MITIGATION STRATEGY

Mitigation Strategy

Introduction

The Mitigation Strategy establishes a policy framework and implementation pathway for reducing risk from natural hazards over the long term. It presents the natural hazards mitigation goals and objectives of Tillamook County, its cities, and the Ports of Garibaldi and Tillamook Bay along with actions to achieve them, a strategy for implementation, and a process for integrating the NHMP into other planning mechanisms. It also identifies the tools and assets that support implementation available to each jurisdiction. Further, it documents progress in achieving mitigation actions since the Tillamook County Multi-Jurisdiction Natural Hazards Mitigation Plan was last approved in 2012.

Goals and Objectives

The Steering Committee reviewed the existing four multi-jurisdictional goals and decided to retain and combine them into three. In addition, several items previously identified as actions pertaining to each goal and other implementation items were revised and transformed into objectives. The overall priorities have not changed from the previous plan; they have been reconsidered, reorganized, and refined.

Goal 1. Develop and implement effective mitigation initiatives, projects, and activities to reduce hazards to life, businesses, property, and environmental systems.

- Objective 1A. Maintain effective natural hazards mitigation plans and regulations.
- Objective 1B. Promote purchase of insurance coverage to mitigate economic loss and enhance post-disaster resilience.
- Objective 1C. Preserve environmental systems to serve natural hazard mitigation functions.
- Objective 1D. Advance natural hazards mitigation with updated data and information as it becomes available.
- Objective 1E. Educate the public about natural hazards and mitigation.
- Objective 1F. Seek funding and partnerships as needed to implement mitigation initiatives, projects, and activities.

Goal 2. Enhance emergency services and the capabilities of local first responders.

- Objective 2A. Enhance the ability of individuals and businesses to be self-reliant for an extended period of time.
- Objective 2B. Seek funding to provide first responders with the training and tools they need to respond effectively to all hazard events.
- Objective 2C. Strengthen emergency operations by improving communication and coordination.

Goal 3. Improve regional coordination and communication.

- Objective 3A. Participate in the countywide Hazard Mitigation Steering Committee.

Objective 3B. Maintain active and collaborative emergency preparedness committees covering the county.

Objective 3C. Improve communication and collaboration between Emergency Operations Centers, including the Tillamook Citizens Corps Council, Emergency Volunteer Corps of Nehalem Bay, Community Emergency Response Teams, Incident Command Teams, Fire Districts, Emergency Services Departments, Public Works Departments, Law Enforcement Agencies, and others. In particular, collaborate on updating the County Emergency Response Plan.

Objective 3D. As funding becomes available, individual jurisdictions will continue to survey their populations about personal preparedness and develop coordinated response plans for each potential hazard.

Mitigation Actions

Mitigation actions are specific actions, projects, activities, or processes that reduce risk to people, property, and the environment from the impacts of natural hazard events.

The University of Oregon's Community Service Center conducted a review of the Tillamook County Development Code, focusing on supplementing and strengthening code associated with natural hazard mitigation. The task included reviewing a range of regulatory and non-regulatory standards that could be used by Tillamook County to mitigate the risk of natural hazards impacting the County. This information was reviewed for potential mitigation actions.

Tables 114-123 list each jurisdiction's prioritized mitigation actions and implementation strategy. Actions marked "ongoing" are those in which a jurisdiction engages regularly or continually and expects to continue doing so. Therefore these actions have not been assigned a specific timeline. Table 124 shows progress in mitigation actions since the last plan update.

Each jurisdiction prioritized its mitigation actions qualitatively in accordance with their levels of necessity and urgency for the protection of people, property, and the environment; internal capacity or need for assistance to accomplish the action; and cost versus benefit. In general, actions considered to be of great necessity or urgency were assigned high priority even if they were expected to be extremely costly. Length of time to complete the action was not a criterion for prioritizing. Therefore some high-priority actions, even if they were considered urgent, have long timelines.

Table 114. Tillamook County Mitigation Actions

TILLAMOOK COUNTY MITIGATION ACTIONS							
				IMPLEMENTATION			
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
High	Adopt new FIS and FIRM.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	DLCD	Tillamook County DCD	2017	Tillamook County
High	Complete beach and dune code update.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	DLCD	Tillamook County DCD	2017	Tillamook County
High	Amend Beach and Dune code.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	DLCD	Tillamook County DCD	2017	Tillamook County
High	Work with the rural unincorporated communities to develop coastal erosion adaptation sub-plans based on the information in the "Framework Plan."	Not Started	Reduce hazards to life, businesses, property, and environmental systems	DCD	Unincorporated Communities	2017	Tillamook County/DLCD
High	Implement three outreach events on hazard insurance (flood, earthquake) over the life of the NHMP.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	DCD	EM	2022	Tillamook County
High	Continue to implement the Southern Flow Corridor Plan.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	Tillamook County	Southern Flow Corridor Plan Partners	2017	POTB/TEP/ TBFID/Various state and federal agencies
High	Re-join the CRS program.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	DCD	DLCD, FEMA	2018	Tillamook County
High	Maintain GIS natural hazards geodatabase and program capability	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	DCD	County Assessor/ DOGAMI/ DLCD	Not Applicable	Tillamook County/FEMA/NOAA
High	Develop a drainage asset management plan with a culvert repair/replacement schedule.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	PW	---	Not Applicable	Tillamook County/ODOT/ FEMA
High	Continue to replace culverts and bridges	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	PW	---	Not Applicable	Tillamook County/ODOT/ FEMA
High	Apply for funding to repair two levees (Shilo and Stillwell)	Not Started	Reduce hazards to life, businesses, property, and environmental systems	PW	---	2022	FEMA/ACOE/ ODOT/ Drainage Districts
High	Continue outreach on natural hazards mitigation to residents and tourists.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	DCD	EM/ Oregon Coast	Not Applicable	Tillamook County
High	Implement education and outreach strategies on seismic resilience, retrofitting, and the building code program.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	Building Official	EM	2018	Tillamook County
High	Continue to partner with DOGAMI through a DOGAMI grant to engage four communities in the "Follow the Elephant" evacuation practice program. (Pacific City, Neskowin, Rockaway Beach, Manzanita, Nedonna Beach).	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	DOGAMI	Tillamook County	Not Applicable	Grant
High	Conduct a mass casualty exercise annually.	Ongoing	Enhance emergency services and local first responders	EM	Cities/ Ports/ OEM	2018	Tillamook County
High	Maintain airborne warning and speaker system.	Ongoing	Enhance emergency services and local first responders	EM	---	Not Applicable	Tillamook County
High	Maintain disaster event chain of command.	Ongoing	Enhance emergency services and local first responders	EM	---	Not Applicable	Tillamook County
Medium	Update the Community Wildfire Protection Plan in coordination with ODF and the County Fire Board	Progressing	Reduce hazards to life, businesses, property, and environmental systems	ODF	Fire Board/ Tillamook County	2019	ODF

TILLAMOOK COUNTY MITIGATION ACTIONS							
				IMPLEMENTATION			
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
Medium	Complete tsunami “Beat the Wave” project.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	DCD	DLCD/DOGAMI	2018	NOAA
Medium	Consult with the Watershed Councils and Tillamook Estuary Partnership about developing and partnering on strategies to preserve environmental systems to serve natural hazards mitigation functions.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	DCD	TCBOCC/ TEP/DLCD	2020	Tillamook County/TEP/ DLCD
Medium	Maintain EVCNB agreement for assistance with NBRFD.	Ongoing	Enhance emergency services and local first responders	EM	---	Not Applicable	Tillamook County
Medium	Provide significant ham radio training throughout the county.	Ongoing	Enhance emergency services and local first responders	IS	EM/Cities/Ports	Not Applicable	Tillamook County/ Cities/Ports/ OEM/FEMA
Low	Develop an Animal Mortality Plan	Not Started	Reduce hazards to life, businesses, property, and environmental systems	ODA	EM/DEQ/ TCHealth/ Creamery Assn/ POTB	2022	ODA/DEQ/ FEMA/TC/ Creamery Association

Table 115. City of Bay City Mitigation Actions

CITY OF BAY CITY MITIGATION ACTIONS							
				IMPLEMENTATION			
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
High	Relocate public works equipment and emergency supplies to evacuation sites in the community.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	Public Works	City	2018	City/FEMA
High	Develop secondary access for the wastewater treatment plant and public works facilities that would result in direct access to US-101, avoiding interim access through the flood zone.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	Public Works	ODOT, FHWA	2020	City/FEMA
High	Design and implement an outreach program on hazard mitigation topics including outreach specific to non-English speakers and people with disabilities.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	City Emergency Preparedness Committee	OEM, Oregon Division of Financial Regulation (ODFR) - Insurance	2018	City/OEM/ DLCD/Local Social Service Orgs.
High	Include infrastructure response plan in EOP.	Not Started	Enhance emergency services and local first responders	Public Works Director	Fire Chief	2017	City
High	Reinvigorate the Emergency Preparedness and Mitigation Committee.	Not Started	Improve regional coordination and communication	City Council	City Manager	2017	FEMA
Medium	Create new risk and flood maps using LIDAR.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	FEMA	DOGAMI, DLCD	2017	FEMA
Medium	Relocate the fire station and City Hall out of the tsunami impact area. Use impounding franchise tax fees to purchase land, then apply for funding for construction.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	City	---	2022	Budgeted through reserve fund to purchase location for Fire/City Hall
Medium	Strengthen the banks of the wastewater treatment ponds to prevent erosion.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	City	---	2022	City
Medium	Develop and implement an outreach program to encourage seismic retrofitting, particularly fastening structures to their foundations.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	City Emergency Preparedness Committee	OEM	2019	City/OEM/ State Division of Financial Regulation (Insurance)/ Tillamook County Building Dept.
Medium	Assist CERT with pre-deploying supplies by placing containers at the north and south evacuation sites.	Not Started	Enhance emergency services and local first responders	City Emergency Preparedness Committee	CERT	2019	City

Table 116. City of Garibaldi Mitigation Actions

CITY OF GARIBALDI MITIGATION ACTIONS							
				IMPLEMENTATION			
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
High	Equip reservoirs with seismically-activated shut-off valves.	Not Started	Enhance emergency services and local first responders	City Engineer	---	2020	City Water Utility Revenue
High	Add surface water treatment. Develop an action plan for analyzing and decontaminating water in the event of an earthquake.	Not Started	Enhance emergency services and local first responders	City Engineer	---	2022	City Water Utility Revenue
High	Work with the USACE, Tillamook County, and the Port of Tillamook Bay to repair and maintain the jetties.	Progressing	Enhance emergency services and local first responders	City Manager	USACE, Tillamook County, Port of Tillamook Bay	2022	USACE
High	Replace 2 miles of asbestos-concrete pipe.	Progressing	Enhance emergency services and local first responders	City Engineer	---	2022	City Water Utility Revenue
High	Install seismically-sound fuel tanks (1 diesel, 1 gas), generators, and storage for emergency supplies on the least hazard-susceptible area out of the floodplain and tsunami zone.	Not Started	Enhance emergency services and local first responders	City Engineer	City Manager	2022	City Utility/General Revenues
Medium	Seismic retrofits to bridges and culverts on US-101 to prevent collapse in an earthquake.	Not Started	Enhance emergency services and local first responders	City Engineer	City Manager	2022	ODOT
Medium	Complete Tourism Plan. The plan will incorporate (1) emergency management into tourism promotion operations so tourists are prepared for natural hazard events; and (2) evaluation of emergency facilities for accommodating tourism demand.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	Tourism Promotion Department	City Manager	2019	City
Low	Dismantle 200+ feet tall relic smoke stack.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	City Manager	---	2022	Private, Non-Profit
Low	Develop an agreement to use forest roads in an emergency or disaster response. Garibaldi has an observably high risk of isolation as a result of earthquake and tsunami events based on apparent vulnerability of transportation infrastructure. General vehicular access to Garibaldi is facilitated by US-101 which runs north and south along the Oregon Coast. Garibaldi can also be accessed through a series of forest land utility roads that interconnect throughout the Coast Range. However, use of these roads requires access to private property and no agreements are in place at this time for use of these roads in either an emergency or for emergency preparation.	Not Started	Enhance emergency services and local first responders	City Manager	USFS, ODF, Private property owners	2020	City, Private

Table 117. City of Manzanita Mitigation Actions

CITY OF MANZANITA MITIGATION ACTIONS							
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	IMPLEMENTATION			
				Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
High	Review and update Nehalem Bay Emergency Response Plan.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	EVCNB	Manzanita, Nehalem, Wheeler	2022	Grants, Cities
High	Earthquake retrofits of water storage facilities. The water tanks serving the upper portion of Manzanita are older and not constructed to earthquake standards. The tanks need to be retrofitted so that water system capability can be maintained after an earthquake.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	PW	CM/CC	2022	City/FEMA
High	Continue to educate the public about natural hazards mitigation through links to EVCNB's website, www.evcnb.org.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	EVCNB	CM	Not Applicable	EVCNB
High	Continue to provide first responders with training and equipment.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	CM	CC	Not Applicable	City
High	Provide short-range and long-range communication systems in the water treatment plant and EOC.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	CM	PW	2018	City/FEMA
High	Enhance city organization self-sustainability by continuing to work with EVCNB, the fire districts, Nehalem, and Wheeler.	Ongoing	Enhance emergency services and local first responders	EVCNB	CC	Not Applicable	EVCNB/City
High	The City and EVCNB have begun outreach and training of neighborhood groups with the goal of increasing self-reported preparedness by 35% in 2017.	Progressing	Enhance emergency services and local first responders	EVCNB	CM	2017	EVCNB
High	The Nehalem Bay Community Emergency Preparedness Forum meets twice each year.	Ongoing	Improve regional coordination and communication	EVCNB	CM/PW	Not Applicable	EVCNB/City
Medium	Update flood maps using LIDAR.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	FEMA	DLCD/ DOGAMI	2017	FEMA
Medium	As hazard events occur, update NHMP and related plans.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	PW	CM/CC	2020	City
Medium	Evaluate the success of mitigation projects and activities.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	PW	CM	2022	City
Medium	Invite the public to NHMP maintenance meetings.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	CM	---	2017	City
Medium	Consider earthquake retrofit of City Hall. The City is considering whether to keep the building and retrofit it or move.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	CM	CC	2018	City/FEMA
Medium	Establish a regional cooperative GIS system for utilities and for enhancing activities and communication of response teams. Focus in areas of greatest need.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	NBCEPF	Cities of Manzanita, Nehalem, and Wheeler	2020	FEMA/City/NBWA
Medium	Continue to meet monthly with the EVCNB.	Ongoing	Improve regional coordination and communication	EVCNB	CM	Not Applicable	EVCNB

CITY OF MANZANITA MITIGATION ACTIONS							
				IMPLEMENTATION			
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
Low	Review and update Community Wildfire Protection Plan (CWPP).	Not Started	Reduce hazards to life, businesses, property, and environmental systems	NBFRD	CC	2019	NBFRD/City
Low	Implement strategies from the CWPP for wildfire safety.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	NBFRD	CC	2019	NBFRD/City
Low	Maintain the wetland at City Park for conservation and natural hazards mitigation functions in perpetuity.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	CM	---	Not Applicable	City
Low	Encourage general service organizations to become self-sustaining.	Not Started	Enhance emergency services and local first responders	EVCNB	CC	2019	EVCNB/City

Table 118. City of Nehalem Mitigation Actions

CITY OF NEHALEM MITIGATION ACTIONS							
				IMPLEMENTATION			
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
High	Provide tsunami evacuation map to short-term rental applicants.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	ACM	---	2017	City/FEMA
High	Complete mass casualty and shelter plan with EVCNB	Progressing	Enhance emergency services and local first responders	CM	---	2019	EVCNB
High	Maintain Forest Management Plan	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	CM	ACM	Not Applicable	CIty
High	Continue working with EVCNB on effective mitigation projects	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	CM	ACM/PW	Not Applicable	CIty
High	Continue to provide brochures about flood insurance.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	ACM	---	Not Applicable	CIty
High	Continue education and outreach about natural hazards to residents and tourists.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	CM	ACM	Not Applicable	CIty
High	Continue working with EVCNB to store supplies and emergency equipment	Ongoing	Enhance emergency services and local first responders	CM	PW	Not Applicable	CIty
High	Continue recruiting and training ham radio operators with EVCNB	Ongoing	Enhance emergency services and local first responders	CM	ACM/PW	Not Applicable	CIty
High	Continue purchasing yellow emergency radios for ham operators with EVCNB	Ongoing	Enhance emergency services and local first responders	CM	ACM	Not Applicable	CIty
High	Continue to encourage citizens to purchase yellow emergency radios with EVCNB	Ongoing	Enhance emergency services and local first responders	CM	ACM/PW	Not Applicable	CIty
High	Continue working with EVCNB to implement all Goal 3 mitigation actions.	Ongoing	Enhance emergency services and local first responders	CM	ACM/PW	Not Applicable	CIty
Medium	Include information about flood insurance on water bills once each year.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	ACM	---	2017	City
Medium	Complete wayfinding project.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	CM	ACM/PW	2017	CIty
Medium	Continue managing 11-acre wetland for conservation and hazard mitigation in perpetuity.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	CM	PW	Not Applicable	CIty

Table 119. City of Rockaway Beach Mitigation Actions

CITY OF ROCKAWAY BEACH MITIGATION ACTIONS							
				IMPLEMENTATION			
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
High	Build a "Public Safety Assembly Facility."	Not Started	Reduce hazards to life, businesses, property, and environmental systems	City	---	2019	City/Grants
High	Maintain a link to FEMA's flood hazard mitigation information on the City's website.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	City	---	Not Applicable	City
High	Rejuvenate CERT Team.	Not Started	Enhance emergency services and local first responders	City	CERT	2017	City/Grants
High	Continue selling Life Straws.	Ongoing	Enhance emergency services and local first responders	City	---	Not Applicable	City
High	Prepare applications for mitigation projects to be ready when funding becomes available.	Not Started	Enhance emergency services and local first responders	City	OEM/DLCD	2017	City
High	Budget for professional assistance as necessary for preparing the applications.	Not Started	Enhance emergency services and local first responders	City	---	2017	City
High	Hire an Emergency Manager for the City.	Not Started	Improve regional coordination and communication	City	---	2017	City
High	Join the Tillamook Citizens Corps Council.	Not Started	Improve regional coordination and communication	City	---	2018	City
Medium	Manage the Nature Preserve for conservation and natural hazards mitigation in perpetuity.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	City	---	Not Applicable	City/OPDR Trails Grant
Medium	Hold a full-scale citywide evacuation drill every October in conjunction with Earthquake Awareness Month or the Great Oregon Shake-Out.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	CERT	City	2017	City
Medium	Broadcast a public service announcement every fall at the beginning of flood season.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	City	DLCD	2017	City/FEMA
Medium	Publish a newsletter with flood hazard mitigation information each fall.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	City	DLCD	2107	City/FEMA
Medium	Help reorganize and re-start operation of our Emergency Volunteer Feeding Group (EVFG).	Not Started	Enhance emergency services and local first responders	EVFG	City	2018	City/EVFG/ Grants
Medium	Continue to be NIMSCAST compliant.	Ongoing	Enhance emergency services and local first responders	City	Fire Dept.	Not Applicable	City/FEMA
Medium	Continue to send key players to FEMA/ICS classes and training.	Ongoing	Enhance emergency services and local first responders	City	Fire Dept.	Not Applicable	City/FEMA
Medium	Consider purchasing emergency radios for staff and for sale to the public.	Not Started	Enhance emergency services and local first responders	City	---	2018	City/Grants
Medium	Continue to draft an Emergency Operations Plan.	Progressing	Enhance emergency services and local first responders	City	---	2022	City/FEMA
Medium	Become involve with the Tillamook County Incident Command Team.	Not Started	Improve regional coordination and communication	City	Tillamook County EM	2017	City
Medium	Consider executing the EVCNB survey or similar in Rockaway Beach.	Not Started	Improve regional coordination and communication	City	---	2018	City/Grants/ Universities

Table 120. City of Tillamook Mitigation Actions

CITY OF TILLAMOOK MITIGATION ACTIONS							
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	IMPLEMENTATION			
				Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
High	Evaluate City Capital Improvement Plan.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	City	---	2017	City
High	Extend 2010 Flood Mitigation Plan.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	City	DLCD/ FEMA	2018	DLCD/FEMA
High	Retrofit or replace school buildings to be earthquake resistant.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	TSD 9	City, OEM	2022	FEMA/OEM/TSD 9
High	Obtain generators for the school buildings to provide electricity, especially for the kitchen facilities.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	TSD 9	City, FEMA	2022	FEMA/OEM/TSD 9
High	Implement two methods for informing the public about how to be disaster-ready and self-reliant, and promote and enhance flood/hazard mitigation through education.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	City	EVCNB, OEM, DLCD, ODFR - Insurance	2017	City
High	Relocation of Water Transmission Line - In cooperation with the POTB, the City will examine the relocation of the City's main water transmission line which currently runs under the Tillamook Municipal Airport and needs to be repaired to provide a functional water source in case of disaster.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	City	POTB/ FEMA	2022	City/FEMA
High	Sewer Line Connection with the POTB (Two purposes: general health, safety, welfare of citizens and hazard mitigation to provide functional sewer to POTB in case of disaster).	Not Started	Reduce hazards to life, businesses, property, and environmental systems	City	POTB	2018	City/POTB/ FEMA
High	Construct a ground-level reservoir tank.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	City	City	2018	City/FEMA
High	Develop 3-Day Storage Reserve for Disaster Preparedness.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	City	TSD 9/ FEMA	2018	City/FEMA
High	Participate in the update of Tillamook County's Emergency Operations Plan.	Ongoing	Enhance emergency services and local first responders	City Police Dept.	Tillamook County EM	Not Applicable	City
High	Community Points of Distribution (C-PODS). Worked with Tillamook County Emergency Management to identify the Tillamook Municipal Airport as a C-POD during periods of emergency.	Ongoing	Enhance emergency services and local first responders	Tillamook County Emergency Management	POTB/ City	Not Applicable	POTB
High	Emergency Drop Location. Worked with Tillamook County Health Department to identify the Tillamook Municipal Airport as an emergency drop location site for medical supplies.	Ongoing	Enhance emergency services and local first responders	Tillamook County Health Dept.	POTB/ City	Not Applicable	POTB
High	Emergency Radio Communication System Upgrades. Acquisition of updated radio equipment to provide continued, uninterrupted intra- and interagency communication during periods of emergency in/around the airport, industrial park complex and community.	Progressing	Enhance emergency services and local first responders	Tillamook County Emergency Mgmt.	City, Port of Tillamook Bay	2017	City/POTB
Medium	Preserve Natural Areas Related to Flooding.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	City	FEMA	Not Applicable	FEMA (NFIP)
Medium	Improve Structural Projects/Buyouts.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	City	FEMA	Not Applicable	FEMA (NFIP)
Medium	Develop a post-disaster recovery plan and implementing code.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	City	OEM/DLCD	2022	City/OEM/DLCD

Table 121. City of Wheeler Mitigation Actions

CITY OF WHEELER MITIGATION ACTIONS							
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	IMPLEMENTATION			
				Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
High	DOGAMI, FEMA, and DLCD are creating new Risk Maps and Flood Maps using LIDAR. The City received the Preliminary maps, distributed as of 12/9/2106. Meetings are scheduled for April 2017 which will be followed by a 90 day appeal period.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	Wheeler	FEMA/ DLCD/ DOGAMI	2017	FEMA
High	Strengthen emergency operations through improvements to communication and coordination such as: (a) acquisition and instillation of a repeater; (b) acquisition of backup power equipment; (c) acquisition of appropriate ancillary equipment; (d) updating of emergency operations plans (as necessary).	Progressing	Enhance emergency services and local first responders	Wheeler	---	2022	Wheeler, FEMA
High	Repair Hemlock Street. Inundated by rain in disaster event DR – 4258 – OR, Hemlock St. experienced surface cracking and degradation due to stormwater surplus overflow from the adjacent drainage that undercut the roadway. The City of Wheeler has applied for and received approval for FEMA Public Assistance funding to provide 75% of the repair cost.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	Wheeler	FEMA	2017	Wheeler, FEMA
High	Adopt a Storm Water Master Plan. The City is on constant vigilance with monitoring, maintenance, and repairs in the existing stormwater drainage system as the City is situated on the east side of the Nehalem Bay and is surrounded by hillsides that extend upwards approximately 1,300 feet in elevation and include a drainage area of 4,400 acres. Many of the streets lack sufficient surface curvature or crown to direct water effectively to a suitable ditch or intake. Rainfall sheets directly down roadways in many places. In some gravel roadways, the sheeting has eroded channels on the surface itself. The City of Wheeler has a Stormwater Master Plan that was produced by HGE Inc. which included extensive field work in winter and spring of 2005 to locate and document existing culverts and other stormwater related problems and infrastructure. A detailed list of capital improvements was generated identifying and prioritizing projects. Detailed mapping was prepared to show locations of existing physical features, drainage basins, general drainage flow patterns, and storm water infrastructure. The city budgets for these improvements each year and completes the high priority projects as budget allows.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	Wheeler	EVCNB	2022	Wheeler, Grants

CITY OF WHEELER MITIGATION ACTIONS							
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	IMPLEMENTATION			
				Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
High	Replace Gervais Creek Drainage. The project is in an effort to reroute Gervais Creek (Drainage of Basin G2) under an existing city street, Rorvik St., state highway US 101, railroad right of way, and city park with an outfall into the Lower Nehalem Watershed (Proposed drainage of Basin G2). The work and location of the pipe would be located toward the center of Rorvik St. to avoid sidewalks and utilities, which reduces construction cost. This would also keep the project from having a direct impact on any existing structures. The diversion of Gervais Creek to a 36" pipe (Current Stormwater System Gervais Creek) is reported to have been completed in the early 1900's. The pipe passes under developed properties and the business core of downtown Wheeler. Documented occurrences of flooding of at least one building of the business core has been recorded for the following periods: 1982, December 1994, January 1995, 1996, November 2000, January 2001, December 2002, February 2003, December 2007, and December 2015. It should be noted that these flooding events typically cause heavy damages to a number of buildings, both commercial and residential. Gervais Creek also has the potential to flood the east part of the business core if the intake structure is obstructed or if stream flows exceed the hydraulic capacity of the 36" line. The proposed project will alleviate these hazards by mitigating storm events in meeting minimum hydraulic requirements of the system.	Not started	Reduce hazards to life, businesses, property, and environmental systems	Wheeler	EVCNB/ Tillamook County/ NBFR	2018	FEMA
High	Re-route Zimmerman Creek. Zimmerman Creek is currently routed under a residential neighborhood in Wheeler which has contributed to two separate instances of roadway failure on Hemlock St. as inventoried during disaster event DR 1672 – OR and DR – 4258 – OR.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	Wheeler	EVCNB	2022	Wheeler, FEMA
High	Participate in the Countywide Hazard Mitigation Steering Committee.	Ongoing	Improve regional coordination and communication	Wheeler	---	Not Applicable	Wheeler
High	Continue participation in an active regional Emergency Preparedness Committee.	Ongoing	Improve regional coordination and communication	Wheeler	---	Not Applicable	Wheeler
High	The City will continue to work in partnership with community resources to develop response plans for potential hazards.	Ongoing	Improve regional coordination and communication	Wheeler	---	Not Applicable	Wheeler
Medium	Establish evacuation routes above inundation zone, alternate to U.S. 101. Establish evacuation routes along the Stimson logging roads above Wheeler. Stimson is requiring that a gravel base be laid down. Estimated cost: $4,500 for gravel. Completed central Wheeler access, but maintenance is an ongoing burden due to difficulty of access for maintenance by City equipment. South Wheeler access is accessible and maintained. North Wheeler access is currently unavailable and further development needs to be addressed with Stimson logging. Ongoing access to 3rd. St. easement must be maintained as well. This access is also compromised by difficulty to access by City maintenance equipment.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	Wheeler	DOGAMI, OEM, Stimson Lumber	2020	Progressing

CITY OF WHEELER MITIGATION ACTIONS							
				IMPLEMENTATION			
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
Medium	Emergency Access Paving. Establish access along paved portions of Wheeler street inventory for emergency evacuation and emergency response staging. The City of Wheeler has received a paving grant from ODOT to provide paving to 1st St. between Hwy 101 and Hemlock for North end evacuation. The City has also received paving funding to create access, parking, and staging areas at Wheeler Upper Park as this is the designated gathering point following a natural disaster. This will allow the City to consolidate supplies and recovery efforts. Additionally the City will pave 3rd. St. between Hemlock and Cedar St. with ODOT paving funds as this will maintain the primary thoroughfare from Central to North Wheeler.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	Wheeler	ODOT/ EVCNB	2017	ODOT
Medium	Continuously develop and update relationships or partnerships to provide updates of natural hazard related data. (Example: Connie Ozawa (Planning) and Paul Manson (Sea Grant, Hatfield School PhD student in Public Affairs Program) After the Wave Survey on Tsunami Resilience Efforts.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	Wheeler	DOGAMI, PSU, OSG, etc.	Not Applicable	Wheeler, PSU. Sea Grant, others
Medium	Develop a maintenance schedule and inventory lists for city infrastructure equipment used in preparing for and addressing the effects of natural hazards. The City has a list of maintenance schedules and inventory for maintaining many of the systems within the infrastructure. These schedules are very helpful and are updated regularly. These lists include: equipment lists, repair parts, water system inventory list and master plan inventory, and stormwater master plan inventory. The City maintains these lists and continually updates them as appropriate. These lists are kept as a separate inventory from this Hazard Mitigation Plan.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	Wheeler	---	Not Applicable	Wheeler
Low	Continue to review utilization and evaluation of ordinances that reduce potential for hazards.	Progressing	Develop and implement effective mitigation initiatives, projects, and activities to reduce hazards to life, businesses, property, and environmental systems.	Wheeler	DLCD	2022	Wheeler
Low	City will continue to update the Water Master Plan as required or as necessary.	Progressing	Develop and implement effective mitigation initiatives, projects, and activities to reduce hazards to life, businesses, property, and environmental systems.	Wheeler	---	2022	Wheeler

Table 122. Port of Tillamook Bay Mitigation Actions

PORT OF TILLAMOOK BAY MITIGATION ACTIONS							
				IMPLEMENTATION			
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
High	Establish secondary ingress/egress at the industrial park.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	POTB	ODOT, FHWA, Tillamook County	2022	Road Maintenance Fees
High	City of Tillamook water transmission line relocation. In cooperation with the City of Tillamook, this project would examine the relocation of its main water transmission line which currently runs underneath the Tillamook Municipal Airport to a more viable location along POTB's outside property boundary.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	City of Tillamook	POTB/ODOT	2022	City of Tillamook/ POTB to provide/revise easements
High	Provide for needed improvements to Hangar B, a Nationally-registered structure that houses the Tillamook Air Museum and other clients.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	POTB	Oregon Heritage Commission	2022	Grants, Donations
High	Provide for multiple Tillamook Municipal Airport improvements through continued participation in the FAA's Airport Improvement Program (AIP) to maintain adequate, uninterrupted airport service to the community. One such project is the replacement of a culvert adjacent to Long Prairie Road to mitigate recurrent floodwaters from the Trask River that may impede/block travel.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	POTB	FAA/ODA	2022	FAA AIP (Revolving) Funds; Grants
High	Community Points of Distribution (C-PODS). Worked with Tillamook County Emergency Management to identify the Tillamook Municipal Airport as a C-POD during periods of emergency.	Progressing	Enhance emergency services and local first responders	Tillamook County Emergency Mgmt.	POTB/ Stake-holders	2017	Tillamook County, POTB
High	Emergency Drop Location. Worked with Tillamook County Health Department to identify the Tillamook Municipal Airport as an emergency drop location site for medical supplies.	Ongoing	Enhance emergency services and local first responders	Tillamook County Health Dept.	POTB/ Tillamook County Emergency Mgmt.	Not Applicable	Tillamook County, POTB
High	Emergency Radio Communication System Upgrades. Acquisition of updated radio equipment to provide continued, uninterrupted intra- and interagency communication during periods of emergency in/around the airport, industrial park complex and community.	Progressing	Enhance emergency services and local first responders	POTB	---	2017	POTB, other non-federal sources
High	POTB Emergency Operations Plan (Update as needed).	Ongoing	Enhance emergency services and local first responders	POTB	Stakeholders	Not Applicable	POTB
High	Update of the Tillamook Municipal Airport Response Plan. Also identifies the Airport as an emergency fuel up spot for the Coast Guard and other agencies.	Ongoing	Enhance emergency services and local first responders	POTB	FAA	Not Applicable	POTB/FAA
High	Participate in countywide Hazard Mitigation Steering Committee meetings, etc.	Ongoing	Improve regional coordination and communication.	POTB	---	Not Applicable	POTB
High	Participate in planning meetings for hazard training events.	Ongoing	Improve regional coordination and communication.	POTB	---	Not Applicable	POTB
Medium	Continue to support Tillamook County, the Port of Garibaldi and other stakeholders to obtain funding to undertake needed repairs to the South Jetty, which is located within Port's (northernmost) district boundary and is part of the primary entrance/exit to/from Tillamook Bay to the Pacific Ocean.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	Tillamook County	POTB/ Port of Garibaldi	2022	Federal Appropriations Request
Low	Cooperate with stakeholders to establish a bovine mortality disposal facility in Tillamook County.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	TCCA	POTB/ ODA/ DEQ/ Tillamook Farming Comm./ TCoDCD/ TCo Emer. Mgmt.	2022	Local, State, and Federal sources

Table 123. Port of Garibaldi Mitigation Actions

PORT OF GARIBALDI MITIGATION ACTIONS							
				IMPLEMENTATION			
PRIORITY	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
High	Continue to lobby for and support USACE funding to repair the Tillamook Bay South Jetty and push for continued support of entire jetty system.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	POG	Tillamook County/ USACE, OPPA/ PNWA	2020	USACE
High	Continue insuring boat/mooring basin and entrance channels are kept dredged and free from hazards to navigation.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	POG (Boat Basin)/ USACE (Channel)	OSMB/ DSL	Not Applicable	POG/USACE/ OSMB
High	Install break wall to protect boat/mooring basin from storm surge, excess sediment deposit, and tsunami surge.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	POG	FEMA/ OSMB, DSL, USACE, FEMA	2022	FEMA/OSMB/ EDA
High	Re-enforce mooring basin road sea wall to prevent underpinning and to stabilize mooring basin road and boat basin from collapse.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	POG	ODOT/ City of Garibaldi/ USDOT/ OSMB	2018	ODOT, USDOT
High	Continue working with local vessel owners to create network of individuals to assist in catching fish and crab to assist feeding population during post event recovery period.	Progressing	Enhance emergency services and local first responders	POG	Stake-holders	2018	EDA
Medium	Replace wooden loading pier with seismically engineered structure to serve as primary unloading platform for county disaster relief from ocean access.	Progressing	Reduce hazards to life, businesses, property, and environmental systems	POG	EDA/ Business Oregon	2022	EDA/FEMA/ Business Oregon
Medium	Continue to develop post event Port of Garibaldi restoration of operations and return of services plan.	Ongoing	Reduce hazards to life, businesses, property, and environmental systems	POG	USCG, Business Owners	Not Applicable	POG
Medium	Continue to support and coordinate with the City of Garibaldi on development of its Emergency Operations Plan.	Ongoing	Improve regional coordination and communication	City of Garibaldi	POG	Not Applicable	City of Garibaldi/POG
Low	Investigate, procure, and strategically stage equipment to help restore critical function following a disaster.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	POG	USCG, Utilities, Business Owners	2020	POG/State of Oregon/Local Governments/ NGOs/ Businesses/ Other Stakeholders
Low	Research feasibility of constructing tsunami safe structure for evacuation safety.	Not Started	Reduce hazards to life, businesses, property, and environmental systems	POG	DOGAMI, OEM, Oregon Building Codes Division	2020	POG/FEMA/ OEM

Table 124. Mitigation Action Progress

MITIGATION ACTION PROGRESS							
				IMPLEMENTATION			
JURISDICTION	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
TILLAMOOK COUNTY	Complete flood code update.	DONE	Reduce hazards to life, businesses, property, and environmental systems	DCD			Tillamook County
TILLAMOOK COUNTY	Review Geohazard code.	DONE	Reduce hazards to life, businesses, property, and environmental systems	DCD			Tillamook County
TILLAMOOK COUNTY	Amend code to incorporate standards from the brochure: Fire Resistant Plants for Home Landscapes	DONE	Reduce hazards to life, businesses, property, and environmental systems				
TILLAMOOK COUNTY	Inventory drainage assets and condition of the culverts.	DONE	Reduce hazards to life, businesses, property, and environmental systems	PW			Tillamook County/ODOT/FEMA
TILLAMOOK COUNTY	Buyout repetitive loss properties through FEMA.	DONE	Reduce hazards to life, businesses, property, and environmental systems				
TILLAMOOK COUNTY	Write a brochure: Fire Resistant Plants for Home Landscapes.	DONE	Reduce hazards to life, businesses, property, and environmental systems				
TILLAMOOK COUNTY	Practice evacuations with Manzanita and Pacific City.	DONE	Reduce hazards to life, businesses, property, and environmental systems				
TILLAMOOK COUNTY	Airborne warning and speaker system controlled by the civil air control dispatched through the Emergency Management Response System.	DONE	Enhance emergency services and local first responders				
TILLAMOOK COUNTY	Establish disaster event chain of command between county, cities, unincorporated communities and non-governmental bodies, Tillamook County Emergency Management Department, Oregon Emergency Management, and FEMA.	DONE	Enhance emergency services and local first responders				
TILLAMOOK COUNTY	Implement Emergency Volunteer Corps of Nehalem Bay (EVCNB) agreement for assistance with Nehalem Bay Regional Fire District (NBRFD).	DONE	Enhance emergency services and local first responders				
TILLAMOOK COUNTY	Train CERT volunteers in north Tillamook County and Rockaway Beach.	DONE	Enhance emergency services and local first responders				
TILLAMOOK COUNTY	Create public hazard mitigation event data entry port.	Not Being Pursued	Reduce hazards to life, businesses, property, and environmental systems				
TILLAMOOK COUNTY	Secure funding to install warning sirens countywide.	Not Being Pursued	Enhance emergency services and local first responders				
BAY CITY	Waterline borings - Remove two water lines from bridges to borings under the Kilchis River; connect the City of Tillamook water system and City of Bay City water system (Kilchis Regional water system) by a boring under the Wilson River.	DONE	Enhance emergency services and local first responders				FEMA
GARIBALDI	Refine tsunami hazard analysis with scientific data from DOGAMI.	DONE	Reduce hazards to life, businesses, property, and environmental systems				
GARIBALDI	Retrofit City Hall/Fire Department building for seismic stability.	DONE	Reduce hazards to life, businesses, property, and environmental systems				

MITIGATION ACTION PROGRESS							
				IMPLEMENTATION			
JURISDICTION	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
GARIBALDI	Analysis of jetty infrastructure and port to determine if action could better assure usability for fishing and the transport of goods to the area in the event of a disaster.	DONE	Enhance emergency services and local first responders				
MANZANITA	The City purchased generators for critical infrastructure, Nehalem Bay Fire and Rescue District, and City Hall.	DONE	Enhance emergency services and local first responders				
MANZANITA	The EVCNB surveyed the Nehalem Bay communities about individual preparedness and has a detailed analysis with an executive summary on its website.	DONE	Improve regional coordination and communication				
NEHALEM	New City Hall	DONE	Reduce hazards to life, businesses, property, and environmental systems				City
NEHALEM	Remove 11-acres wetland from development.	DONE	Reduce hazards to life, businesses, property, and environmental systems				City
NEHALEM	Participate in the CRS Program.	DONE	Reduce hazards to life, businesses, property, and environmental systems				City
NEHALEM	Provide tsunami evacuation map to beachfront property managers.	DONE	Reduce hazards to life, businesses, property, and environmental systems				City
NEHALEM	Purchase yellow emergency radios for the City.	DONE	Enhance emergency services and local first responders				City
NEHALEM	New Community Center	Not Being Pursued	Reduce hazards to life, businesses, property, and environmental systems				City
NEHALEM	New Public Works Facility	Not Being Pursued	Reduce hazards to life, businesses, property, and environmental systems				City
ROCKAWAY BEACH	Purchased a portable generator for the Water Treatment Plant in 2012.	DONE	Reduce hazards to life, businesses, property, and environmental systems				
ROCKAWAY BEACH	Installed generator disconnect switches on three wells.	DONE	Reduce hazards to life, businesses, property, and environmental systems				
ROCKAWAY BEACH	Installed a special water faucet at Pacific View Estates Reservoir in 2016 to facilitate the distribution of potable water in an emergency if the plant was operational but the water lines were damaged.	DONE	Reduce hazards to life, businesses, property, and environmental systems				
ROCKAWAY BEACH	Placed an emergency container at McMillan Creek Reservoir in 2014.	DONE	Reduce hazards to life, businesses, property, and environmental systems				
TILLAMOOK	Evaluate applicable city ordinances.	DONE	Reduce hazards to life, businesses, property, and environmental systems	City	DLCD/FEMA		
TILLAMOOK	Train individual residents to be disaster-ready and self-reliant.	DONE	Enhance emergency services and local first responders	City	DOGAMI		
TILLAMOOK	Commit to writing procedures for cooperation during storms.	DONE	Enhance emergency services and local first responders	City Police Dept.			
TILLAMOOK	Develop response plans for each hazard as part of Tillamook County's Emergency Operations Plan.	DONE	Improve regional coordination and communication	City Police Dept.			
TILLAMOOK	Develop an emergency response plan for Tillamook School District #9 (TSD 9) to transport students if a disaster event occurs while they are in school.	DONE	Improve regional coordination and communication	Tillamook School District #9			

MITIGATION ACTION PROGRESS							
				IMPLEMENTATION			
JURISDICTION	MITIGATION ACTION DESCRIPTION	PROGRESS	GOAL ADDRESSED	Leads	Supporters	Target Completion Date	Actual or Potential Funding Sources
WHEELER	Adopt Ordinance 2006-01: NIMS process for preparing for disaster	DONE	Enhance emergency services and local first responders				
WHEELER	Adopt Ordinance 2000-01: identifying succession of authority	DONE	Enhance emergency services and local first responders				
WHEELER	Repair Hemlock Street. Inundated by rain in disaster event DR – 1672-OR, Hemlock St. slid into Zimmerman Creek taking sewer, water, and stormwater utilities with it.	DONE	Reduce hazards to life, businesses, property, and environmental systems				
WHEELER	Adopt a Water Master Plan. The City of Wheeler has a Water Master Plan which was produced by Lee Engineering, and most recently was replaced by and updated plan by Pace Engineering Inc. that has helped keep the city in compliance with the Federal Safe Water Drinking Act of 1986. A major project (Redacted) was undertaken to change the source of the cities drinking water from surface water to a ground water source in partnership with the City of Manzanita. We will continue to update this master plan for future water system needs. Completed; City will continue to update this plan as required or as necessary.	DONE	Reduce hazards to life, businesses, property, and environmental systems				
WHEELER	Periodically review, evaluate, and amend or adopt as necessary ordinances that reduce potential for hazards. Ordinances, permits, and inspections for control of new construction are in place to insure that development or land alteration does not create downstream sedimentation, water quality, flooding, or drainage problems and provides for adequate drainage systems and soil protection for the site being developed, and its adjacent sites. The permit process allows for review of grading and erosion control plans and details contours of properties, including drainage areas which may affect property. Completed: review utilization and evaluation of these ordinances is ongoing.	DONE	Reduce hazards to life, businesses, property, and environmental systems				
PORT OF TILLAMOOK BAY	Provide fire suppression service upgrades at the Tillamook Municipal Airport.	DONE	Reduce hazards to life, businesses, property, and environmental systems	POTB	FEMA/ State of Oregon/ Tillamook Pilots' Assn./ Tillamook Fire Marshal		
PORT OF GARIBALDI	Completed a new $4M seismically engineered commercial wharf/pier structure.	DONE	Reduce hazards to life, businesses, property, and environmental systems	POG			
PORT OF GARIBALDI	Completed a $2M upgrade to Commercial Avenue roadway and undergrounded utilities to ensure resilience from winter storms and windstorms.	DONE	Reduce hazards to life, businesses, property, and environmental systems	POG			
PORT OF GARIBALDI	Dredged the main channel to ensure vessels can safely navigate to the boat basin.	DONE	Reduce hazards to life, businesses, property, and environmental systems	POG			

Integration

To achieve risk reduction, it is necessary to consider natural hazards mitigation in jurisdictional planning processes, from land use to infrastructure to emergency response. Every advance in mitigation reduces impact, decreasing the need for response and recovery and increasing resilience. Each jurisdiction engages in comprehensive planning and other processes (budget, capital facilities, public works and engineering, open space and recreation, environmental planning, etc.) within which mitigation can be considered and accomplished. However, it is not yet generally embedded in the context of these conversations. For most jurisdictions this will constitute a type of awareness campaign and require a change in organizational culture. The Port of Garibaldi has already successfully integrated natural hazards mitigation into its organizational culture, planning, projects, and operations. As it works closely on these issues with the City of Garibaldi, mitigation has also become an integral part of the City's considerations in its planning and operations.

Steering Committee members will be responsible for communicating the importance and necessity of integrating mitigation goals, objectives, and actions into the everyday business of the jurisdiction to those within their individual organizational structures responsible for developing and implementing the various planning and operations documents and processes. Steering Committee members will also engage in those planning and operations processes to the extent necessary and appropriate to ensure that mitigation goals, objectives, and actions are duly considered and incorporated as applicable and feasible.

DLCD has committed to assisting the jurisdictions with integration of the updated, FEMA-approved NHMP into comprehensive plans and other planning and operations processes and documents. The process for this endeavor will be determined with each participating jurisdiction after this updated NHMP is approved.

Table 125 identifies by jurisdiction the types of plans and implementing codes into which natural hazard mitigation goals, objectives, and actions may be integrated.

Tools and Assets

Beyond the planning and other processes available for integration, each jurisdiction has a variety of tools and assets available for implementing natural hazards mitigation. Many are the same or similar among the jurisdictions. A few are unique. Table 126 identifies both.

The Cities of Manzanita, Nehalem, and Wheeler are fortunate to work with the Emergency Volunteer Corps of Nehalem Bay on natural hazards mitigation and preparation activities. The Corps is a highly organized and effective organization that is well-respected far beyond the borders of Oregon. The other cities look to the activities of the Corp and the northern cities for examples of activities they can take on and partnerships they can form to enhance mitigation.

In general, the jurisdictions are small, understaffed, and dealing with difficult financial circumstances. Even so, their long experience with natural disasters elevates their individual and collective commitment to mitigation. Their mitigation strategies ground their visions aspirations, demonstrating that they will use and leverage their tools and assets as fully as possible to advance mitigation, focusing on improving communication, supporting their first responders, and reducing risk to people, businesses, property, and the environment.

Table 125. Plans and Codes for Potential Integration

	Strategic Plan	Comprehensive Plan	Capital Improvements Plan	Economic Development Plan	Emergency Response Plan	Post-Disaster Recovery Plan	Building Code	Zoning Code	Subdivision Code	Site Plan Review Code	Special Purpose Codes	Post-Disaster Recovery Code	Real Estate Disclosure Requirements	Comments
Tillamook County	X	X	X	X	X	X	X	X	X	X	X	---	X	Neskowin has real estate disclosure requirements.
Bay City	X	X	X	---	X	---	X	X	X	X	X	---	---	Enterprise zone. Continuity of Gov't plan.
Garibaldi	X	X	X	---	X	---	X	X	X	X	X	---	---	
Manzanita	X	X	X	---	X	---	X	X	X	X	X	---	---	Off-season tourism promotion plan. Working on post-disaster recovery plan – more than 5 years out.
Nehalem	X	X	---	---	X	---	X	X	X	X	X	---	---	Working forest funds capital projects. Working on post-disaster recovery plan – more than 5 years out. Only special purpose code is floodplain management.
Rockaway Beach	X	X	X	---	---	---	X	X	X	X	X	---	---	Draft ERP stalled.
Tillamook	X	X	X	---	X	---	X	X	X	X	X	---	---	CIP being updated. TSP to be updated next year.
Wheeler	X	X	X	---	X	---	X	X	X	X	X	---	---	Water/Sewer CIP. Draft TSP. Waterfront development plan. Water Operations Emergency Response Plan.
Port of Tillamook Bay	X	---	X	X	X	---	X	---	---	---	---	---	---	Subject to Tillamook County development codes.
Port of Garibaldi	X	---	X	X	X	---	X	---	---	---	---	---	---	Subject to City of Garibaldi development codes.

Table 126. Tools and Assets Supporting Mitigation

	Land Use Planner or Engineer	Public Works or Construction Engineer	Natural Hazards Planner or Engineer	Floodplain Manager	Surveyor	Vulnerability Assessment Expertise	GIS or Hazus Expertise	Scientists with local Hazards Expertise	Emergency Manager	Grant Writing Expertise	CDBG	CIP Funding	Authority to Levy Taxes	Water, Sewer, Electric, Gas** Fees	Impact Fees	General Obligation Bonds*	Special Tax Bonds*	Private Activity Bonds*	Withhold Spending in Hazard Areas	Comments
Tillamook County	X	X	---	X	X	---	X	---	X	X	X	X	X	---	X	X	X	X	---	Water, sewer, electric provided by utility districts.
Bay City	X	X	X	X	X	X	---	---	---	X	X	X	X	X	---	X	X	X	---	Expertise by contract. Water and sewer SDCs. Electric provided by utility district.
Garibaldi	X	X	X	X	X	X	---	---	X	X	X	X	X	X	---	X	X	X	---	Floodplain Manager on contract. EOP Manager, Mayor, City Manager all have Emergency Manager responsibilities. Capital improvements funded internally and through USDA, Urban Renewal Agency, OR IFA. Occasional access to other grants such as assistance to fire fighters. Water and sewer SDCs. Electric provided by utility district.
Manzanita	X	X	X	X	X	X	---	---	---	X	X	X	X	X	---	X	X	X	---	Engineer and surveyor on contract. Working on securing GIS expertise. There are a number of highly educated people, not necessarily scientists, familiar with Manzanita's hazards. CIP funded by City, USDA, and Oregon State loans. Water fees through a regional sewerage agency. Electric provided by utility district. Stormwater utility fee being considered. Park fees.
Nehalem	X	X	X	X	X	X	X	X	X	X	---	X	X	X	---	X	X	---	---	Expertise obtained through contracts funded with timber receipts. CIP funded with timber receipts. SDCs for water system. Electric provided by utility district. Private activity bonds not used for mitigation.
Rockaway Beach	X	X	X	X	X	X	X	---	---	X	---	X	X	X	X	X	X	X	---	Planner, engineers, surveyor, vulnerability assessment expert, GIS expert all on contract. City wants to hire an Emergency Manager. CIP funded internally and through USDA and ARRA funds. City levies taxes for roads and streets. Water and sewer SDCs. Electric provided by utility district. Impact fees for transportation. City has never used its authority to bond.
Tillamook	X	X	---	X	X	X	---	---	---	---	X	X	X	X	---	X	X	X	---	Contract with County for building inspection. Public Works personnel are not engineers. Surveyor on contract. CIP funded through grants. Water and sewer SDCs. Electric provided by utility district.
Wheeler	X	X	X	X	X	X	---	X	---	X	X	X	X	X	---	X	X	X	---	Most expertise on contract or through the county. Electric provided by utility district. City does not use authority for special tax or private activity bonds.
Port of Tillamook Bay	---	---	---	---	---	---	---	---	---	X	---	X	X	---	---	X	X	X	---	
Port of Garibaldi	---	X	X	---	---	X	X	---	X	X	---	X	X	---	---	X	X	X	---	

*In general, all jurisdictions can incur debt through bonds, but only with voter approval.

**No gas service in Tillamook County.

Economic Analysis of Natural Hazard Mitigation Projects

This paper was developed by the Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center. It has been reviewed and accepted by the Federal Emergency Management Agency as a means of documenting how the prioritization of actions 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.

The paper outlines three approaches for conducting economic analyses of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: The Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon Military Department – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, *Report on Costs and Benefits of Natural Hazard Mitigation*. This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating possible natural hazard mitigation activities provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce "ripple-effects" throughout the community, greatly increasing the disaster's social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

What are some Economic Analysis Approaches for Evaluating Mitigation Strategies?

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into three general categories: benefit/cost analysis, cost-effectiveness analysis and the STAPLE/E approach. The distinction between the three methods is outlined below:

Benefit/Cost Analysis

Benefit/cost analysis is a key mechanism used by the state Oregon Military Department – Office of Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Benefit/cost analysis is used in natural hazards 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. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoiding future damages, and risk. In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented. A project must have a benefit/cost ratio greater than 1 (i.e., the net benefits will exceed the net costs) to be eligible for FEMA funding.

Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

Investing in Public Sector Mitigation Activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions which involve a diverse set of beneficiaries and non-market benefits.

Investing in Private Sector Mitigation Activities

Private sector mitigation projects may occur on the basis of one or two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;
3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchases. Correcting deficiencies can be expensive and time consuming, but their existence can

prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

STAPLE/E Approach

Considering detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practical. There are some alternate approaches for conducting a quick evaluation of the proposed mitigation activities which could be used to identify those mitigation activities that merit more detailed assessment. One of those methods is the STAPLE/E approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a synthetic fashion. This set of criteria requires the committee to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLE/E) constraints and opportunities of implementing the particular mitigation item in your community. The second chapter in FEMA's How-To Guide "Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies" as well as the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process" outline some specific considerations in analyzing each aspect. The following are suggestions for how to examine each aspect of the STAPLE/E approach from the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process."

Social

Community development staff, local non-profit organizations, or a local planning board can help answer these questions.

- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

Technical

The city or county public works staff, and building department staff can help answer these questions.

- 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 community goals?

Administrative

Elected officials or the city or county administrator, can help answer these questions.

- Can the community 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

Consult the mayor, city council or city board of commissioners, city or county administrator, and local planning commissions to help answer these questions.

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

Legal

Include legal counsel, land use planners, risk managers, and city council or county planning commission members, among others, in this discussion.

- Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Are there legal side effects? Could the activity be construed as a taking?
- Is the proposed action allowed by the comprehensive plan, or must the comprehensive plan be amended to allow the proposed action?
- Will the community be liable for action or lack of action?
- Will the activity be challenged?

Economic

Community economic development staff, civil engineers, building department staff, and the assessor's office can help answer these questions.

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private?)
- How will this action affect the fiscal capability of the community?
- 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 community goals, such as capital improvements or economic development?
- What benefits will the action provide? (This can include dollar amount of damages prevented, number of homes protected, credit under the CRS, potential for funding under the HMGP or the FMA program, etc.)

Environmental

Watershed councils, environmental groups, land use planners and natural resource managers can help answer these questions.

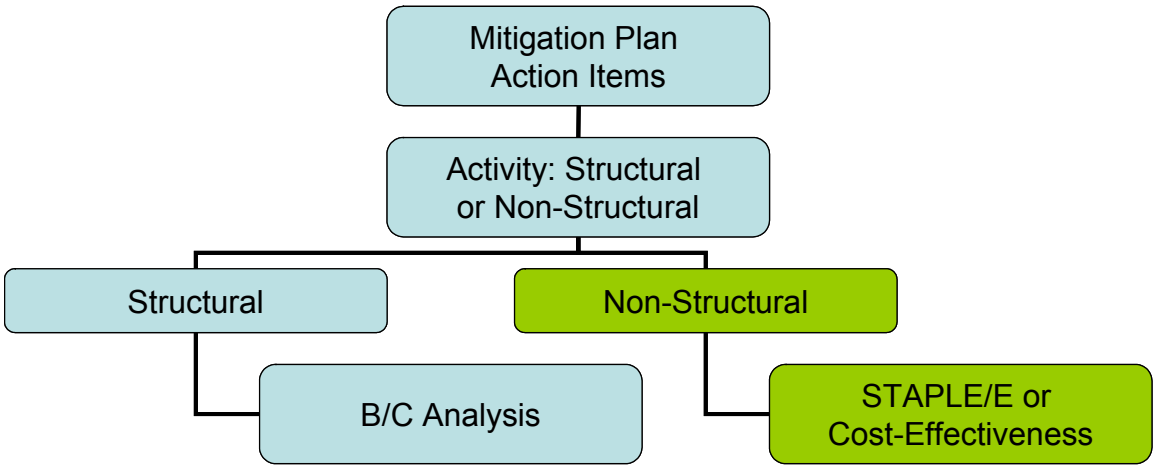
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

The STAPLE/E approach is helpful for doing a quick analysis of mitigation projects. Most projects that seek federal funding and others often require more detailed benefit/cost analyses.

When to use the Various Approaches

It is important to realize that various funding sources require different types of economic analyses. The following figure is to serve as a guideline for when to use the various approaches.

Figure 127: Economic Analysis Flowchart



Source: Oregon Partnership for Disaster Resilience. 2005.

Implementing the Approaches

Benefit/cost analysis, cost-effectiveness analysis, and the STAPLE/E are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating mitigation activities is outlined below. This framework should be used in further analyzing the feasibility of prioritized mitigation activities.

1. Identify the Activities

Activities for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation projects can assist in minimizing risk to natural hazards, but do so at varying economic costs.

2. Calculate the Costs and Benefits

Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate activities. Potential economic criteria to evaluate alternatives include:

Determine the project cost.

This may include initial project development costs, and repair and operating costs of maintaining projects over time.

Estimate the benefits

Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.

Consider costs and benefits to society and the environment.

These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.

Determine the correct discount rate.

Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

3. Analyze and Rank the Activities

Once costs and benefits have been quantified, economic analysis tools can rank the possible mitigation activities. Two methods for determining the best activities given varying costs and benefits include net present value and internal rate of return.

Net present value.

Net present value is the value of the expected future returns of an investment minus the value of the expected future cost expressed in today's dollars. If the net present value is greater than the projected costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.

Internal rate of return.

Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project. Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

Economic Returns of Natural Hazard Mitigation

The estimation of economic returns, which accrue to building or land owners as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

Additional Costs from Natural Hazards

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic

development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

Resources

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