Risk Report (DRAFT)

For Grays Harbor County including the Cities of Aberdeen, Cosmopolis, Hoquiam, Ocean Shores, Westport, Montesano, McCleary, Elma, and Oakville

October 9, 2014

FEMA

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1. Introduction

This report outlines the risk assessment results and findings for FEMA's Risk Mapping Assessment and Planning (Risk MAP) Study. All results, databases, and maps used to generate this report are provided in the Risk Assessment Database which is included with this report. The Risk Report has two goals: to inform communities of their risks related to certain natural hazards and to enable communities to act to reduce their risk. State and local officials can use the summary information provided in this report, in conjunction with the data in the risk database, to:

- **Update local hazard mitigation plans, shoreline master programs, and community comprehensive plans** – Planners can use risk information in the development and/or update of hazard mitigation plans, comprehensive plans, future land use maps, and zoning regulations. For example, zoning codes may be changed to better provide for appropriate land uses in high hazard areas.
- **Update emergency operations and response plans** – Emergency managers can identify low risk areas for potential evacuation and sheltering. Risk assessment information may show vulnerable areas, facilities and infrastructure for which planning for continuity of operations plans (COOP), continuity of government (COG) plans, and emergency operations plans (EOP) would be essential.
- **Communicate risk** – Local officials can use the information in this report to communicate with property owners, business owners, and other citizens about risks and areas of mitigation interest.
- **Inform the modification of development standards** – Planners and public works officials can use information in this report to support the adjustment of development standards for certain locations.
- **Identify mitigation projects** – Planners and emergency managers can use this risk assessment to determine specific mitigation projects. For example, a floodplain manager may identify critical facilities that need to be elevated or removed from the floodplain.

The intended audience for this report includes, but is not limited to:

- Local Elected Officials
- Community Planners
- Emergency Managers
- Public Works Officials

2. Risk Analysis

A risk assessment analyzes how a hazard impacts the built environment, population, and local economy. In hazard mitigation planning, risk assessments are the basis for mitigation strategies and actions. A risk assessment defines the hazard and enhances the decision making process. The risk assessments in this report were completed using a free FEMA risk assessment tool, Hazus, which estimates losses to flood and earthquake for specific buildings. A complete list of every building in Grays Harbor County is incorporated into the Hazus model. Other hazards were assessed through a vulnerability assessment. To assess potential community losses the following information was collected:

- Local assets or resources at risk to hazard
- The physical features and human activities that contribute to that risk
- Location and severity of the hazard

The report contains the following types of risk analysis to help describe and visualize the risk for a variety of hazards at the jurisdictional levels:

1. Coastal Flood Risk Assessment: Hazus Estimated Loss Information
2. Earthquake Risk Assessment: Hazus Estimated Loss Information
3. Tsunami Risk Assessment: Vulnerability Assessment

A detailed methodology of the risk assessment is listed in the Appendix.

3. Grays Harbor Coastal RiskMAP Overview

The Grays Harbor County Coastal RiskMAP project began in 2012 and is expected to extend through 2015. FEMA's Service Provider, the Strategic Alliance for Risk Reduction (STARR) and Washington Department of Natural Resources (WADNR) are contributing to this project.

Project Milestones

Project milestones are estimated completion timeframes for key tasks or events that must be accomplished in order to complete a Risk MAP Project phase. They serve as indicators for progress and as the basis for planning future Risk MAP meetings. All project milestones, however, are subject to change due to changes in scope, delays in data acquisition and other unforeseen complexities within a study. The project timeline is shown in Table 1.

Table 1: Project Timeline

Task Name	Time of Completion
Engineering Analysis	December 21, 2013
Flood Risk Review Meeting	Jan. 29, 2013
Preliminary Map Production	October 25, 2013
Final CCO & Public Meeting	December 10, 2013 & Feb. 6, 2014
Resiliency Meeting	October 23, 2014
Effective Map Production	2015*
**Dates are shown as projected*	

There will be at least three meetings between FEMA, the State, and the affected communities associated with this study. They are the Flood Risk Review (FRR), Final Community Coordination Officer (CCO), and Resiliency meetings. The FRR meeting will be held after the completion of the Coastal Analysis task. The input data, methodology and draft result was presented at the FRR meeting which was held on Jan. 29, 2013. The Final CCO meeting is the meeting at which the preliminary results of a Flood Insurance Study are reviewed and discussed with community officials and was held on December

10, 2013. A public meeting was held on February 6, 2014. The Resiliency meeting will be held on October 23rd. The purpose of the Resiliency meeting is to continue to build local capacity for implementing priority mitigation activities within the watershed. The resiliency meeting will be held in fall of 2014 to discuss this document and mitigation strategies for multi-hazards.

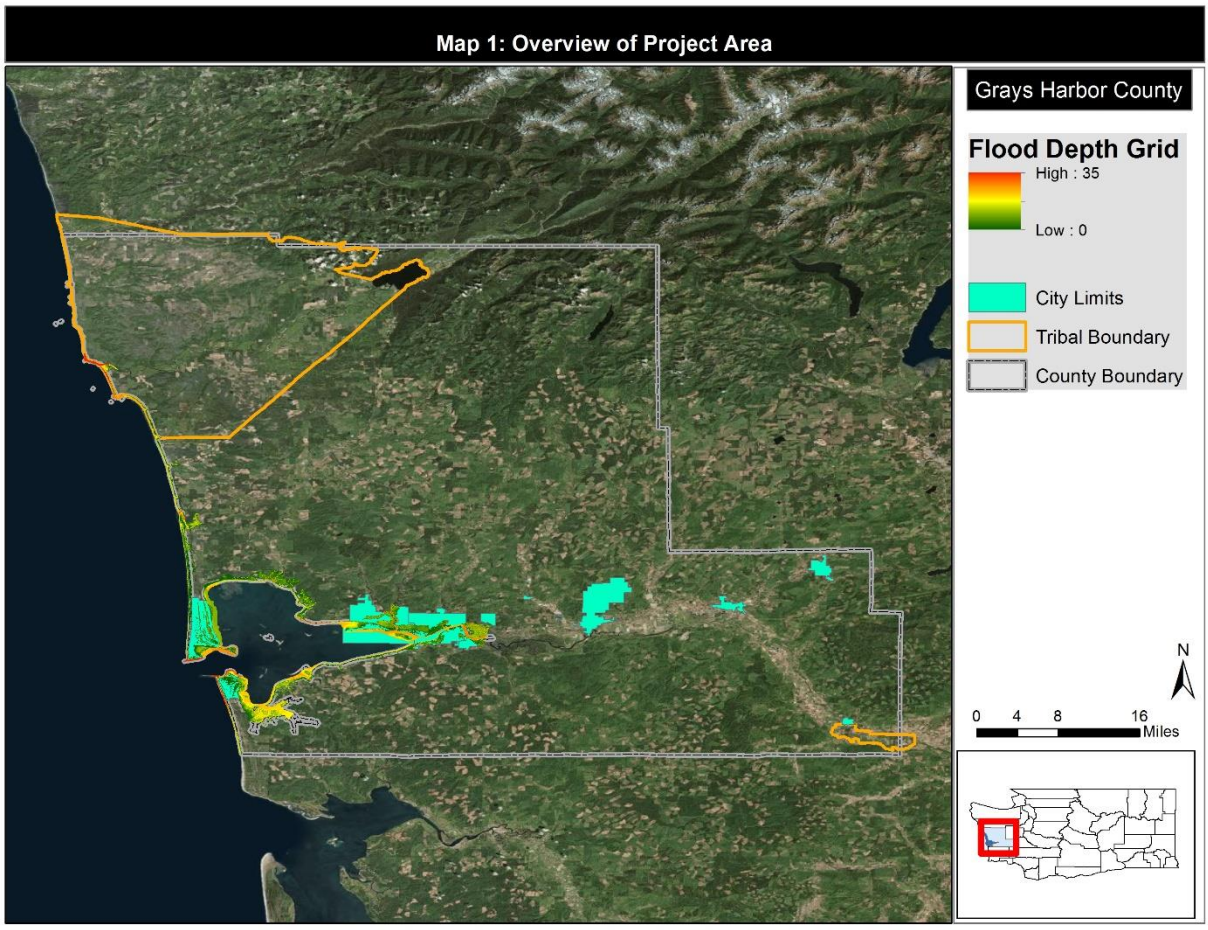
Project Scope

Scope includes all 39 miles of coastline in Grays Harbor County shown in Map 1.

Additional Project Deliverables

Project also includes standard Risk Products (Risk Report/Map/Database) as well as Flood Risk Datasets (Changes since Last FIRM, Flood Depth and Analyses Grids and Flood Risk Assessment). The Risk MAP datasets were completed in summer of 2014.

Map 1: Overview of Project Area

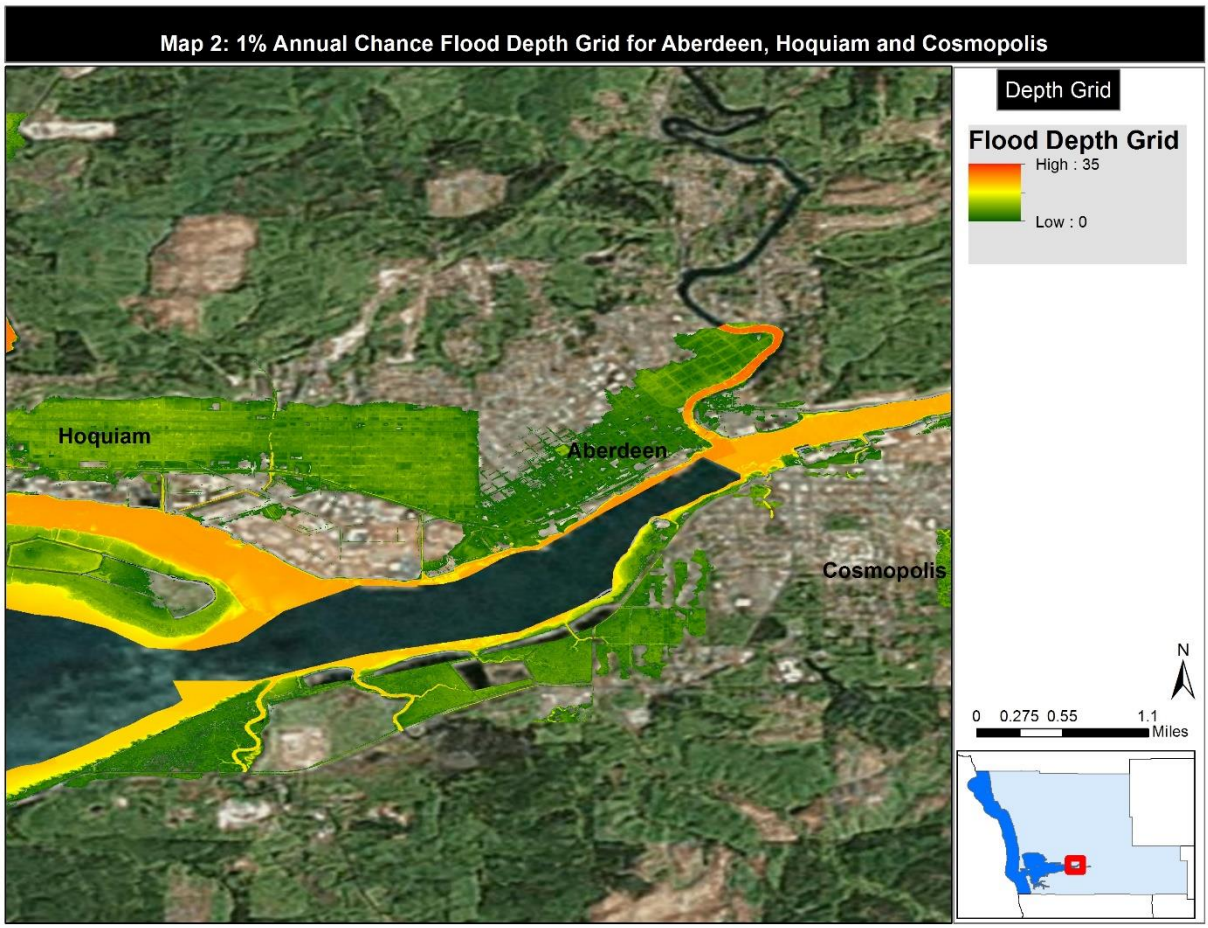


4. Flood Risk Assessment

Flood Hazard Overview

FEMA created new flood insurance rate maps for Grays Harbor County which included updated flood modeling for the coastline for Aberdeen, Hoquiam, Westport, Ocean Shores, and unincorporated Grays Harbor County. In addition to new flood maps, flood risk assessment products were developed and used in this risk report. Depth grids were created for the 1% annual chance flood (100 year flood) for the coastal areas. Depth grids were generated from the coastal flood model and show level of flooding in feet for each pixel and each flood frequency. Depth grids were used in this risk assessment to determine properties impacted by flooding. The 1% annual chance depth grid is shown in Map 2 for the Aberdeen area below.

Map 2: 1% Annual Chance Depth grid (in feet) for Aberdeen, Hoquiam, and Cosmopolis

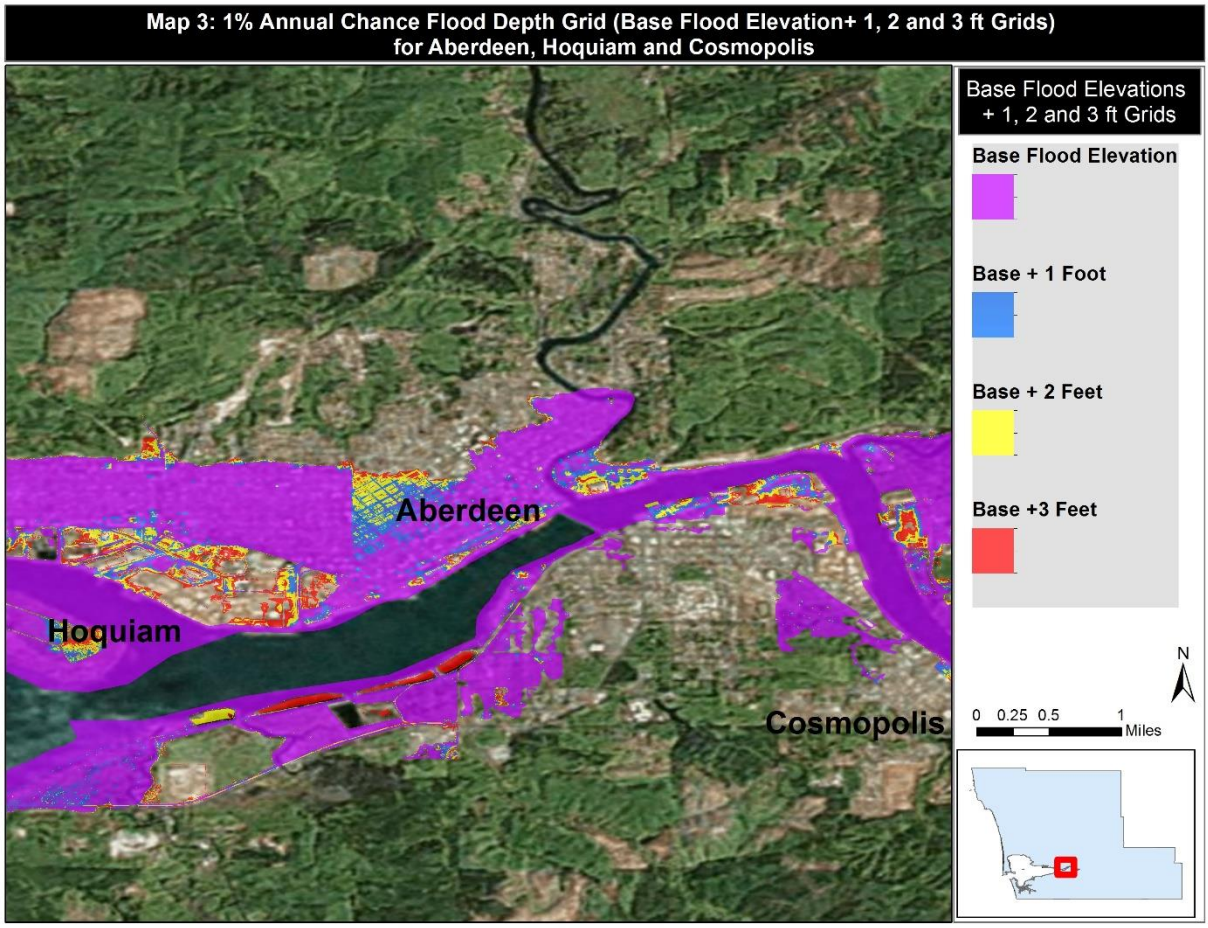


The 1% annual chance depth grid shown above can also be used as an outreach tool to show hazards of flooding. These properties would be excellent locations for mitigation projects. Some of these potential mitigation projects are highlighted in each community section of this report. For areas not located on the coast, a vulnerability assessment was completed.

In addition to the depth grid a BFE+ grid was created which shows increases of one, two, and three feet above our 1% annual chance base flood elevation which can be used to represent higher flood events

above the 1% annual chance flood to include potential sea level rise. This product is meant to guide local communities on future risk and does not substitute for detailed sea level rise modeling. The BFE+ grid is shown in Map 3 for Aberdeen area.

Map 3: Base flood elevation (BFE) and plus 1, 2 and 3 feet grids.



The BFE+ grid can be used to identify areas impacted by increased storm surge, storms greater than our 1% annual chance event, and areas potentially impacted by sea level rise. This dataset can be used for future land use and comprehensive planning.

Flood Risk Assessment Overview

This risk assessment includes the following communities as shown in Table 2:

Table 2: Community Characteristics

Community Name	Total Population	Environmental Sensitive Issues	CRS Community	Flood Claims	Repetitive Loss Properties	Total Policies	Total Insurance Coverage
Aberdeen	16,896	Y	N	221	9	933	$137,649,300
Hoquiam	8,726	Y	N	76	6	1153	$150,268,900
Ocean Shores	5,569	Y	N	23	1	623	$171,855,900
Westport	2,099	Y	Y – Class 6	12	0	338	$60,451,900
Cosmpolis	1,616	Y	N	3	0	15	$2,931,900
McCleary	1,619	Y	N	0	0	5	$1,102,500
Elma	3,052	Y	N	18	1	7	$1,780,100
Oakville	676	Y	N	8	7	10	$2,122,700
Montesano	3,905	Y	N	14	0	8	$1,934,000
Grays Harbor	71,078	Y	N	210	29	553	$114,244,200

The community overview summarizes community characteristics at the community level. Data was obtained from FEMA, Census, and the communities. The risk assessment for the Quinault Tribe will be summarized in another report. The Chehalis Tribe was not analyzed in this project, but will be in the Lower Chehalis RiskMAP Project.

The above information can be used to highlight communities which are already impacted by flooding including repetitive loss properties and flood claims. In addition the insurance coverage can be compared to the dollar losses shown below to determine if enough coverage exists for a specific event.

The flood risk assessment was completed using local parcel/assessors data from Grays Harbor County as well as coastal depth grids derived from this RiskMAP project. For this assessment a coastal flood depth grid was used for the coastal area as shown in Map 2. For the riverine areas, a vulnerability assessment was completed for those buildings in the special flood hazard area. Individual building data was incorporated into Hazus which allows losses to be reported at the building level. The essential facilities were also updated in Hazus. Please refer to the appendix for detailed methodology on incorporating local data into Hazus. Table 3 highlights building value and percent of buildings located within the floodplain by community. In addition, losses are highlighted by community for those in the mapped coastal floodplains in addition to a building count by community for buildings within the 1% annual chance floodplain.

Table 3: Special Flood Hazard Area Assessments

Community	Total Estimated Building Value	Percent of Buildings in the Special Flood Hazard Area	Building Dollar Loss for a 1% Annual Chance Flood Event	Loss Ratio (Dollar Losses/Total Building Value)	Number of Buildings within the VE Zone	Number of Buildings within the AE, A, AO, AH zones
Aberdeen	$872 Million	32%	$72 Million	8%	N/A	2026
Hoquiam	$373 Million	83%	$68 Million	18%	N/A	2859
Ocean Shores	$722 Million	2%	$5.8 Million	< 1%	33	55
Westport	$181 Million	7%	$5.5 Million	3%	56	37
Unincorporated County	$1.8 Billion	12%	$9.5 Million*	< 1%*	298	1208
Cosmopolis	$119 Million	2%	N/A	N/A	N/A	13
McCleary	$80 Million	3%	N/A	N/A	N/A	21
Montesano	$261 Million	< 1%	N/A	N/A	N/A	9
Oakville	$38 Million	< 1%	N/A	N/A	N/A	2
Elma	$189 Million	< 1%	N/A	N/A	N/A	4
Total	**$2.0 Billion**		**$160 Million**	**8%**	**387**	**6234**

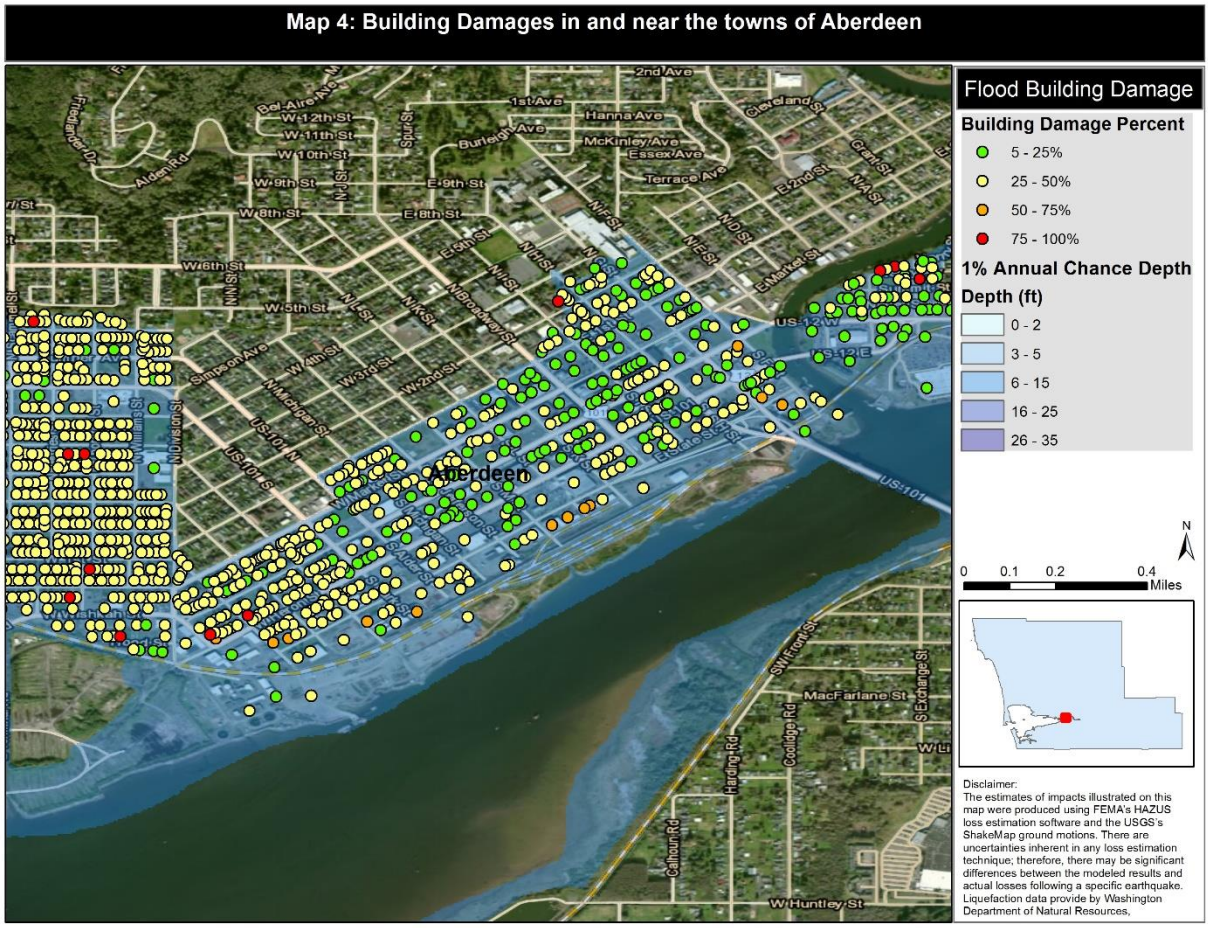
Note: Loss information is included for those communities in the coastal floodplain. Dollar losses are reported as well as a loss ratio which is calculated by the total losses/total building value. Also included is a building count for those buildings in the VE zone which is the high hazard 1% annual chance coastal flood zone as well as the buildings located in the A, AE, AO, and AH zone which is the riverine and/or coastal 1% annual chance floodplain. *The loss information for the County is only for coastal areas, the rest of the county was not included in the risk assessment, but will be analyzed in the Lower Chehalis RiskMAP project.

The Cities of Aberdeen and Hoquiam have the largest percentage of buildings located in the special flood hazard area (1% annual chance flood zone). Those same communities have the highest loss ratio which compares the losses due to flood to the overall building value within the community. Not all of the buildings within the floodplain experience damage due to level of flooding as well as current floodplain regulations. In addition the number of buildings are highlighted which are located in the 1% annual chance flood zone. When comparing table 2 to 3 you will see that all of the communities have a total of 3,645 national flood insurance policies, where you have a total of 6,234 buildings located in the 1% annual chance flood zone. This could be due to no mortgages, current regulations, letters of map amendment (LOMA) etc. Using the data from this analysis you could easily target communities for flood insurance outreach.

The buildings located within the VE zone are highlight specifically since they are subject to 3 feet or more of wave inundation and are considered a high hazard area due to the velocity impacts The risk assessment only takes depth of water into account when calculating damages, therefore the properties that are within the VE zone should use the loss information as a minimum since velocity impacts are not accounted for.

The community results shown above give an idea of where the largest flooding concerns are. This risk assessment includes information for every building in each community, so you can easily determine which buildings in your community have the highest flood risk. Map 4 shows the building losses for a 1% annual chance event for the cities of Aberdeen and Hoquiam. Buildings shown in red and orange have a potential to be damaged during a 1% annual chance flood event based on the depth of flooding at their location as well as the height of the building.

Map 4: Building damage percent (loss ratio) in and near the towns of Aberdeen and Hoquiam



Note: The above damage percent is calculated by the total building loss divided by the total building value. This percentage easily highlights those buildings which will have the most building damage in the community.

The loss data from Hazus and the exposure analysis can highlight those areas impacted from flooding which can be used to identify properties for mitigation projects as well as additional outreach in the area. Highlighted areas of greatest impacts and potential mitigation actions will be shown in the community sections of this report. All results, databases, and maps are provided in the Risk Assessment Database which is included with this report.

5. Earthquake Risk Assessment

Earthquake Hazard Overview

Earthquakes have been reported in Grays Harbor County at least as early as the 1872 North Cascades earthquake. No major damaging earthquakes have been definitively shown to have occurred within the county before the advent of the Puget Sound Seismic Network in 1969. However, a 1944 earthquake caused minor damage only around Grays Harbor College and so was presumably a local event. The largest recorded earthquakes in Grays Harbor County were the July 2, 1999 M_w5.8 and the June 10, 2001 M_w5.0 Satsop quakes. These were located 5-10 miles north of Satsop, at depths of about 25 miles, which

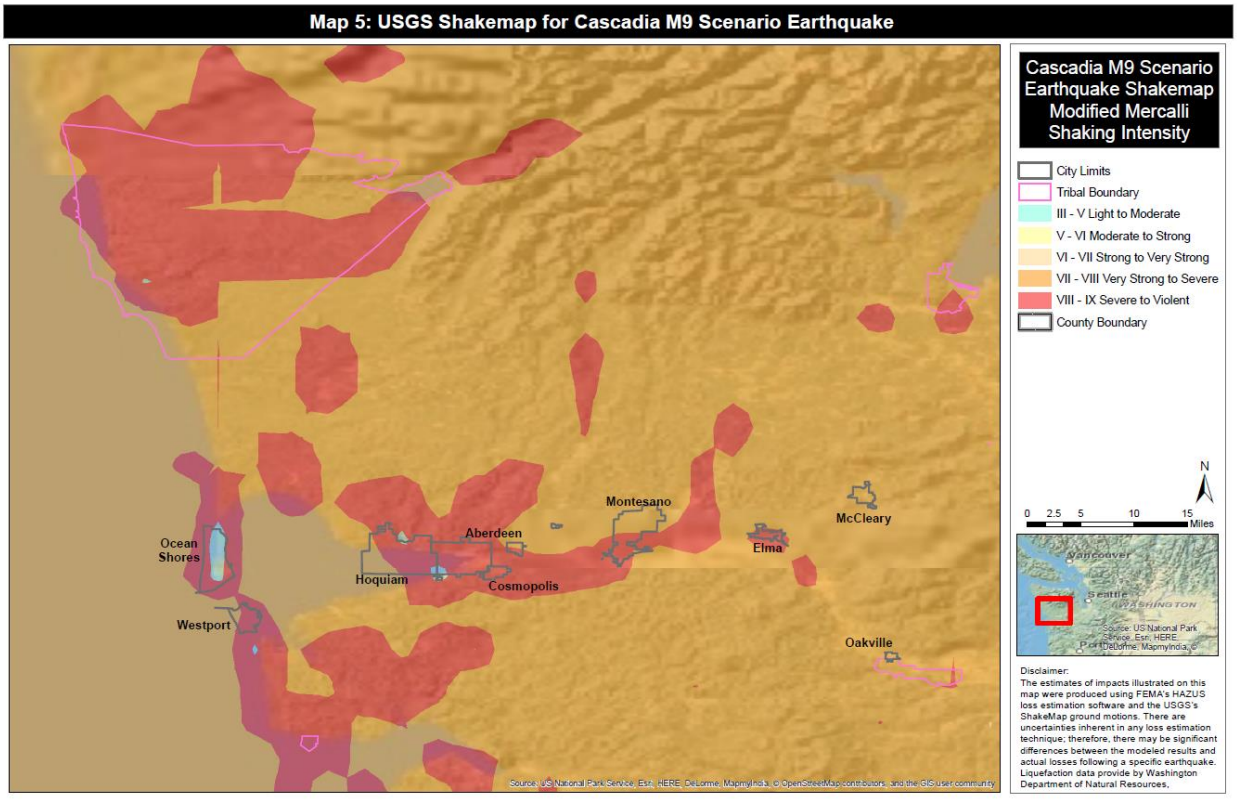
makes them Benioff Zone events, a type of earthquake that takes place in the subducting crust. The 1999 earthquake caused damage to the county courthouse in Montesano and minor building damage and power outages in Aberdeen and Hoquiam.

The largest earthquake threat to the county is likely from a Cascadia subduction zone earthquake. Abundant physical evidence for an earthquake in AD 1700 includes evidence for abrupt tectonic subsidence along the Copalis River (cover photo) and subsequent drowning of a spruce and cedar forest. This event was probably about M9 and is the largest earthquake in Grays Harbor County in the historic or paleoseismic record. The evidence for this earthquake is documented in Atwater and others (2005) and Goldfinger and others (2012). A repeat of this event dominates the hazard for the county in the National Seismic Hazard Map and will be the basis for assessing earthquake risk in this report.

ShakeMaps

Maps depicting shaking intensity and ground motion following an earthquake, called ShakeMaps, can be produced in near-real time for events or created for specific scenarios by regional seismic network operators in cooperation the United States Geologic Service (USGS). These ShakeMaps can be used for response, land use, and emergency planning purposes. The following ShakeMap is available for Grays Harbor County:

Map 5: ShakeMap showing the Modified Mercalli shaking intensity for Cascadia M9 Earthquake.



Earthquake assessment in this report was completed only for a scenario earthquake on the Cascadia subduction zone. Additional earthquakes have been modeled on a hypothesized earthquake linking the Canyon River Fault and the Saddle Mountain faults (DNR Scenario catalogue, (https://fortress.wa.gov/dnr/seismicscenarios/index.html?config=canyonRiver.xml), but further work

needs to be done to demonstrate the feasibility of this source. Additionally, because this fault has only been demonstrated to be in the northeast corner of Grays Harbor County, far from the built environment, the scenario generates only minor estimated damage.

Earthquake Risk Assessment Overview

The earthquake risk assessment was completed using local parcel data from the County as well as the ShakeMap listed above. For this study individual building/parcel data from the county was incorporated into Hazus which allow losses to be reported at the building level. Please refer to the appendix for detailed methodology on incorporating local data into Hazus. The results are summarized below in Table 4.

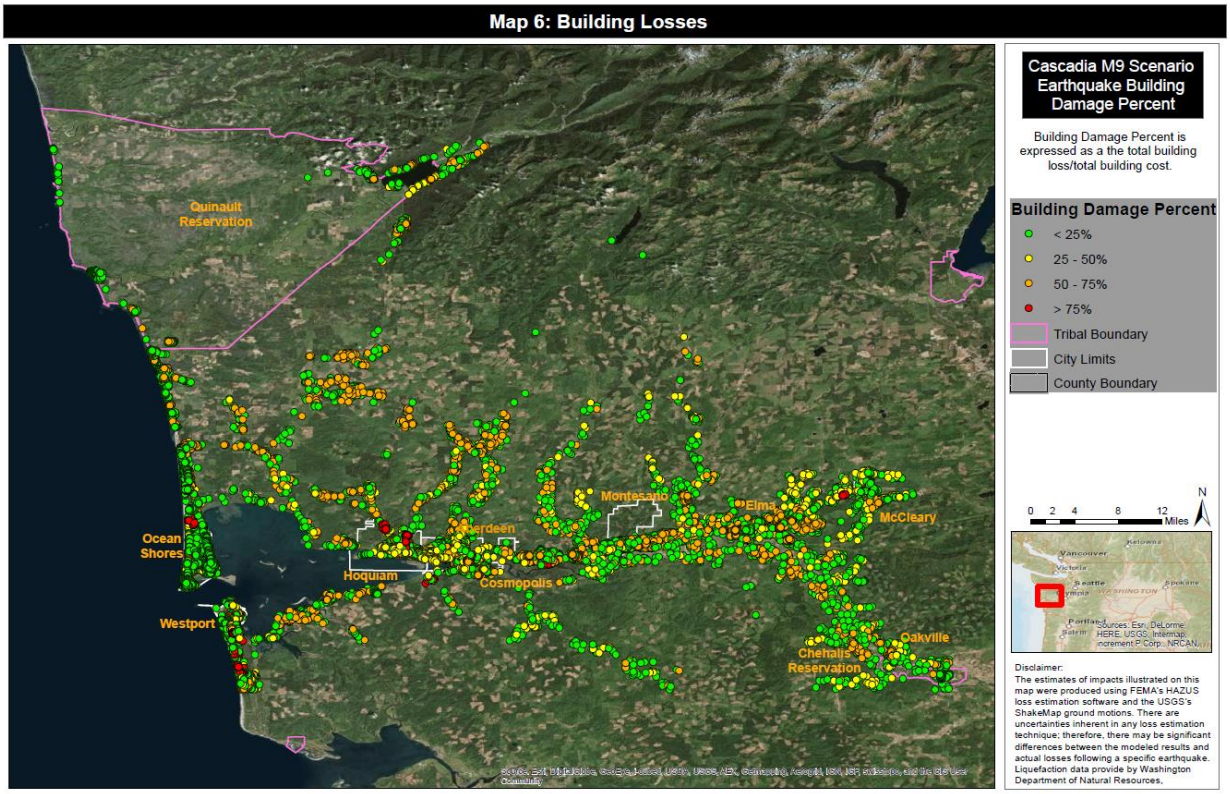
Table 4: Hazus Earthquake Results for a Scenario MW 9.0 Cascadia Earthquake

Community	Total Estimated Building Value	Percent of Buildings in the Moderate-High Liquefaction Zone	Number of Buildings in the Moderate – High Liquefaction Zone	Building Dollar Loss for a Cascadia 9.0 Event	Loss Ratio (Dollar Losses/Total Building Value)
Aberdeen	$872 Million	32%	4664	$277 Million	32%
Hoquiam	$373 Million	83%	3148	$138 Million	37%
Ocean Shores	$722 Million	2%	4543	$167 Million	23%
Westport	$181 Million	7%	1281	$38 Million	21%
Unincorporated County	$1.8 Billion	12%	4088	$387 Million	22%
Cosmopolis	$119 Million	2%	714	$29 Million	24%
McCleary	$80 Million	3%	0	$11 Million	14%
Montesano	$261 Million	< 1%	63	$54 Million	21%
Oakville	$38 Million	< 1%	20	$6 Million	16%
Elma	$189 Million	< 1%	45	$45 Million	24%
Total	**$2.0 Billion**		**18,616**	**$1.15 Billion**	**57.5%**

Note: The above table shows the total estimate building value by community, and percent of buildings and number of buildings located within the high liquefaction zone. In addition buildings losses are reported for a Cascadia 9.0 event as well as a loss ratio. A loss ratio is calculated by dividing the dollar loss by the total building value. The loss values are for building losses only, additional damages to infrastructure and building contents are not captured in this table.

The Cities of Aberdeen and Hoquiam have the largest percentage of buildings located in the moderate-high liquefaction zone. Many of the communities will have a substantial impacted if Cascadia were to occur. The losses report above are for building losses, therefore additional damage to infrastructure and building contents were not included in the above table, therefore these losses should be considered as a minimum. The building loss ratio is shown below on Map 6 for the entire County.

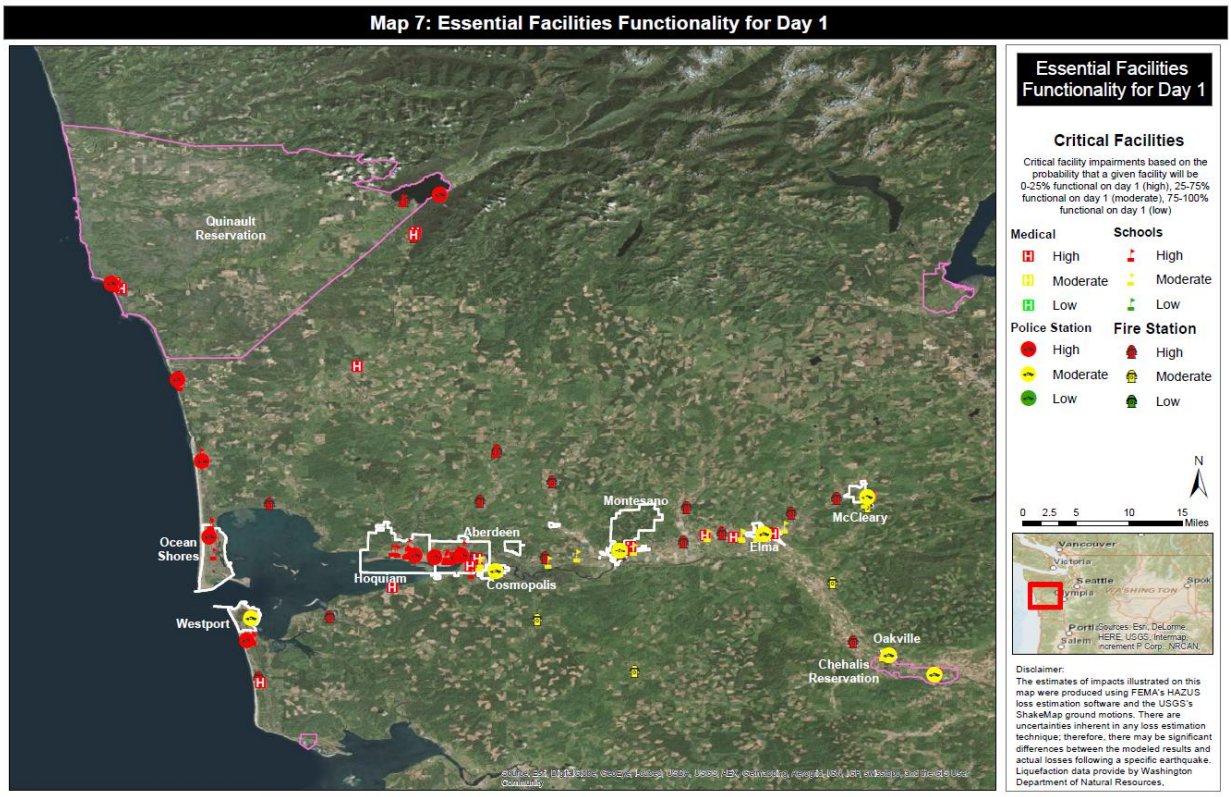
Map 6: Building damage percent (loss ratio) for the study area



Note: The damage percent is calculated by the total building loss divided by the total building value. This percentage easily highlights those buildings which will have the most building damage in the community. Only the building damage is shown above; other infrastructure damage was not included in this map.

In addition to the building analysis, essential facilities were analyzed which are characterized by fire, police, medical facilities, and schools. Essential facilities were analyzed to determine if they would be functional on day 1 after the earthquake as shown in Map 7. Anything labeled “high” would be considered not functioning and is expected to receive major damage. For the entire study area 46% of schools are expected to not be functional, 56% of police stations are expected not to be functional, 100% of medical facilities are expected to not be functional, and 88% of fire stations are expected to not be functional the day after the earthquake. Much of this area will need to rely on outside assistance weather by air or road. Although transportation damage is not shown in the report, this data was analyzed for the risk assessment and will be provided to the communities for further planning.

Map 7: Essential Facility Functionality for Day 1



Note: Hazus determines building functionality on day 1. Buildings shown in Red are expected to not be functional and therefore have the most damage.

An analysis was also completed identifying how many buildings were built to a specific building code. Hazus identifies key changes in earthquake building codes based on year. Homes built prior to 1941 are considered pre-code; they were constructed before earthquake building codes were put in place. Homes constructed after 1941 are considered moderate code which include some earthquake building components. The results of each type are summarized below in Table 5.

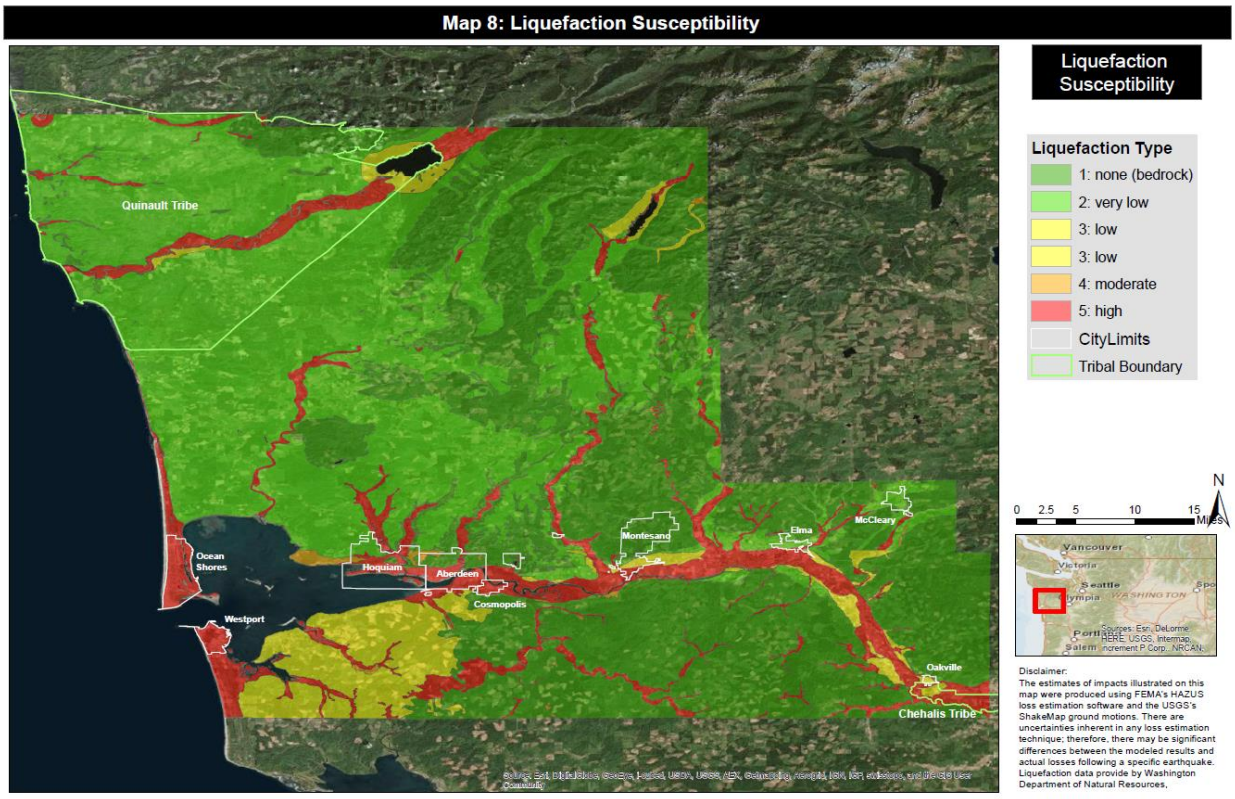
Table 5: Pre-Code versus Moderate Code Buildings in Grays Harbor County

Community	Number of Pre-Code	Number of Moderate Code	Total
Grays Harbor County Total	9275	24452	33727
Westport	149	1142	1291
Ocean Shores	3	4597	4600
Aberdeen	3507	2824	6331
Hoquiam	2257	1200	3457
Cosmopolis	244	496	740
Elma	368	860	1228
McCleary	222	450	672
Montesano	531	1023	1554
Oakville	113	218	331
Unincorporated County	1848	11053	12901

Comparing table 5 to table 4 you can easily see that the reason Aberdeen and Hoquiam have the highest loss ratio is due to the number of pre-code structures located in each community. Due to the age of these buildings they will not perform as well in an earthquake since building codes did not exist at the time of construction.

Liquefaction susceptibility describes the likelihood of sediments to liquefy, resulting in permanent ground deformations. The looser the soils the more likely they are to liquefy. A value of 1 indicates the liquefaction susceptibility for that area is none (bedrock), 2 is very low, 3 is low, 4 is moderate, and 5 indicates a high liquefaction susceptibility. This map is significant because it shows a large percentage of buildings in a highly susceptible area. Map 8 below shows the liquefaction susceptibility for the entire study area.

Map 8: Liquefaction Susceptibility in Grays Harbor County



Moderate to high liquefaction susceptibility can lead to greater damage to buildings in an earthquake.

The loss data from Hazus and the design code analysis can highlight those buildings/areas impacted from earthquakes which can be used to identify properties for mitigation projects as well as additional outreach in the area. Highlighted areas of greatest impacts and potential mitigation actions will be shown in the community sections of this report.

Magnitude 9+ earthquakes can potentially trigger slope failures as well. Map 9 shows the slopes susceptible to seismically induced shallow landslides associated with a M9+ Cascadia subduction zone earthquake in Aberdeen, Cosmopolis, Hoquiam, Ocean Shores, and Westport, Grays Harbor County, Washington (Slaughter and others, 2013).

The critical acceleration (a_c) is a relative predictor of slope performance that indicates which slopes are more likely to fail under a given earthquake magnitude. High is an a_c less than 0.2, medium is an a_c between 0.2 and 0.3, and low is an a_c between 0.3 and 0.4; slopes with an a_c greater than 0.4 were not rated. The a_c between 0.0 and 0.4 were included in Map 10 for scenarios with the water table at the surface and at a depth of three feet: this represents a conservative mapping approach and the worst-case scenario for groundwater conditions.

For this risk assessment the building data was compared to the geographic extent of the landslide hazard area. This map shows where buildings overlay the slopes susceptible to shallow landslides, but the surrounding buildings will likely be affected as well if they fall within the slide affected zone.

Map 10: Shallow Landslide Susceptibility Zones – Ocean Shores/Westport/Aberdeen Area

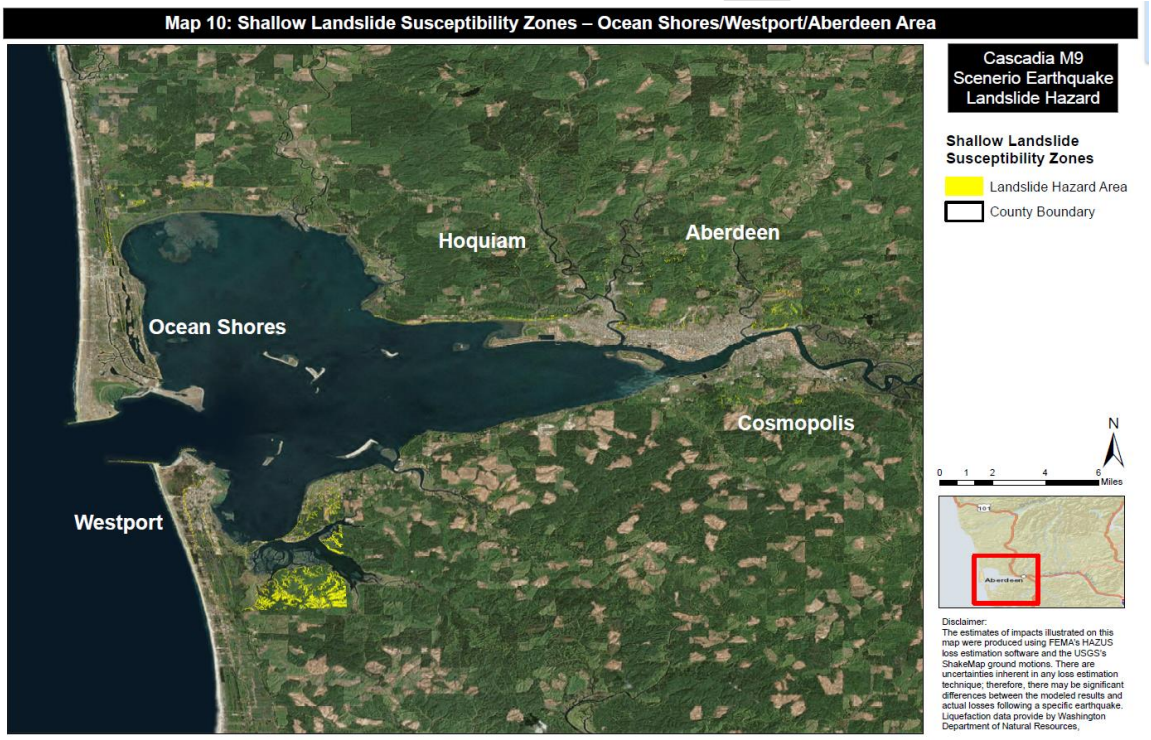


Table 6 shows the building value (in dollars) for the general occupancy types of UDFs in the shallow landslide susceptibility zones. This table also includes the total number of buildings for each general occupancy type, and the overall total number of buildings and building value.

Table 6: Landslide Building Damage Costs for occupancy type

Community	Total Estimated Building Value	Building Value in Landslide Zone	Number of Buildings in Landslide Zone
Aberdeen	$872 Million	$11 Million	66
Hoquiam	$373 Million	$2.5 Million	32
Ocean Shores	$722 Million	6.4 Million	45
Westport	$181 Million	$7.8 Million	59
Unincorporated County	$1.8 Billion	$15.8 Million	129

Community	Total Estimated Building Value	Building Value in Landslide Zone	Number of Buildings in Landslide Zone
Cosmopolis	$119 Million	$0.1 Million	1
McCleary	$80 Million	Unknown	Unknown
Montesano	$261 Million	Unknown	Unknown
Oakville	$3.8 Million	Unknown	Unknown
Elma	$189 Million	Unknown	Unknown
Total	**$2.1 Billion**	**$43.6 Million**	**332**

Updated landslide hazard information has been compiled for the coastal communities in the County. Although other communities are shown as having no risk, this may not be the case. Additional analysis will need to be completed for areas in the eastern part of the county to better understand the landslide risk. Over 300 buildings are in the currently defined landslide zone totaling close to $43 million in impacted buildings. The landslide inventory assessment can be used to identify properties for mitigation projects as well as additional outreach in the area. Highlighted areas of greatest impacts and potential mitigation actions will be shown in the community sections of this report. All results, databases, and maps are provided in the Risk Assessment Database which is included with this report.

6. Tsunami Risk Assessment

Tsunami Hazard Overview

Tsunamis are generated when geologic events, such as earthquakes or landslides, cause large, rapid movements in the sea floor that displace the water column above. That swift change creates a series of high-energy waves that radiate outward like pond ripples. Offshore tsunamis can strike adjacent shorelines in minutes and cross the ocean at speeds as great as 600 miles per hour to strike distant shores.

The coast of Washington is at risk from tsunamis of both local and distant origin. These destructive waves are most commonly caused by submarine earthquakes. Our current technology gives us adequate warning for tsunamis produced by distant quakes. However, an earthquake on the Cascadia subduction zone—like the 1700 event or an event from across the Pacific—could generate a tsunami that would strike our coast with great force within a few tens of minutes.

The tsunami model for Grays Harbor County is based on a Cascadia magnitude 9.0 (M9) earthquakes. This tsunami model is based on the L1 scenario developed by the Pacific Marine Environmental laboratory including Witter and others (2011). This scenario was selected because it is thought to represent the event with an annual probability of approximately .04%, or colloquially, the 2500 year event. This is a probability comparable to the International Building Code standard for earthquake loading for buildings of high importance. The publication of this modeling will be released in late 2014 or early 2015.

Tsunami Risk Assessment

The arrival time and duration of flooding are key factors to be considered in evacuation strategies. For locations on the outer coast, the first wave crest is generally predicted to arrive at between 25 and 40 minutes after the earthquake, whereas within Grays Harbor, the first crest is not expected to arrive for more than an hour. Significant flooding can occur before the first crest arrives because a Cascadia Subduction Zone earthquake is expected to lower the ground surface along the coast. Flooding of areas less than about 6 ft (1.8 m) above tide stage is expected soon after the earthquake, rendering evacuation time even shorter for people on the beach. Maximum flooding depth, velocity, and extent will depend on tide height at the time of tsunami arrival.

For this risk assessment the building data was compared to the geographic extent of the tsunami. The results of the risk assessment are shown in Table 6.

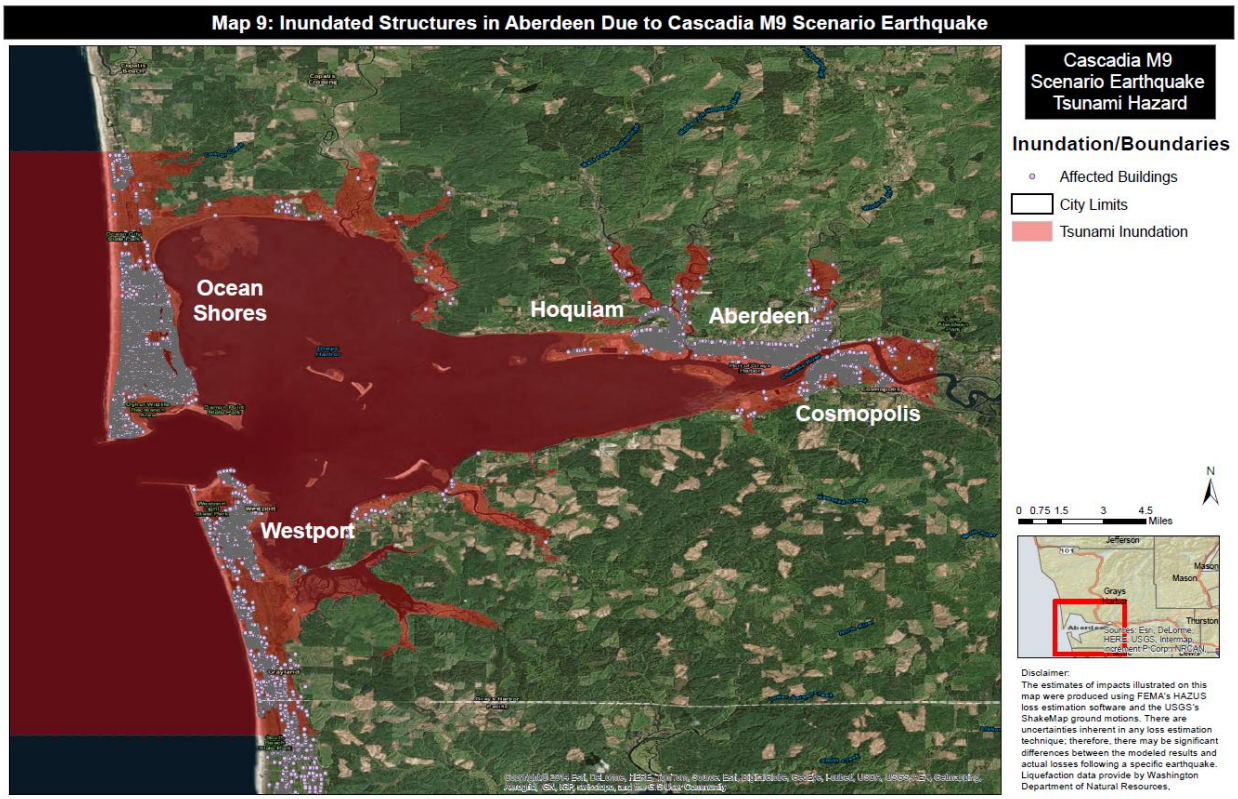
Table 6: Building exposure associated with a Cascadia M9 earthquake induced tsunami along Grays Harbor County coastal region

Community	Total Estimated Building Value	Building Value in Tsunami Zone	Number of Buildings in Tsunami Zone
Aberdeen	$872 Million	$464 Million	4133
Hoquiam	$373 Million	$263 Million	2851
Ocean Shores	$722 Million	$729 Million	4600
Westport	$181 Million	$181 Million	1291
Cosmopolis	$119 Million	$10 Million	106
Unincorporated County	$1.8 Billion	$237 Million	2154
Total	**$2.0 Billion**	**$1.9 Billion**	**15,135**

Note: Estimates for each city are based on the new L1 model. The tsunami inundation for some areas in unincorporated Grays Harbor County is based on an estimate and new modeling is current being planned.

For many communities along the coast most of the built environment will be impacted from a tsunami generated by the Cascadia M9 event. Over 15,000 buildings are expected to be impacted from the tsunami totaling close to $2 billion in impacted buildings. The impacted buildings and tsunami inundation area are shown in Map 9.

Map 9. Inundated Structures for the tsunami generated by the Cascadia M9 scenario.



The tsunami inventory assessment can be used to identify properties for mitigation projects as well as additional outreach in the area. Highlighted areas of greatest impacts and potential mitigation actions will be shown in the community sections of this report. All results, databases, and maps are provided in the Risk Assessment Database which is included with this report.

7. Areas of Mitigation Interest (AOMI) and Recommended Mitigation Strategies

This section of the Risk Report takes risk findings from Hazus models and other hazard overlays and focuses on specific areas where mitigation efforts should occur. These areas are called "Areas of Mitigation Interest" (AOMI) and were developed through conversations with the community during the Risk MAP process as well as through analysis of various datasets for flood, earthquake, tsunami, and landslide hazards. The AOMI targets areas where potential damage, economic loss, and casualties could occur from a hazard event; FEMA has provided strategies for mitigation in these specific areas. These mitigation strategies advise ways the risks to hazards can be reduced thereby reducing potential damages, economic loss, and casualties during hazard events. The mitigation strategies suggest potential projects for hazard mitigation, encouraging local collaboration, and communicating how various mitigation activities can successfully reduce risk.

The AOMI section of this report is broken down by individual community to create a more specific discussion of mitigation for each jurisdiction.

Unincorporated Grays Harbor County: Areas of Mitigation Interest and Recommended Mitigation Strategies

Based on the Hazus risk assessment an overall hazard assessment was completed for the County which includes buildings most impacted by multiple hazards. The table below highlights some of the buildings which are impacted in unincorporated Grays Harbor County from flooding, tsunami, earthquake, and landslide.

Table 7: Grays Harbor County Areas of Mitigation Interest

Community Building Name	Address	Building Value	Loss Value	Loss Ratio	Hazard Type
Grays Harbor County Building	Hwy 101 Aberdeen	$3.7 Million	$1.3 Million	35%	Earthquake, Tsunami
Grays Harbor County Building	Copalis Crossing	$417,000	$276,000	66%	Earthquake
North Beach School District#64	Hwy 115	$11.7 Million	$4.4 Million	37%	Earthquake, Tsunami
Fire District #2	Hwy 12	$580,000	$163,000	28%	Earthquake
Pacific Beach State Park	Pacific Beach	$348,000	$147,000 (FL)	42%(FL)	Flood, Earthquake, Tsunami

Hazard Mitigation Plan Analysis

The Grays Harbor County Hazard Mitigation Plan, effective January 12, 2012 to January 12, 2017, identifies the following Hazard Mitigation Projects that can be aided by the information in this Risk Report.

Table 8: Grays Harbor County Hazard Mitigation Plan Analysis

Hazard	Projects Tier 1	Additional information from Risk Report
Earthquake	1.1 Retrofit the Grays Harbor Community Hospital to withstand earthquake events	Loss estimation for Building 58
Earthquake	1.2 Retrofit Aberdeen School District buildings to current building codes	Loss estimations for district buildings
Earthquake	1.3 Retrofit the Pearsall Building (Public Health)	Loss estimation for Pearsall Building
Flood	2. Retrofit bridges and reconstruct county roads on primary transportation routes	Coastal and riverine depth grids could be used
Multi	3.1 Locate, design, permit, and construct a solid waste staging area	Risk Report can be used to identify lower risk locations with fewer access issues. This can be combined with other site selection considerations.
Tsunami Earthquake	3.2 Replace the Grays Harbor Fire District 11 Fire Station with a tsunami/earthquake resistant structure	Loss estimations and tsunami hazard information may help in project development and benefit cost analysis.
Flood	5.1 Assist homeowners in making their buildings flood, earthquake, and severe storm proof	Risk Report can help prioritizes areas of greatest risk for homeowners
Hazard	**Projects Tier 2**	**Additional information from Risk Report**
Multi	1.1 Identification of public buildings that could be used as emergency shelters	Loss estimations and User-Defined building analysis can identify buildings that will perform best during various hazard events
Multi	3.1 Update the Grays Harbor County Comprehensive Plan to encourage development in areas less vulnerable to all natural disasters	Use Risk Report to identify areas of lower risk to encourage development
Flood Tsunami	3.2 Update the Shoreline Master Program to manage development adjacent to shorelines to reduce the risk of hazard events to structures	New coastal hazard mapping can be used for SMP.

Recommended Mitigation Strategy

Based on the assessment above the following recommended mitigation strategies are recommended.

Table 9: Grays Harbor County Recommended Mitigation Strategies

Mitigation Interest	Problem Statement	Recommended Strategy
To be completed following the resilience meeting		

While federal funding for the above projects is limited, FEMA recommends incorporating these projects into your Natural Hazards Mitigation Plan should disaster funds become available. Additional funding may be available through your community's Capital Improvement Planning (CIP) process, bond authority, or other local, state, or private funding source. More information on how to mitigate for natural hazards can be found in the FEMA Local Mitigation Planning Handbook (http://www.fema.gov/media-library/assets/documents/31598?id=7209). Additional information on integrating your Hazard Mitigation Plan with the Local Planning Process can be found here (http://www.fema.gov/media-library/assets/documents/19261?id=4267)

City of Aberdeen: Areas of Mitigation Interest and Recommended Mitigation Strategies

Based on the Hazus risk assessment an overall hazard assessment was completed for the County which includes buildings most impacted by multiple hazards. The table below highlights some of the buildings which are impacted in the City of Aberdeen from flooding, tsunami, earthquake, and landslide.

Table 10: City of Aberdeen Areas of Mitigation Interest

Community Building Name	Address	Building Value	Loss Value	Loss Ratio	Hazard Type
Public Utility District #1	Cherry St.	$3.9 Million	$1.4 Million	37%	Earthquake, Tsunami
Public Utility District #1	Hwy 101	$2.4 Million	$900,000	37%	Earthquake, Tsunami
City of Aberdeen	Heron St.	$1.3 Million	$48,000 (EQ)	34% (EQ)	Earthquake, Tsunami, Flood
Aberdeen Fire Station	Hwy 101	$850,000	$300,000 (EQ)	34% (EQ)	Earthquake, Tsunami
Aberdeen School District #5	G. St.	$49 Million	$15 Million (EQ)	31% (EQ)	Earthquake, Tsunami, Flood
Grays Harbor College	*Edward P. Smith Dr.*	*$4.2 Million*	*$1.1 Million*	*28%*	*Earthquake, Landslide*

Hazard Mitigation Plan Analysis

The City of Aberdeen Hazard Mitigation and Preparedness Plan, which expired in 2009, identifies the following Hazard Mitigation Projects that can be aided by the information in this Risk Report. An update of the plan is highly recommended.

Table11: City of Aberdeen Hazard Mitigation Plan Analysis

Hazard	Project	Additional information from Risk Report
Flood	Update the City's Comprehensive Plan in conjunction with design standards, to address reducing the flood risk (HMP: p. 42 and 52)	Use hazard information in the report and database to identify no build areas or implement specific zoning or design standards to reduce the risk.
Flood	Add elements to the building code to minimize flood	Use the flood risk information

Hazard	Project	Additional information from Risk Report
	impacts (HMP: p. 48 and 52)	to determine the 1% chance and +1, +2, and +3 above BFE. Develop code to appropriate standard.
Tsunami	Develop tsunami evacuation contingency plan and route (HMP: p. 53)	Use tsunami risk information to determine evacuation routes and safe zones.
Earthquake	Identify remaining critical facilities for seismic retrofit and perform retrofit (HMP: p. 53)	Use earthquake risk information to understand critical facilities with greatest loss and prioritize based on results.

Recommended Mitigation Strategy

Based on the assessment above the following recommended mitigation strategies are recommended.

Table12: City of Aberdeen Recommended Mitigation Strategies

Mitigation Interest	Problem Statement	Recommended Strategy
To be completed following the resilience meeting		

While federal funding for the above projects is limited, FEMA recommends incorporating these projects into your Natural Hazards Mitigation Plan should disaster funds become available. Additional funding may be available through your community's Capital Improvement Planning (CIP) process, bond authority, or other local, state, or private funding source. More information on how to mitigate for natural hazards can be found in the FEMA Local Mitigation Planning Handbook (http://www.fema.gov/media-library/assets/documents/31598?id=7209). Additional information on integrating your Hazard Mitigation Plan with the Local Planning Process can be found here (http://www.fema.gov/media-library/assets/documents/19261?id=4267)

City of Hoquiam: Areas of Mitigation Interest and Recommended Mitigation Strategies

Based on the Hazus risk assessment an overall hazard assessment was completed for the County which includes buildings most impacted by multiple hazards. The table below highlights some of the buildings which are impacted in the City of Hoquiam from flooding, tsunami, earthquake, and landslide.

Table13: City of Hoquiam Areas of Mitigation Interest

Community Building Name	Address	Building Value	Loss Value	Loss Ratio	Hazard Type
City of Hoquiam	Pacific Ave.	$129,000	$24,000 (FL)	18% (FL)	Flood, Earthquake, Tsunami
Hoquiam Post Office	M St.	$720,000	$550,000 (EQ)	76% (EQ)	Earthquake, Flood,

Community Building Name	Address	Building Value	Loss Value	Loss Ratio	Hazard Type
					Tsunami
City of Hoquiam	8th St.	$880,000	$672,000 (EQ)	76% (EQ)	Earthquake, Flood, Tsunami
Hoquiam School District #28	W. Emerson Av.	$3.5 Million	$1.2 Million (EQ)	35% (EQ)	Earthquake, Flood, Tsunami
City of Hoquiam	Semler Dr.	$73,000	$11,000	15% (EQ)	Earthquake, Landslide

Hazard Mitigation Plan Analysis

The City of Hoquiam Hazard Mitigation Plan, effective February 16, 2010 to February 16, 2015, identifies the following Hazard Mitigation Projects that can be aided by the information in this Risk Report.

Table14: City of Hoquiam Hazard Mitigation Plan Analysis

Hazard	Project	Additional information from Risk Report
Multi	Evaluate and prioritize critical facilities in hazard areas to assess their resistance to hazard events.	Use information in the Risk Report and Risk Database to determine loss estimated
Earthquake	Retrofit critical facilities in hazard areas to increase their resistance to hazard events.	Use information in the Report and Database to identify critical facilities in the hazard areas.
Multi	Distribute hazard mitigation information and publications published by FEMA, EMD, Red Cross, and other agencies and organizations to the Library, schools, and other public facilities to promote citizen commitment to hazard mitigation.	Use the information in the Report and Database to produce educate various stakeholders.
Multi	Maintain a disaster contingency fund within the City budget.	Use the loss estimation information to inform how much funding would need to be available for recovery.

Recommended Mitigation Strategy

Based on the assessment above the following recommended mitigation strategies are recommended.

Table15: City of Hoquiam Recommended Mitigation Strategies

Mitigation Interest	Problem Statement	Recommended Strategy
To be completed following the resilience meeting		

While federal funding for the above projects is limited, FEMA recommends incorporating these projects into your Natural Hazards Mitigation Plan should disaster funds become available. Additional funding may be available through your community's Capital Improvement Planning (CIP) process, bond

authority, or other local, state, or private funding source. More information on how to mitigate for natural hazards can be found in the FEMA Local Mitigation Planning Handbook (http://www.fema.gov/media-library/assets/documents/31598?id=7209). Additional information on integrating your Hazard Mitigation Plan with the Local Planning Process can be found here (http://www.fema.gov/media-library/assets/documents/19261?id=4267)

City of Ocean Shores: Areas of Mitigation Interest and Recommended Mitigation Strategies

Based on the Hazus risk assessment an overall hazard assessment was completed for the County which includes buildings most impacted by multiple hazards. The table below highlights some of the buildings which are impacted in the City of Ocean Shores from flooding, tsunami, earthquake, and landslide.

Table16: City of Ocean Shores Areas of Mitigation Interest

Community Building Name	Address	Building Value	Loss Value	Loss Ratio	Hazard Type
City of Ocean Shores	Ocean Lake Way NE	$8.5 Million	$3.9 Million (EQ)	47% (EQ)	Earthquake, Tsunami
Public Utility District #1	Seahorse Ave.	$245,000	$100,000 (EQ)	40% (EQ)	Earthquake, Tsunami
City of Ocean Shores	Point Brown Ave. NE	$174,000	$71,000 (EQ)	40% (EQ)	Earthquake, Tsunami
Ocean Shores Fire Station	Point Brown Ave. NE	$78,000	$13,000 (EQ)	16% (EQ)	Earthquake, Tsunami

Hazard Mitigation Plan Analysis

The City of Ocean Shores does not have a FEMA approved Hazard Mitigation Plan; completing one is highly recommended.

Recommended Mitigation Strategy

Based on the assessment above the following recommended mitigation strategies are recommended.

Table17: City of Hoquiam Recommended Mitigation Strategies

Mitigation Interest	Problem Statement	Recommended Strategy
To be completed following the resilience meeting		

While federal funding for the above projects is limited, FEMA recommends incorporating these projects into your Natural Hazards Mitigation Plan should disaster funds become available. Additional funding may be available through your community's Capital Improvement Planning (CIP) process, bond authority, or other local, state, or private funding source. More information on how to mitigate for natural hazards can be found in the FEMA Local Mitigation Planning Handbook (http://www.fema.gov/media-library/assets/documents/31598?id=7209). Additional information on integrating your Hazard Mitigation Plan with the Local Planning Process can be found here (http://www.fema.gov/media-library/assets/documents/19261?id=4267)

City of Westport: Areas of Mitigation Interest and Recommended Mitigation Strategies

Based on the Hazus risk assessment an overall hazard assessment was completed for the County which includes buildings most impacted by multiple hazards. The table below highlights some of the buildings which are impacted in the City of Westport from flooding, tsunami, earthquake, and landslide.

Table18: City of Westport Areas of Mitigation Interest

Community Building Name	Address	Building Value	Loss Value	Loss Ratio	Hazard Type
City of Westport	E. Pacific Ave.	$755,000	$156,000 (EQ)	20% (EQ)	Earthquake, Tsunami
Islander Resort LLC	Westhaven Dr.	$835,000	$344,000 (FL)	41% (FL)	Flood, Earthquake, Tsunami
Medical Facility	W. Washington Ave.	$4.0 Million	$1.1 Million (EQ)	28% (EQ)	Earthquake, Tsunami
Port of Grays Harbor	Westhaven Dr.	$668,000	$254,000 (FL)	38% (FL)	Flood, Earthquake, Tsunami

Hazard Mitigation Plan Analysis

The City of Westport Hazard Mitigation Plan, which expired in 2013, identifies the following Hazard Mitigation Projects that can be aided by the information in this Risk Report. An update of the plan is highly recommended.

Table19: City of Westport Hazard Mitigation Plan Analysis

Hazard	Project	Additional information from Risk Report
Multi	Evaluate and prioritize critical facilities in hazard areas to assess their resistance to hazard events.	Use information in the Risk Report and Risk Database to determine loss estimated
Earthquake	Retrofit critical facilities in hazard areas to increase their resistance to hazard events.	Use information in the Report and Database to identify critical facilities in the hazard areas.
Multi	Distribute hazard mitigation information and publications published by FEMA, EMD, Red Cross, and other agencies and organizations to the Library, schools, and other public facilities to promote citizen commitment to hazard mitigation.	Use the information in the Report and Database to produce educate various stakeholders.
Multi	Maintain a disaster contingency fund within the City budget.	Use the loss estimation information to inform how much funding would need to be available for recovery.

Recommended Mitigation Strategy

Based on the assessment above the following recommended mitigation strategies are recommended.

Table20: City of Hoquiam Recommended Mitigation Strategies

Mitigation Interest	Problem Statement	Recommended Strategy
To be completed following the resilience meeting		

While federal funding for the above projects is limited, FEMA recommends incorporating these projects into your Natural Hazards Mitigation Plan should disaster funds become available. Additional funding may be available through your community's Capital Improvement Planning (CIP) process, bond authority, or other local, state, or private funding source. More information on how to mitigate for natural hazards can be found in the FEMA Local Mitigation Planning Handbook (http://www.fema.gov/media-library/assets/documents/31598?id=7209). Additional information on integrating your Hazard Mitigation Plan with the Local Planning Process can be found here (http://www.fema.gov/media-library/assets/documents/19261?id=4267)

City of Cosmopolis: Areas of Mitigation Interest and Recommended Mitigation Strategies

Based on the Hazus risk assessment an overall hazard assessment was completed for the County which includes buildings most impacted by multiple hazards. The table below highlights some of the buildings which are impacted in the City of Cosmopolis from flooding, tsunami, earthquake, and landslide.

Table21: City of Cosmopolis Areas of Mitigation Interest

Community Building Name	Address	Building Value	Loss Value	Loss Ratio	Hazard Type
City Building	Hwy 1010	$117,000	35,000 (EQ)	30% (EQ)	Earthquake
City Building	2nd St.	$949,000	$283,000 (EQ)	30% (EQ)	Earthquake
Cosmopolis School District #99	3rd St.	$3.3 Million	$992,000 (EQ)	30% (EQ)	Earthquake

Hazard Mitigation Plan Analysis

The City of Cosmopolis Hazard Mitigation Plan, effective November 19, 2010 to November 19, 2015, identifies the following Hazard Mitigation Projects that can be aided by the information in this Risk Report.

Table22: City of Cosmopolis Hazard Mitigation Plan Analysis

Hazard	Project	Additional information from Risk Report
Multi	Evaluate and prioritize critical facilities in hazard areas to assess their resistance to hazard events.	Loss estimations and user-defined facilities assessment can help identify facilities at most risk.
Multi	Retrofit critical facilities in hazard areas to increase their	Loss estimations and user-

Hazard	Project	Additional information from Risk Report
	resistance to hazard events.	defined facilities assessment can help identify facilities at most risk.

Recommended Mitigation Strategy

Based on the assessment above the following recommended mitigation strategies are recommended.

Table23: City of Cosmopolis Recommended Mitigation Strategies

Mitigation Interest	Problem Statement	Recommended Strategy
To be completed following the resilience meeting		

While federal funding for the above projects is limited, FEMA recommends incorporating these projects into your Natural Hazards Mitigation Plan should disaster funds become available. Additional funding may be available through your community's Capital Improvement Planning (CIP) process, bond authority, or other local, state, or private funding source. More information on how to mitigate for natural hazards can be found in the FEMA Local Mitigation Planning Handbook (http://www.fema.gov/media-library/assets/documents/31598?id=7209). Additional information on integrating your Hazard Mitigation Plan with the Local Planning Process can be found here (http://www.fema.gov/media-library/assets/documents/19261?id=4267)

City of Elma: Areas of Mitigation Interest and Recommended Mitigation Strategies

Based on the Hazus risk assessment an overall hazard assessment was completed for the County which includes buildings most impacted by multiple hazards. The table below highlights some of the buildings which are impacted in the City of Elma from flooding, earthquake, and landslide.

Table24: City of Elma Areas of Mitigation Interest

Community Building Name	Address	Building Value	Loss Value	Loss Ratio	Hazard Type
City Building/Fire Department	Main St.	$272,000	$179,000	66%	Earthquake
Elma High School	W. Main St.	$13.9 Million	$3.6 Million	26%	Earthquake
Elma Middle School	W. Main St.	$6.8 Million	$1.8 Million	26%	Earthquake

Hazard Mitigation Plan Analysis

The City of Elma does not have a FEMA approved Hazard Mitigation Plan; completing one is highly recommended.

Recommended Mitigation Strategy

Based on the assessment above the following recommended mitigation strategies are recommended.

Table25: City of Elma Recommended Mitigation Strategies

Mitigation Interest	Problem Statement	Recommended Strategy
To be completed following the resilience meeting		

While federal funding for the above projects is limited, FEMA recommends incorporating these projects into your Natural Hazards Mitigation Plan should disaster funds become available. Additional funding may be available through your community's Capital Improvement Planning (CIP) process, bond authority, or other local, state, or private funding source. More information on how to mitigate for natural hazards can be found in the FEMA Local Mitigation Planning Handbook (http://www.fema.gov/media-library/assets/documents/31598?id=7209). Additional information on integrating your Hazard Mitigation Plan with the Local Planning Process can be found here (http://www.fema.gov/media-library/assets/documents/19261?id=4267)

City of Montesano: Areas of Mitigation Interest and Recommended Mitigation Strategies

Based on the Hazus risk assessment an overall hazard assessment was completed for the County which includes buildings most impacted by multiple hazards. The table below highlights some of the buildings which are impacted in the City of Montesano from flooding, earthquake, and landslide.

Table26: City of Montesano Areas of Mitigation Interest

Community Building Name	Address	Building Value	Loss Value	Loss Ratio	Hazard Type
Grays Harbor County Offices	W. Broadway	$6.1 Million	$3.6 Million	60%	Earthquake
City of Montesano Building	W. Broadway	$885,000	$530,000	60%	Earthquake
Montesano School	W. Simpson	$8.9 Million	$2.2 Million	25%	Earthquake
Montesano Treatment Plant	Off Hwy 101	$4.1 Million	$917,000	22%	Earthquake, Flood

Hazard Mitigation Plan Analysis

The City of Montesano does not have a FEMA approved Hazard Mitigation Plan; completing one is highly recommended.

Recommended Mitigation Strategy

Based on the assessment above the following recommended mitigation strategies are recommended.

Table27: City of Montesano Recommended Mitigation Strategies

Mitigation Interest	Problem Statement	Recommended Strategy
To be completed following the resilience meeting		

While federal funding for the above projects is limited, FEMA recommends incorporating these projects into your Natural Hazards Mitigation Plan should disaster funds become available. Additional funding may be available through your community's Capital Improvement Planning (CIP) process, bond authority, or other local, state, or private funding source. More information on how to mitigate for natural hazards can be found in the FEMA Local Mitigation Planning Handbook (http://www.fema.gov/media-library/assets/documents/31598?id=7209). Additional information on integrating your Hazard Mitigation Plan with the Local Planning Process can be found here (http://www.fema.gov/media-library/assets/documents/19261?id=4267)

City of McCleary: Areas of Mitigation Interest and Recommended Mitigation Strategies

Based on the Hazus risk assessment an overall hazard assessment was completed for the County which includes buildings most impacted by multiple hazards. The table below highlights some of the buildings which are impacted in the City of McCleary from flooding, tsunami, earthquake, and landslide.

Table28: City of McCleary Areas of Mitigation Interest

Community Building Name	Address	Building Value	Loss Value	Loss Ratio	Hazard Type
McCleary School District	S. 4th St.	$6.4 Million	$1.1 Million	18%	Earthquake
City of McCleary	W. Maple St.	$2.5 Million	$450,000	18%	Earthquake

Hazard Mitigation Plan Analysis

The City of McCleary does not have a FEMA approved Hazard Mitigation Plan; completing one is highly recommended.

Recommended Mitigation Strategy

Based on the assessment above the following recommended mitigation strategies are recommended.

Table29: City of Montesano Recommended Mitigation Strategies

Mitigation Interest	Problem Statement	Recommended Strategy
To be completed following the resilience meeting		

While federal funding for the above projects is limited, FEMA recommends incorporating these projects into your Natural Hazards Mitigation Plan should disaster funds become available. Additional funding may be available through your community's Capital Improvement Planning (CIP) process, bond authority, or other local, state, or private funding source. More information on how to mitigate for natural hazards can be found in the FEMA Local Mitigation Planning Handbook (http://www.fema.gov/media-library/assets/documents/31598?id=7209). Additional information on integrating your Hazard Mitigation Plan with the Local Planning Process can be found here (http://www.fema.gov/media-library/assets/documents/19261?id=4267)

City of Oakville: Areas of Mitigation Interest and Recommended Mitigation Strategies

Based on the Hazus risk assessment an overall hazard assessment was completed for the County which includes buildings most impacted by multiple hazards. The table below highlights some of the buildings which are impacted in the City of Oakville from flooding, tsunami, earthquake, and landslide.

Table30: City of Oakville Areas of Mitigation Interest

Community Building Name	Address	Building Value	Loss Value	Loss Ratio	Hazard Type
Oakville Elementary School	School St.	$8.1 Million	$1.2 Million	16%	Earthquake

Hazard Mitigation Plan Analysis

The City of Oakville Hazard Mitigation Plan, effective February 8, 2010 to February 8, 2015, identifies the following Hazard Mitigation Projects that can be aided by the information in this Risk Report.

Table31: City of Oakville Hazard Mitigation Plan Analysis

Hazard	Project	Additional information from Risk Report
Multi	Evaluate and prioritize critical facilities in hazard areas to assess their resistance to hazard events.	Loss estimations and user-defined facilities assessment can help identify facilities at most risk.
Multi	Retrofit critical facilities in hazard areas to increase their resistance to hazard events.	Loss estimations and user-defined facilities assessment can help identify facilities at most risk.
Flood	Elevation of housing (home elevation) in flooded areas	Risk report can help identify housing areas of highest flood risk.

Recommended Mitigation Strategy

Based on the assessment above the following recommended mitigation strategies are recommended.

Table32: City of Oakville Recommended Mitigation Strategies

Mitigation Interest	Problem Statement	Recommended Strategy
To be completed following the resilience meeting		

While federal funding for the above projects is limited, FEMA recommends incorporating these projects into your Natural Hazards Mitigation Plan should disaster funds become available. Additional funding may be available through your community's Capital Improvement Planning (CIP) process, bond authority, or other local, state, or private funding source. More information on how to mitigate for natural hazards can be found in the FEMA Local Mitigation Planning Handbook (http://www.fema.gov/media-library/assets/documents/31598?id=7209). Additional information on

integrating your Hazard Mitigation Plan with the Local Planning Process can be found here (http://www.fema.gov/media-library/assets/documents/19261?id=4267)

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9. Appendices (To be finalized in the final document)

Hazus Methodology

GIS layers

Acronyms and Definitions

Additional Resources

Large Format Maps