3.B. above for the purpose of being used to disburse payments in the manner set forth in Section 8 of this ILA.

C. Attests that the Pooled Commerce Grant Monies will be used to prepare and adopt amendments to implement the requirements of HB 1181 related to climate planning and further attests that the City understands that the GMA requires it to adopt goals and policies related to climate change and that these goals and policies will be considered and adopted as part of its scheduled periodic review update to its comprehensive plan deadline.

D. Will designate a senior staff representative to serve on the HMCR who will be responsible for attending the HMCR meetings regularly and conveying information to its governing council/Mayor/City Manager and bring back their statements and opinions to the HMCR.

E. To the extent workload and staffing levels permit, will provide sufficient staff to support the planning activities under this ILA, including public outreach efforts, distribution of news releases, public hearing notices, meetings with Clallam County planning staff and the Consultant and providing comments to the draft Hazard Plan Update.

5. PLANNING PROCESS: The planning process in the creation of the Hazard Plan Update shall be conducted in accordance with the planning requirements set forth by FEMA in 44 CFR Parts 201 and 206, the guidance provided under FEMA's Local Mitigation Planning Policy Guide (effective April 19, 2023) and the FEMA Region 10

Crosswalk entitled "FEMA's Hazard Mitigation Plan x Washington Department of Commerce's Climate Element Planning Guidance" and that the work regarding the satisfaction of the climate resilience sub-element under HB 1181 will be conducted in accordance with Commerce's most recent published climate element planning guidance, including Commerce's guidance entitled "Best Practices for Integrating Climate into Hazard Mitigation Plan."

6. PLAN CONTENT: The Hazard Plan Update to be developed shall include, at a minimum, the following:

- Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.
- A vulnerability risk assessment that provides a factual basis for activities proposed in the strategy to reduce losses from identified hazards.
- A mitigation strategy that provides the Parties' blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, polices, programs, and resources, and its ability to expand on and improve the existing tools.
- A plan maintenance process consistent with FEMA's planning requirements.
- Documentation that the plan has been formally adopted by the governing bodies of the Parties to this ILA.

7. DELIVERABLES: The following deliverables will be created in connection with this ILA: (1) each of the Cities and Clallam County will receive a draft Hazard Plan Update prepared by the Consultant and created to meet FEMA's planning requirements The Hazard Plan update delivered will follow Commerce's most recent published climate element planning guidance entitled "Best Practices for Integrating Climate into Hazard Mitigation Plan" and the FEMA Region 10 Crosswalk entitled "FEMA's Hazard Mitigation Plan x Washington Department of Commerce's Climate Element Planning Guidance" created at Commerce's request and focused upon the "overlap between elements in FEMA's Update Planning Policy Guidance (released in April 2022) and Commerce's climate element planning guidance to develop and implement plans and policies that foster climate resilience and equity" as required under HB 1181; (2) the Consultant in collaboration with the Parties will have conducted a public outreach sufficient to elicit public comment on the Hazard Plan Update during the drafting stage and prior to plan approval; (3) each of the Cities and Clallam County will have had the ability to work with the Consultant and collaboratively among the Parties to develop comprehensive planning goals and policies to create a climate action plan with respect to each agency to the extent required to satisfy the resilience sub-element under HB 1181 and consistent with Commerce's most recent published climate element planning guidance; and (4) Clallam County will submit the Hazard Plan Update of all the Parties for approval to the State Hazard Mitigation Officer for initial review and to the appropriate FEMA regional office for review and approval. The County and Cities will each be responsible for the incorporation of these deliverables into each of their overall

comprehensive plan by June 30, 2025 and adhere to all notice requirements set forth by RCW 36.70A.106 concerning notice of intent to adopt a comprehensive plan and development regulation amendments.

8. PAYMENTS FROM POOLED COMMERCE GRANT MONIES: Clallam County will act to disburse payments from the Pooled Commerce Grant Monies to the Consultant and to the County for work performed and costs accrued consistent with the terms of this ILA and within the limitations provided under the budget amounts in Exhibit B. The Pooled Commerce Grant Monies shall be the sole source for making payments under this ILA. Consultant invoices shall provide a detailed description of the work performed along with the date, the amount of time and the charges including any expenses. Consultant invoices shall be due by the 15th of the month. Payments from the Pooled Commerce Grant Monies shall be made by Clallam County within 30 days of receipt of the invoice.

8. LIABILITY: It is the intent of each of the Parties to this ILA to be responsible for the acts, errors, and/or omissions of their respective officers, officials, employees, agents and volunteers concerning any acts or activities under this ILA. To the extent permitted by law, each Party to this ILA shall defend, indemnify, and hold harmless, the other Parties from and against all claims, suits, causes of actions, judgments, or costs/damages of any nature (including cost of defense and attorney fees) that arise from any intentional or negligent act or omission of the indemnifying party's officers, employees, agents, while performing any acts or activities authorized by this ILA.

The provisions of this section survive expiration or termination of this ILA.

Nothing herein is to be interpreted to limit the ability of an individual or agency to exercise any right, defense, or remedy that any Party may have with respect to third parties or the individual(s) whose action or inaction gave rise to loss, claim, or liability, including but not limited to an assertion that the individual was acting beyond the scope of their employment.

Nothing herein is to be interpreted to cover or require indemnification or payment of any judgment against any individual or agency for intentionally wrongful conduct outside the scope of employment of any individual or for any judgment for damages against any individual or agency outside the scope of employment. Payment of damage awards, fines, or sanctions will be the sole responsibility of the individual against whom said judgment is rendered and/or their municipal employer, should that employer elect to make said payment voluntarily.

9. EXECUTION: This ILA may be executed in any number of counterparts, each of which is deemed to be an original as against any Party whose signature appears thereon, and all of which together constitute one and the same instrument. This ILA becomes binding when one or more counterparts, individually or taken together, bears the signature of all of the Parties reflected as signatories.

10. FILING: As provided by RCW 39.34.040, prior to its entry in force this ILA must be filed on each of the Parties' websites.

11. AMENDMENTS AND ADDED PARTIES: This ILA may only be amended by written agreement of all the undersigned agencies. Additional municipal agencies may be considered for inclusion upon written request, provided that all Parties agree and the agency receives authorization from its legislative body.

12. SEVERABILITY: If any section of this ILA is adjudicated to be invalid, such action does not affect the validity of any section not so adjudged.

13. TERM AND TERMINATION; WITHDRAWAL OF A PARTY; SURVIVABILITY OF PROVISIONS: The term of this ILA shall be from the Effective Date until June 30, 2025. If the amounts of the Commerce Grant Monies received by the Parties are less than the amounts shown in Section 3.B, this ILA will terminate immediately.

If Pooled Commerce Grant Monies are remaining after the Deliverables specified under Section 7 herein have occurred, the County will inform Commerce and the other Parties and seek to use the remaining Pooled Commerce Grant Monies to perform hazard mitigation scoping projects under a renegotiated ILA with all of the Parties.

A Party may withdraw from the ILA at any time by providing the other Parties with 60 calendar days' prior written notice. Termination or withdrawal pursuant to this section relieves a Party of all further obligations under this ILA except that any liability resulting from any act or omission which occurred during the term will survive the expiration or other termination. Termination or withdrawal of a Party will not entitle the Party to the return of any of the Pooled Commerce Grant Monies.

14. NOTICE: All notices required under this ILA must be given by regular United States mail and are complete three days after the date mailed when addressed to the Parties at the Service Addresses shown on their respective signature blocks below, or such other addresses as may be provided in writing in the future.

This provision is not intended to apply to informal communications, which are commonly conducted by email.

15. LEAD POINTS OF CONTACT: The lead points of contact for each of the Parties is: for Clallam County: DCD Chief Deputy Director Holden Fleming; for the City of Forks: Rod Fleck, Attorney/Planner; for the City of Port Angeles: William Habel, Natural Resources/Grant Administrator for the City of Sequim: Charisse Deschenes, Deputy City Manager/Director of Community & Economic Development

16. MISCELLANEOUS PROVISIONS:

A. Construction: In the event of a dispute among the Parties as to the meaning of terms, phrases, or specific provisions of this ILA, the ILA's authorship will not be cause for the term, phrase, or provision to be construed for or against any Party.

B. Administration: This ILA will be collectively administered by all Parties and does not create any separate legal or administrative entity. However, nothing in this ILA is intended to prevent or otherwise interfere with discussions or decisions that may be made by the Parties during a review of this ILA. Further, the Parties understand and agree that there will be communication between the Parties to effectuate the terms of this ILA.

C. Insurance: Each Party must obtain and keep in force during the full term of this ILA sufficient types and amounts of insurance coverage as recommended by their respective municipal risk pools or other insurance providers. Each Party must provide evidence of coverage to the other Parties upon request.

D. Applicable Law and Venue: This ILA will be governed by and construed in accordance with the laws of the State of Washington. The venue for any court action will be in Clallam County in any court with jurisdiction. In the event disputes over the terms of this ILA reasonably necessitate the procurement of legal services, each party is responsible for its own attorney fees and costs. The Parties do not waive the right to a jury trial. The Parties agree to negotiate in good faith before resorting to litigation.

E. Nondiscrimination and Compliance with Laws: The Parties agree not to discriminate against any employee or applicant for employment or any other person in the performance of this ILA because of race, creed, color, national origin, marital status, sex, sexual orientation, age, disability, or other circumstance prohibited by federal, state, or local law or ordinance, except for a bona fide occupational qualification.

The Parties will comply with all federal, state, and local laws and ordinances applicable to the work to be done under this ILA.

Violation of this section is a material breach of the ILA and grounds for cancellation of a request or response thereto, suspension of a Party, or termination of the entire ILA.

F. Waiver: Failure to insist upon strict compliance with any terms, covenants, or conditions of this ILA is not a waiver of such. A waiver by a Party of any term or condition will not be deemed or construed to be a waiver of any other term or condition, nor is the waiver of any breach or default by a Party to be deemed or construed to constitute a waiver of any subsequent breach or default, whether of the same or any other term or condition of this ILA. Any waiver of a breach or default must be done in writing and signed by the authorized representatives of the Parties.

G. Public Records Requests: Each Party is responsible for timely and adequately responding to requests for records addressed to it under the Public Records Act or other demand for disclosure.

H. Records Retention and Audit: Clallam County agrees to maintain records of all costs incurred under this ILA in accordance with a work order accounting system as

prescribed and approved by the State Auditor's Office. These records will be kept available for inspection and audit for five years after payment of the requested service.

I. Challenges: Entry into this ILA will not be construed to be a waiver or abandonment of any defense or claim that any of the Parties may have against the other.

J. Survival of Certain Provisions. Any term of this ILA that by reasonable implication contemplates continued performance, rights, or compliance beyond its expiration or termination, survives and continues to be enforceable. Without limiting the generality of this provision, the Parties' obligation to indemnify each other survives for a period equal to any and all relevant statutes of limitation, plus the time necessary to fully resolve any claims, matters, or actions begun within that period.

K. Independent Capacity. The employees or agents of each Party who are engaged in the performance of this ILA shall continue to be employees or agents of that Party and shall not be considered for any purpose to be employees or agents of any of the other Parties.

The EFFECTIVE DATE of this Interlocal Agreement is the date of last signature below, or the ____day of _____, 2024 (whichever occurs first).

PARTY SIGNATURES AND SERVICE ADDRESSES FOLLOW

CLALLAM COUNTY

Executed this 11 day of June, 2024 by the Board of County Commissioners for Clallam County, Washington.

COMMISSIONER

COMMISSIONER

COMMISSIONER

Attest:

Clerk of the Board

CLERK OF THE BOARD
CLALLAM COUNTY
COMMISSIONERS
PORT ANGELES, WA

Approved as to Form:

Clallam County Prosecuting Attorney

SERVICE ADDRESS:

Clallam County Board of County Commissioners
Attn: Clerk of the Board
223 E. 4th Street, Suite 4
Port Angeles WA 98362

DocuSign Envelope ID: DB806C0F-DEFD-4A35-8DF8-67680C25A323

CITY OF PORT ANGELES

Executed this 16 day of May, 2024 as authorized by the Port Angeles City Council.

DocuSigned by:
9E66045115SE409...
MAYOR

Attest:
DocuSigned by:
kari Martinez-Bailey
5C32803CA9974C4...
City Clerk

Approved as to Form:
DocuSigned by:
William Bloor
E5FC5FBD4113427...
City Attorney

SERVICE ADDRESS:

City of Port Angeles
Attn: City Clerk
321 East 5th Street
Port Angeles WA 98362

DocuSign Envelope ID: DB806C0F-DEFD-4A35-8DF8-67680C25A323

CITY OF SEQUIM

Executed this 8th day of April, 2024 as authorized by the Sequim City Council.

Mayor

Attest:

City Clerk

Approved as to Form:

City Attorney

SERVICE ADDRESS:

City of Sequim
Attn: City Clerk
152 West Cedar Street
Sequim WA 98382

DocuSign Envelope ID: DB806C0F-DEFD-4A35-8DF8-67680C25A323

CITY OF FORKS

Executed this 22 day of May, 2024 as authorized by the Forks City Council.

MAYOR

Attest:

City Clerk

Approved as to Form:

City Attorney

SERVICE ADDRESS:

City of Forks
Attn: City Clerk
500 East Division Street
Forks WA 98331

APPENDIX G.2

Voluntary Participation Agreement – Clallam County and Clallam County PUD No. 1

Voluntary Participation Agreement

PURPOSE

A Voluntary Participation Agreement (VPA) is hereby entered into by and between Clallam County (lead agency) and the Clallam County Public Utility District #1 (participating jurisdiction) for the Clallam County Multi-Jurisdictional Hazard Mitigation Plan.

The purpose of this VPA is to establish commitments from, and a cooperative working relationship between, participating jurisdictions in the development and implementation of the Clallam County Multi-Jurisdictional Hazard Mitigation Plan. In addition, the intent of this VPA is to ensure that the multi-jurisdictional hazard mitigation plan is developed in accordance with Title 44 of the Federal Code of Regulations Part 201.6; that the planning process is conducted in an open manner involving community stakeholders; that it is consistent with each participating jurisdiction's policies, programs, and authorities; and that it is an accurate reflection of the community's values.

This VPA sets out the responsibilities of all parties and identifies the work to be performed by participating jurisdictions. The Clallam County Multi-Jurisdictional Hazard Mitigation Plan created as a result of this VPA will be presented to the governing body (Planning Commission, City Council and/or Board of Commissioners, etc.) of each participating jurisdiction for adoption.

PLANNING TEAM RESPONSIBILITIES

Clallam County will act as the lead agency and participating jurisdictions authorize the Lead Agency to manage and facilitate the planning process in accordance with the MJHMP Annex Coordination Plan.

Participating jurisdictions understand that representatives must engage in a planning process, which includes, but is not limited to:

- Organizing and attending regular meetings of the Planning Team.
- Helping the Planning Team develop and conduct an outreach strategy to involve other planning team members, stakeholders, and the public, as appropriate, to represent their respective Jurisdiction.
- Identifying community resources available to support the planning effort, including meeting spaces, facilitators, and media outlets.
- Providing data and feedback to develop the risk assessment and mitigation strategy, including a specific mitigation action plan for their respective Jurisdiction.
- Submitting the draft plan to their respective jurisdiction for review.
- Working with the Planning Team to incorporate all their respective jurisdiction's comments into the draft plan.
- Submitting the draft plan to their respective governing body for consideration and adoption.
- After adoption, coordinating a process to monitor, evaluate, and work toward plan implementation.

PLANNING TEAM

The following points of contact and alternatives are authorized on behalf of the governing bodies to participate as members of the Planning Team for the Clallam County Multi-Jurisdictional Hazard Mitigation Plan:

Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff
360 417-2520
Diane.harvey@clallamcountywa.gov

Shailesh Shere
Clallam County Public Utilities District #1
General Superintendent
(800) 542-7859
sshere@clallampud.net

VPA IMPLEMENTATION

This VPA will be in effect from the date of signature by all parties and will remain in effect through the duration of the planning process. This VPA will terminate after adoption of the final FEMA-approved mitigation plan by all participating jurisdictions, or 5 years after FEMA approval, whichever is earlier. This VPA may be terminated prior to that time for any participating jurisdiction by giving 60 days written notice. This VPA is to be implemented through the attached Work Program and Schedule, and any addendums that describe specific activities, programs, and projects, and if necessary, funding by separate instrument.

Signature: _____ Date: MAY 13, 2024
Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff

Signature: _____ Date: May 13, 2024

Shailesh Shere
PUD No. 1 Of Clallam County
General Superintendent

ATTACHMENTS

MJHMP Annex Coordination Plan

APPENDIX G.3

Voluntary Participation Agreement – Clallam County and Port of Port Angeles

Voluntary Participation Agreement

PURPOSE

A Voluntary Participation Agreement (VPA) is hereby entered into by and between Clallam County (lead agency) and the Port of Port Angeles, Washington (participating jurisdiction) for the Clallam County Multi-Jurisdictional Hazard Mitigation Plan.

The purpose of this VPA is to establish commitments from, and a cooperative working relationship between, participating jurisdictions in the development and implementation of the Clallam County Multi-Jurisdictional Hazard Mitigation Plan. In addition, the intent of this VPA is to ensure that the multi-jurisdictional hazard mitigation plan is developed in accordance with Title 44 of the Federal Code of Regulations Part 201.6; that the planning process is conducted in an open manner involving community stakeholders; that it is consistent with each participating jurisdiction's policies, programs, and authorities; and that it is an accurate reflection of the community's values.

This VPA sets out the responsibilities of all parties and identifies the work to be performed by participating jurisdictions. The Clallam County Multi-Jurisdictional Hazard Mitigation Plan created as a result of this VPA will be presented to the governing body (Planning Commission, City Council and/or Board of Commissioners, etc.) of each participating jurisdiction for adoption.

PLANNING TEAM RESPONSIBILITIES

Clallam County will act as the lead agency and participating jurisdictions authorize the Lead Agency to manage and facilitate the planning process in accordance with the MJHMP Annex Coordination Plan.

Participating jurisdictions understand that representatives must engage in a planning process, which includes, but is not limited to:

- Organizing and attending regular meetings of the Planning Team.
- Helping the Planning Team develop and conduct an outreach strategy to involve other planning team members, stakeholders, and the public, as appropriate, to represent their respective Jurisdiction.
- Identifying community resources available to support the planning effort, including meeting spaces, facilitators, and media outlets.
- Providing data and feedback to develop the risk assessment and mitigation strategy, including a specific mitigation action plan for their respective Jurisdiction.
- Submitting the draft plan to their respective jurisdiction for review.
- Working with the Planning Team to incorporate all their respective jurisdiction's comments into the draft plan.
- Submitting the draft plan to their respective governing body for consideration and adoption.
- After adoption, coordinating a process to monitor, evaluate, and work toward plan implementation.

PLANNING TEAM

The following points of contact and alternatives are authorized on behalf of the governing bodies to participate as members of the Planning Team for the Clallam County Multi-Jurisdictional Hazard Mitigation Plan:

Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff
360 417-2520
Diane.harvey@clallamcountywa.gov

Jesse Waknitz
Port of Port Angeles
Environmental Manager
jessew@portofpa.com

VPA IMPLEMENTATION

This VPA will be in effect from the date of signature by all parties and will remain in effect through the duration of the planning process. This VPA will terminate after adoption of the final FEMA-approved mitigation plan by all participating jurisdictions, or 5 years after FEMA approval, whichever is earlier. This VPA may be terminated prior to that time for any participating jurisdiction by giving 60 days written notice. This VPA is to be implemented through the attached Work Program and Schedule, and any addendums that describe specific activities, programs, and projects, and if necessary, funding by separate instrument.

Signature: Dvri Harvey Date: 5/3/2024
Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff

Signature: Jesse Waknitz Date: 5/3/2024
Jesse Waknitz
Port of Port Angeles
Environmental Manager

ATTACHMENTS

MJHMP Annex Coordination Plan

APPENDIX G.4

Voluntary Participation Agreement – Clallam County and Jamestown S'Klallam Tribe

Voluntary Participation Agreement

PURPOSE

A Voluntary Participation Agreement (VPA) is hereby entered into by and between Clallam County (lead agency) and the Jamestown S'Klallam Tribe (participating jurisdiction) for the Clallam County Multi-Jurisdictional Hazard Mitigation Plan.

The purpose of this VPA is to establish commitments from, and a cooperative working relationship between, participating jurisdictions in the development and implementation of the Clallam County Multi-Jurisdictional Hazard Mitigation Plan. In addition, the intent of this VPA is to ensure that the multi-jurisdictional hazard mitigation plan is developed in accordance with Title 44 of the Federal Code of Regulations Part 201.6; that the planning process is conducted in an open manner involving community stakeholders; that it is consistent with each participating jurisdiction's policies, programs, and authorities; and that it is an accurate reflection of the community's values.

This VPA sets out the responsibilities of all parties and identifies the work to be performed by participating jurisdictions. The Clallam County Multi-Jurisdictional Hazard Mitigation Plan created as a result of this VPA will be presented to the governing body (Planning Commission, City Council and/or Board of Commissioners, etc.) of each participating jurisdiction for adoption.

PLANNING TEAM RESPONSIBILITIES

Clallam County will act as the lead agency and participating jurisdictions authorize the Lead Agency to manage and facilitate the planning process in accordance with the MJHMP Annex Coordination Plan.

Participating jurisdictions understand that representatives must engage in a planning process, which includes, but is not limited to:

- Organizing and attending regular meetings of the Planning Team.
- Helping the Planning Team develop and conduct an outreach strategy to involve other planning team members, stakeholders, and the public, as appropriate, to represent their respective Jurisdiction.
- Identifying community resources available to support the planning effort, including meeting spaces, facilitators, and media outlets.
- Providing data and feedback to develop the risk assessment and mitigation strategy, including a specific mitigation action plan for their respective Jurisdiction.
- Submitting the draft plan to their respective jurisdiction for review.
- Working with the Planning Team to incorporate all their respective jurisdiction's comments into the draft plan.
- Submitting the draft plan to their respective governing body for consideration and adoption.
- After adoption, coordinating a process to monitor, evaluate, and work toward plan implementation.

PLANNING TEAM

The following points of contact and alternatives are authorized on behalf of the governing bodies to participate as members of the Planning Team for the Clallam County Multi-Jurisdictional Hazard Mitigation Plan:

Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff
360 417-2520
Diane.harvey@clallamcountywa.gov

Robert Knapp
Jamestown S'Klallam Tribe
Environmental Planning Manager
rknapp@jamestowntribe.org

Luke Strong-Cvetich
Jamestown S'Klallam Tribe
Tribal Planning Manager
lstrong@jamestowntribe.org

VPA IMPLEMENTATION

This VPA will be in effect from the date of signature by all parties and will remain in effect through the duration of the planning process. This VPA will terminate after adoption of the final FEMA-approved mitigation plan by all participating jurisdictions, or 5 years after FEMA approval, whichever is earlier. This VPA may be terminated prior to that time for any participating jurisdiction by giving 60 days written notice. This VPA is to be implemented through the attached Work Program and Schedule, and any addendums that describe specific activities, programs, and projects, and if necessary, funding by separate instrument.

Signature: Diane Harvey Date: 5/2/24
Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff

Signature: Luke Strong-Cvetich Date: 05/02/2024
Luke Strong-Cvetich
Jamestown S'Klallam Tribe
Tribal Planning Manager

ATTACHMENTS

MJHMP Annex Coordination Plan

APPENDIX G.5

Voluntary Participation Agreement – Clallam County and Lower Elwha S'Klallam Tribe

Voluntary Participation Agreement

PURPOSE

A Voluntary Participation Agreement (VPA) is hereby entered into by and between Clallam County (lead agency) and the Lower Elwha Klallam Tribe (participating jurisdiction) for the Clallam County Multi-Jurisdictional Hazard Mitigation Plan.

The purpose of this VPA is to establish commitments from, and a cooperative working relationship between, participating jurisdictions in the development and implementation of the Clallam County Multi-Jurisdictional Hazard Mitigation Plan. In addition, the intent of this VPA is to ensure that the multi-jurisdictional hazard mitigation plan is developed in accordance with Title 44 of the Federal Code of Regulations Part 201.6; that the planning process is conducted in an open manner involving community stakeholders; that it is consistent with each participating jurisdiction's policies, programs, and authorities; and that it is an accurate reflection of the community's values.

This VPA sets out the responsibilities of all parties and identifies the work to be performed by participating jurisdictions. The Clallam County Multi-Jurisdictional Hazard Mitigation Plan created as a result of this VPA will be presented to the governing body (Planning Commission, City Council and/or Board of Commissioners, etc.) of each participating jurisdiction for adoption.

PLANNING TEAM RESPONSIBILITIES

Clallam County will act as the lead agency and participating jurisdictions authorize the Lead Agency to manage and facilitate the planning process in accordance with the MJHMP Annex Coordination Plan.

Participating jurisdictions understand that representatives must engage in a planning process, which includes, but is not limited to:

- Organizing and attending regular meetings of the Planning Team.
- Helping the Planning Team develop and conduct an outreach strategy to involve other planning team members, stakeholders, and the public, as appropriate, to represent their respective Jurisdiction.
- Identifying community resources available to support the planning effort, including meeting spaces, facilitators, and media outlets.
- Providing data and feedback to develop the risk assessment and mitigation strategy, including a specific mitigation action plan for their respective Jurisdiction.
- Submitting the draft plan to their respective jurisdiction for review.
- Working with the Planning Team to incorporate all their respective jurisdiction's comments into the draft plan.
- Submitting the draft plan to their respective governing body for consideration and adoption.
- After adoption, coordinating a process to monitor, evaluate, and work toward plan implementation.

PLANNING TEAM

The following points of contact and alternatives are authorized on behalf of the governing bodies to participate as members of the Planning Team for the Clallam County Multi-Jurisdictional Hazard Mitigation Plan:

Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff
360 417-2520
Diane.harvey@clallamcountywa.gov

Glen Roggenbuck
Lower Elwha Klallam Tribe
Director of Emergency Management
glen.roggenbuck@elqha.org

VPA IMPLEMENTATION

This VPA will be in effect from the date of signature by all parties and will remain in effect through the duration of the planning process. This VPA will terminate after adoption of the final FEMA-approved mitigation plan by all participating jurisdictions, or 5 years after FEMA approval, whichever is earlier. This VPA may be terminated prior to that time for any participating jurisdiction by giving 60 days written notice. This VPA is to be implemented through the attached Work Program and Schedule, and any addendums that describe specific activities, programs, and projects, and if necessary, funding by separate instrument.

Signature: _____ Date: 7/18/24
Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff

Signature: _____ Date: 07/18/24
Glen Roggenbuck
Lower Elwha Klallam Tribe
Director of Emergency Management

ATTACHMENTS

MJHMP Annex Coordination Plan

APPENDIX G.6

Voluntary Participation Agreement – Clallam County and Peninsula Community College

Voluntary Participation Agreement

PURPOSE

A Voluntary Participation Agreement (VPA) is hereby entered into by and between Clallam County (lead agency) and Peninsula College (participating jurisdiction) for the Clallam County Multi-Jurisdictional Hazard Mitigation Plan.

The purpose of this VPA is to establish commitments from, and a cooperative working relationship between, participating jurisdictions in the development and implementation of the Clallam County Multi-Jurisdictional Hazard Mitigation Plan. In addition, the intent of this VPA is to ensure that the multi-jurisdictional hazard mitigation plan is developed in accordance with Title 44 of the Federal Code of Regulations Part 201.6; that the planning process is conducted in an open manner involving community stakeholders; that it is consistent with each participating jurisdiction's policies, programs, and authorities; and that it is an accurate reflection of the community's values.

This VPA sets out the responsibilities of all parties and identifies the work to be performed by participating jurisdictions. The Clallam County Multi-Jurisdictional Hazard Mitigation Plan created as a result of this VPA will be presented to the governing body (Planning Commission, City Council and/or Board of Commissioners, etc.) of each participating jurisdiction for adoption.

PLANNING TEAM RESPONSIBILITIES

Clallam County will act as the lead agency and participating jurisdictions authorize the Lead Agency to manage and facilitate the planning process in accordance with the MJHMP Annex Coordination Plan.

Participating jurisdictions understand that representatives must engage in a planning process, which includes, but is not limited to:

- Organizing and attending regular meetings of the Planning Team.
- Helping the Planning Team develop and conduct an outreach strategy to involve other planning team members, stakeholders, and the public, as appropriate, to represent their respective Jurisdiction.
- Identifying community resources available to support the planning effort, including meeting spaces, facilitators, and media outlets.
- Providing data and feedback to develop the risk assessment and mitigation strategy, including a specific mitigation action plan for their respective Jurisdiction.
- Submitting the draft plan to their respective jurisdiction for review.
- Working with the Planning Team to incorporate all their respective jurisdiction's comments into the draft plan.
- Submitting the draft plan to their respective governing body for consideration and adoption.
- After adoption, coordinating a process to monitor, evaluate, and work toward plan implementation.

PLANNING TEAM

The following points of contact and alternatives are authorized on behalf of the governing bodies to participate as members of the Planning Team for the Clallam County Multi-Jurisdictional Hazard Mitigation Plan:

Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff
360 417-2520
Diane.harvey@clallamcountywa.gov

Marty Martinez
Peninsula College
Director of Emergency Management
mmartinez@pencol.edu

VPA IMPLEMENTATION

This VPA will be in effect from the date of signature by all parties and will remain in effect through the duration of the planning process. This VPA will terminate after adoption of the final FEMA-approved mitigation plan by all participating jurisdictions, or 5 years after FEMA approval, whichever is earlier. This VPA may be terminated prior to that time for any participating jurisdiction by giving 60 days written notice. This VPA is to be implemented through the attached Work Program and Schedule, and any addendums that describe specific activities, programs, and projects, and if necessary, funding by separate instrument.

Signature: Diane Harvey Date: 5/6/24
Diane Harvey
Clallam County Sheriff's Office
Special Assistant to Sheriff's Office Command Staff

Signature: Date: 5-6-2024
Marty Martinez
Peninsula College
Director of Emergency Management

ATTACHMENTS

MJHMP Annex Coordination Plan