

ROADMAP TO RESILIENCE: NATURAL HAZARDS AND CLIMATE CHANGE PORT OF BELLINGHAM



Roadmap to Resilience: Natural Hazards and Climate Change: Port of Bellingham

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Prepared for the Port of Bellingham

1801 Roeder Avenue Bellingham, WA 98225



PORT OF BELLINGHAM
Washington State

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AmeriCorps

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KEY TERMS AND ACRONYMS

APP- Accident Prevention Program

ARFF – Airport Rescue and Firefighting

AQI- Air Quality Index

BCT – Bellingham Cruise Terminal

BLI – Bellingham International Airport

BST – Bellingham Shipping Terminal

CISA – Cybersecurity and Infrastructure Security Agency

CRF- Comprehensive Recovery Framework

CoSMoS – U.S. Geological Survey’s Coastal Storm Modeling System

CSZ – Cascadia Subduction Zone

DOC- Department of Commerce

DNR – Washington Department of Natural Resources

EMD – Emergency Management Division

EPA- Environmental Protection Agency

EOP- Emergency Operations Plan

ESA – Exposure, Sensitivity and Adaptive Capacity

FAA – Federal Aviation Administration

FEMA – Federal Emergency Management Agency

GHG – Greenhouse Gases

GIS – Geographic Information System

GMA – Growth Management Act

HB – House Bill

ILA- Interlocal Agreement

JCAT – Joint Climate Action Team

MOU-Memorandum of Understanding

NPIAS – National Plan of Integrated Airport Systems

NRG – National Resilience Guidance

PGA – Peak Ground Acceleration

PGD – Permanent Ground Deformation

POB – Port of Bellingham

REP- Regional Economic Partnership

RRAP – Regional Resiliency Assessment Program

RSL – Rising Sea Levels

RSLR – Relative Sea Level Rise

SBDC- Small Business Development Center

SLR – Sea Level Rise

USCG- U.S. Coast Guard

USDOT- U.S. Department of Transportation

USGS – U.S. Geological Survey

WSDOT – Washington State Department of Transportation

WUCC – Whatcom Unified Coordination Center

WU EOC- Whatcom Unified Emergency Operations Center

WWU- Western Washington University

EXECUTIVE SUMMARY

Within the past decade, Whatcom County has experienced unprecedented heat waves, coastal storms, increased frequency of heavy precipitation, drought, more flooding events, decreased snowpack, longer wildfire seasons with more fires and smoke, among other climate change impacts.¹ These impacts are projected to become more frequent and severe.

Washington has the second-highest earthquake risk in the nation. The Cascadia Subduction Zone (CSZ), located just off Washington's Pacific coast, can generate a powerful magnitude 9+ earthquake, potentially triggering a tsunami and secondary hazards such as soil liquefaction.² Approximately 30 miles east of Bellingham lies Mount Baker, an active volcano. Eruptions from Mount Baker and Glacier Peak, found in Snohomish County, would severely impact Whatcom County. Due to its location in northwest Washington, the Port of Bellingham (the Port) is vulnerable to these climate-exacerbated and natural hazards.

Despite these vulnerabilities, the Port currently lacks a comprehensive resilience strategy in its capital infrastructure and operations planning framework. As it operates an airport, two shipping terminals, two marinas, commercial real estate, industrial lots, and public parks, the Port must be prepared to respond and adapt to natural hazards and climate change. The Port's ability to quickly resume operations after disruptions will play a crucial role in the short and long-term recovery of the local community and economy.

This document outlines a roadmap for developing a comprehensive Natural Hazards and Climate Change Resilience Strategy for the Port. It defines the Port's role in supporting regional resilience planning, highlights climate-exacerbated and natural hazards and their impacts on operations, provides recommendations to increase resilience, and identifies opportunities to enhance efforts and align with existing initiatives.

¹ Whatcom County. "Whatcom County Climate Action Plan: Summary of Observed Trends and Projected Climate Change Impacts," 2020. <https://www.whatcomcounty.us/DocumentCenter/View/53837/Whatcom-County-Climate-Science-Summary-2020>.

² Washington State Military Department, Emergency Management Division. "Tsunami Maritime Response and Mitigation Strategy - Port of Bellingham," 2021.

THE PORT OF BELLINGHAM

SPOTLIGHT

With ownership of approximately 1.4 million square feet of office, commercial, and industrial space and approximately 250 tenants holding 300 leases or other agreements, the Port plays a vital role in the region's economy.

The Port of Bellingham is a special-purpose municipal corporation that serves all of Whatcom County. By leading the Regional Economic Partnership (REP), the Port works with partners to retain and attract livable wage jobs. The Port is also responsible for managing publicly owned land, facilities, and transportation infrastructure, including seaports and airports. These responsibilities distinguish the Port from both private enterprises and other government entities.³



The Port's mission is to promote sustainable economic development, optimize transportation gateways, and manage publicly owned land and facilities for the benefit of Whatcom County. With ownership of approximately 1.4 million square feet of office, commercial, and industrial space and approximately 250 tenants holding 300 leases or other agreements, the Port plays a vital role in the region's economy.⁴ According to an analysis by the McKinley Research Group, the county's maritime industry supports an estimated 6,400 jobs, \$416 million in labor income, and \$1.6 billion in business revenues in 2023.⁵

³ Whatcom County. "2021 Natural Hazards Mitigation Plan," n.d. <https://www.whatcomcounty.us/3914/2021-Natural-Hazards-Mitigation-Plan>.

⁴ Port of Bellingham 2025 Strategic Budget.

⁵ McKinley Research Group, "Economic Impacts of Whatcom County's Maritime Industry," 2023.

Bellingham Cruise Terminal (BCT) and **Bellingham Shipping Terminal (BST)** are critical transportation hubs for moving goods and personnel. In the event of highway disruptions, they are the only critical facilities in Whatcom County capable of accommodating larger vessels and barges, ensuring continued regional connectivity.³

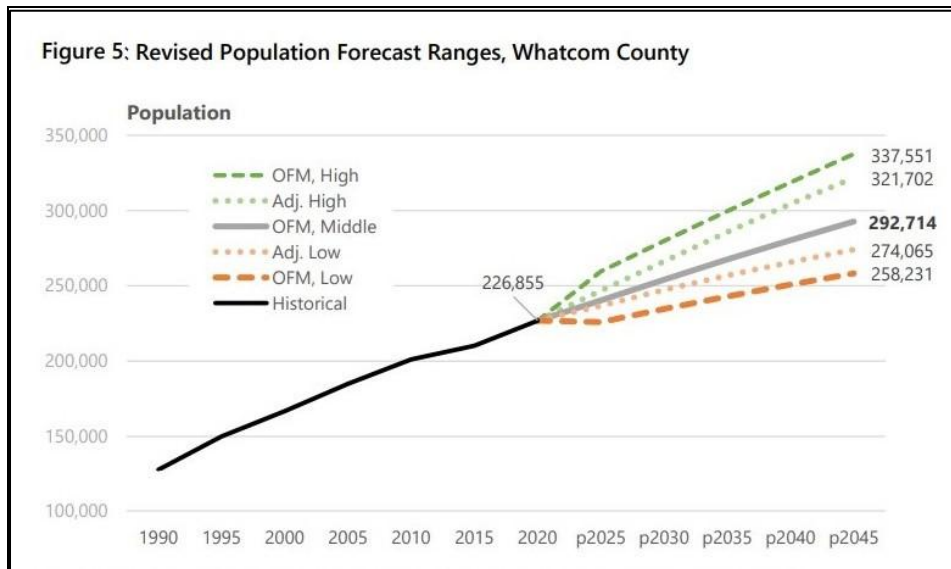


Bellingham Cruise Terminal

Fairhaven Station is a key transportation hub, offering Amtrak train service from Bellingham to Seattle/Vancouver, B.C., and Greyhound and Whatcom Transportation Authority (WTA) bus services. Given its ability to efficiently move large volumes of goods, rail transportation can play a critical role in post-disaster response and recovery efforts.



Fairhaven Station



Whatcom County Comprehensive Plan (2024); using OFM historical data and projections (2022)

The Port actively supports the working waterfront through initiatives such as offering discounted rates for marine trades and commercial fishermen, preserving marine industrial properties, revitalizing underutilized areas, recruiting new businesses, and enhancing waterfront infrastructure. **The Port's infrastructure and facilities are vital to maritime, air, and ground transportation, connecting Whatcom County to the region, North America, and the world.**

UNDERSTANDING RESILIENCE

The Cybersecurity and Infrastructure Security Agency's (CISA) Marine Transportation Systems Resilience (MTS) Guide is a comprehensive methodology to facilitate resilience assessments across the maritime domain. It offers tools for scoping and planning resilience assessments for individual ports, networks of ports, and the inland marine transportation system. The MTS Guide highlights a shift in resilience approaches, moving beyond simply "bouncing back" to pre-disruption productivity levels. Instead, **resilience should focus on "bouncing forward" by improving practices to reduce long-term vulnerability to disruptions**. In this context, a Port's resilience is defined as maintaining an acceptable level of operations with minimal service disruptions through short- and long-term environmental and human-related disturbances and stressors while enhancing its ability to adapt to future adverse events.⁶

It's important to acknowledge that **resilience has no single definition**. Most frameworks closely align with the Federal Emergency Management Agency's (FEMA) National Resilience Guidance (NRG). The NRG defines resilience as the ability to **"prepare for threats and hazards, adapt to changing conditions, and withstand and recover rapidly from adverse conditions and disruptions."** The NRG emphasizes that all levels of government play a role in enhancing resilience by integrating resilience principles into planning, adopting infrastructure standards, addressing stressors through policy, engaging communities, ensuring government continuity, and fostering cross-agency coordination. This builds trust and strong partnerships, forming the foundation of resilient communities, with future success depending on expanding collaboration among stakeholders.⁷

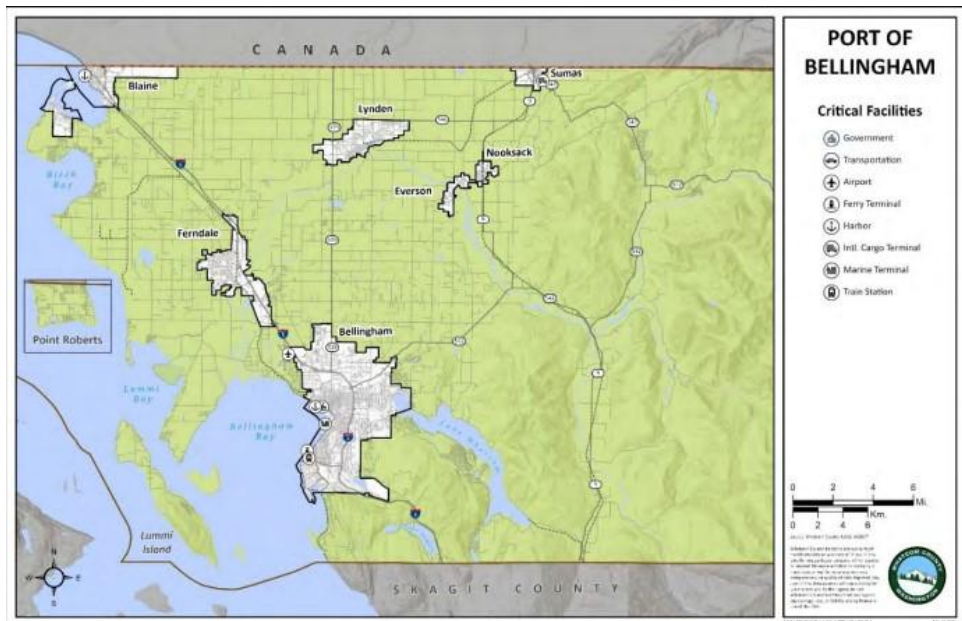
⁶ Cybersecurity and Infrastructure Security Agency. "Marine Transportation System Resilience Assessment Guide," 2023.

⁷ FEMA. "National Resilience Guidance: A Collaborative Approach to Building Resilience," 2022.

PORT-WIDE RESILIENCE STRATEGY

As climate-exacerbated and natural hazards become more frequent and intense, the responsibility for addressing these challenges will increase for local, regional, and Tribal governments.

The Port manages critical facilities, including Blaine and Squalicum harbors, Bellingham International Airport (BLI), Bellingham Shipping Terminal (BST), Bellingham Cruise Terminal (BCT), and Fairhaven Station. These assets are vital community lifelines, supporting food and agriculture, safety and security, and transportation. Damage to these resources could trigger cascading impacts across the region, particularly affecting disadvantaged communities.



Map of critical facilities identified by the Port of Bellingham³

Protecting working waterfronts preserves community and cultural identities for those whose heritage and histories are rooted in coastal waters.⁸ As climate-exacerbated and natural hazards become more frequent and intense, the responsibility for addressing these challenges will increase for local, regional, and Tribal governments. The Port has long prioritized resilience planning, including

⁸ Urban Ocean Lab. “A Path to Protect and Support Working Waterfronts,” 2024.

Over the past several decades, climate change has increased the intensity of wildfires, heatwaves, droughts, and floods across Washington.

initiating a Climate Action Strategy, Coastal Vulnerability Assessment, Master List of Potential Climate Actions, Tsunami Maritime Response and Mitigation Strategy, and updates and maintains a Comprehensive Economic Development Strategy. The Port is also part of Whatcom County's multi-jurisdictional Natural Hazards Mitigation Plan and Comprehensive Emergency Management Plan.

The Port is dedicated to providing a safe and healthy work environment for all employees. A cornerstone of this commitment is the Accident Prevention Program (APP), which was developed to engage management, supervisors, and employees in identifying and eliminating workplace hazards. Additionally, the Port has an Emergency Operations Plan (EOP), designed to ensure that the Port effectively addresses all emergencies and disasters, detailing authorities, functions, and responsibilities to establish a collaborative plan of action.

Over the past several decades, climate change has increased the intensity of wildfires, heatwaves, droughts, and floods across Washington.⁹ Scientists agree that these impacts will continue or worsen, primarily due to fossil fuel use.¹⁰ Atmospheric greenhouse gases (GHGs) have risen significantly globally, threatening the environment, human health, and climate. In Whatcom County, emissions have decreased 20% since 2017, due to reductions in industrial processes and electricity emissions.¹¹

The Port has made significant progress in mitigating and adapting to the effects of climate change. Efforts have included remediating legacy pollution, enhancing beach habitats for juvenile salmon and forage fish, improving energy efficiency, engaging the public through open houses, and reducing waste across operations. The Port

⁹ Washington State Department of Ecology. "Washington State Climate Resilience Strategy," 2024.

¹⁰ Triangle Associates. "Port of Bellingham Climate Action Strategy," 2023.

¹¹ Cascadia Consulting Group, "Greenhouse Gas Emissions Trends- Whatcom County," 2024.

Every \$1 invested in resilience measures can save \$13 in economic impacts, damage repair, and cleanup costs following a disaster.

The Port's Portal Container Village

also achieved a 78.4% reduction in GHG emissions from 2019 to 2024.¹² Building on these efforts, the Port's Coastal Vulnerability Assessment includes detailed Exposure, Sensitivity, and Adaptive Capacity (ESA) Analyses targeting sea level rise and storm surges for high-priority areas and developed a GIS-based sea level rise web viewer based on the USGS Coastal Storm Model (CoSMoS). However, further action is needed to strengthen the Port's resilience.

Investments in resilience and disaster preparedness yield substantial cost savings. According to the 2024 Climate Resiliency Report by the U.S. Department of Commerce (DOC), every \$1 invested in resilience measures can save \$13 in economic impacts, damage repair, and cleanup costs following a disaster.¹³ The cost of inaction will only rise over time, making proactive investment essential for long-term community stability and economic security.

Developing a resilience strategy aligns with the Port's 2025 Strategic Budget planning objectives, prioritizing a "Port-wide Resilience Initiative" and climate adaptation planning, while enhancing collaboration with local partners to leverage funding and resources for regional climate action initiatives and countywide resilience efforts.⁴



¹² Port of Bellingham. "Port of Bellingham Sustainability Report," 2024.

¹³ U.S. Chamber of Commerce, Allstate, and U.S. Chamber of Commerce Foundation. "The Preparedness Payoff: The Economic Benefits of Investing in Climate Resilience," 2024.

A Port-Wide Resilience Strategy focused on adaptation will strengthen the Port and the broader community's ability to withstand and respond to natural hazard and climate impacts.

As a provider of services essential to recovery efforts, the Port has a strong vested interest in minimizing the impacts of threats and hazards. As described by the County, the Port should be prepared to utilize all available port facilities, including airports, wharfs, docks, and warehouses, to support disaster-related activities, including relocating injured persons and accommodating the arrival of resources by air and/or water.¹⁴

The Port is uniquely positioned to play a critical role in regional recovery efforts. In an ever-changing ecosystem, adaptable and forward-thinking planning is essential. Implementing a Port-Wide Resilience Strategy focused on adaptation will strengthen the Port and the broader community's ability to withstand and respond to natural hazard and climate impacts.

PORT TENANTS / PROPERTY MANAGEMENT

Many of the Port's tenants operate in sectors highly susceptible to natural hazards and climate impacts. For instance, industries such as fishing and recreation may experience intensified impacts due to their reliance on natural resources and exposure to ocean acidification, extreme weather, and coastal hazards. As addressed in this roadmap, assessing the sustainability and resilience of tenant industries is vital for effective preparedness and essential for their ongoing operation and contribution to the local economy. By enhancing Port resilience, tenants will have more opportunities and support to strengthen their operational resilience.

ECONOMIC AND BUSINESS DEVELOPMENT

The Port maintains and updates its Comprehensive Economic Development Strategy (CEDS), a long-term planning document designed to guide economic development throughout Whatcom County. The Port's Economic Development Division updates the CEDS every five years to promote a more efficient, stable, and programmatic approach to

¹⁴ Whatcom County Sheriff's Office Division of Emergency Management. "Whatcom County Comprehensive Emergency Management Plan," 2022.

development, fulfill Economic Development Administration (EDA) requirements to ensure stakeholders within the County can effectively access funding sources, and create an internal work plan for the team.

As emphasized in the CEDS, regional economic prosperity requires resilience, and **Goal 6 is dedicated to supporting countywide economic resilience and recovery efforts.** Its objectives include connecting businesses with disaster tools and experts, advocating for local government assistance in disaster recovery and climate resilience preparation, and securing relief and recovery funding for businesses, communities, and households while ensuring resilient redevelopment efforts. Additionally, it encompasses supporting partners and businesses in accurately documenting disaster-related business losses, as well as promoting and backing public and private partner initiatives related to resilience, mitigation, and climate change in the context of economic and business development. Furthermore, it aims to participate in and support regional partner economic recovery efforts from disasters.

As part of the 2022-2026 CEDS planning and community engagement efforts, the Economic Development Division conducted several Strengths, Weaknesses, Opportunities, and Threats (SWOT) analyses with internal and external stakeholders. SWOT analyses are commonly used as strategic planning tools and are a required component of a CEDS under EDA guidelines.¹⁵

The Port's SWOT analysis identified key opportunities, such as the need for environmental cleanup and improvements to make waterfront properties suitable for development, and for upgrades and resilience efforts at Squalicum Harbor. **The regional SWOT also identified disasters as a threat, including windstorms, floods, sea-level rise, fires, earthquakes, and tsunamis.**¹⁵ The 2027-2031 CEDS update will begin in Fall 2025, incorporating SWOT revisions. These insights emphasize the importance of integrating resilience and adaptation into the Port's strategic planning.

¹⁵ Port of Bellingham, Whatcom County, and Regional Economic Partnership. "Whatcom County Comprehensive Economic Development Strategy," 2019.

LEGISLATION AND POLICY GUIDANCE

According to FEMA's National Resilience Guidance (NRG), policies play a vital role in building resilience by allocating resources, granting authority for specific preparation and recovery actions, and communicating organizational or community priorities. The NRG encourages collaborative teams to adopt a systems-thinking approach to address unintended consequences and ensure consistency across policy actions. This partnership-driven approach aligns goals and enhances resilience-building efficiency.⁷

The Washington State Climate Commitment Act (CCA), enacted in 2021, aims to reduce greenhouse gas emissions from Washington's largest sources. This cap-and-invest program requires polluters to pay for emissions that exceed a designated limit, supporting Washington's goal of achieving a 95% reduction in greenhouse gas emissions by 2050. Additionally, the CCA provides funding to specific strategies in the 2024 Washington State Climate Resilience Strategy, which outlines Washington's climate resilience approach and provides actionable strategies.¹⁶

The Washington Climate Partnership is a statewide collaborative effort to develop near- and long-term strategies to meet Washington's climate goals for 2030 and beyond. As part of the Climate Pollution Reduction Grant (CPRG) program and funded by the federal government through the Inflation Reduction Act of 2022, state, local, and Tribal governments have been supported in reducing greenhouse gas emissions and air pollution. Coordination with other CPRG recipients ensures that climate action plans are aligned. With the support of state funding, the Washington Department of Commerce and the Department of Ecology are co-developing Washington's statewide Priority Climate Action Plan (PCAP) and Comprehensive Climate Action Plan (CCAP).¹⁷

FEMA encourages hazard mitigation planning to raise risk awareness, prioritize risk-reduction actions, and allocate resources efficiently. Natural hazard mitigation plans (NHMPs) typically identify hazards impacting a jurisdiction, assess vulnerabilities, and outline strategies to lessen disaster impacts. Whatcom County updates its NHMP every five years to evaluate evolving hazards, reassess mitigation strategies, and maintain FEMA eligibility. This allows the County and its partners to access federal funding for mitigation and pre-disaster projects, which help reduce disaster impacts. The current plan, approved by FEMA in 2021, includes a section specific to the Port.³

¹⁶ Washington State Department of Ecology. "Climate Commitment Act," n.d. <https://ecology.wa.gov/air-climate/climate-commitment-act>.

¹⁷ "Washington Climate Partnership," n.d. <https://waclimatepartnership.org/en/about/>.

The Port is physically located wholly in Whatcom County, and partially in the City of Bellingham and the City of Blaine. These close ties to various jurisdictions mean that the Port is subject to numerous planning requirements and maintains relationships with various divisions of local government. Whatcom County is one of 18 counties required to conduct comprehensive planning under the Growth Management Act (GMA). In 2023, the GMA was amended through HB 1181 to add a climate change and resilience goal, along with a mandatory climate element with a resilience sub-element. This sub-element must include goals and policies that enhance climate preparedness, response, and recovery while equitably improving resilience and minimizing climate impacts on human communities and ecosystems. It must also align with the best available science and use credible climate projections and impact scenarios.¹⁸

The City of Bellingham's Climate Action Plan outlines strategies to meet its greenhouse gas emissions reduction goals in energy efficiency and conservation, renewable energy, transportation, green building, waste reduction, and land use. To comply with HB 1181 requirements, the City of Bellingham must incorporate a climate element into its comprehensive plan and enhance the existing framework by adding any necessary climate resilience goals and policies. "Climate" will become a stand-alone chapter, while climate-related goals and policies will remain integrated throughout all chapters.

In developing its resilience strategy, the Port should incorporate relevant Federal, State, County, and City policy guidance where feasible, aligning its planning efforts with those of partner agencies. Prioritizing resilience in comprehensive plans will help the Port address climate change and natural hazards while fostering coordination across jurisdictions. A comprehensive strategy should ensure alignment with Whatcom County's planning requirements and reflect the Port's commitment to proactive climate adaptation and preparedness.

¹⁸ House Committee on Local Government. "House Bill Report, HB 1181," 2023.

GUIDING PRINCIPLES

This section presents the draft **proposed guiding principles and expectations for the Port's resilience strategy**. These principles were developed based on feedback gathered from Port staff in an internal planning questionnaire developed for the Roadmap to a Climate Action Plan.¹⁹

1. The resilience strategy will support the Port's mission to promote sustainable economic development, optimize transportation gateways, and manage publicly owned land and facilities to benefit Whatcom County.
2. The resilience strategy will build on information previously developed for the Port and will reflect the knowledge of staff and partners regarding natural hazards and climate impacts.
3. The resilience strategy will reflect the best available data and science relevant to the Port.
4. The resilience strategy will provide clear, transparent project information to increase stakeholder awareness and prepare for climate change and natural hazard impacts.
5. Outcomes of the resilience strategy should be achievable and support the Port's identity as a local economic driver.

SCOPE OF THE RESILIENCE STRATEGY

The **Port's resilience strategy** will **prioritize practical, achievable goals and actionable strategies**, focusing on capital and natural infrastructure within the Port's direct control and consistent with regional resilience goals. The strategy will outline specific actions for the next five years, while also establishing broader targets for the long-term future.

Designed to be adaptive, the resilience strategy will evolve and be integrated into existing policy and planning frameworks to ensure longevity.

Key elements of the resilience strategy's scope include:

- **Strengthening the Port's Resilience and Recovery Role:** The resilience strategy will be developed to reinforce the Port's role as a regional economic driver and as a leader in providing services critical to recovery efforts in the face of natural hazards and climate impacts.

¹⁹ ECONorthwest. "Roadmap to a Climate Action Plan Port of Bellingham," 2019.

- **Five-Year Actionable Goals & Strategies:** Specific, short-term goals and strategies will be set for a five-year period, ensuring clear and measurable progress.
- **Aspirational Long-Term Targets:** In addition to near-term actions, the Plan will set ambitious, long-term targets for building the Port's resilience.
- **Vulnerability Assessments:** Detailed vulnerability assessments will evaluate the Port's infrastructure to natural hazard and climate risks, informing future capital investment priorities to enhance resilience.
- **Adaptation Strategies:** Strategies will address preparedness, coastal resilience, and adaptation in planning and capital projects. The strategy will also explore opportunities to extend these strategies to include stakeholder collaboration.

The Port can utilize the Environmental Protection Agency's (EPA) **Regional Resilience Toolkit** as a guide for building large-scale resilience to natural disasters.²⁰ Closely following FEMA's Local Mitigation Planning Handbook, the Regional Resilience Toolkit includes five steps and expected outcomes to build resilience:

- 1. Engage stakeholders** by building a Stakeholder Map including the project team, advisory group, leadership and decision makers, interest groups, and the broader community. Develop an Engagement and Outreach Plan which identifies goals, target audiences, key messages, tools for outreach, strategies for outreach, and an implementation plan.
- 2. Assess vulnerability** by conducting vulnerability assessments to prioritize hazards, hazard scenarios with a corresponding exposure analysis.
- 3. Identify and prioritize strategies** by drafting a list of feasible, impactful strategies that include stakeholder buy-in and their corresponding implementation plans spanning between 5-20 years.
- 4. Develop a comprehensive resilience finance strategy**, including self-funding, public-private partnerships, philanthropic opportunities, regional funds, and grants.
- 5. Construct a timeline for tracking, evaluating, and reporting metrics**, ensuring metrics are designed to support a living document.

²⁰ U.S. Environmental Protection Agency and Federal Emergency Management Agency, "Regional Resilience Toolkit," 2019.

CLIMATE-EXACERBATED HAZARDS



COASTAL FLOODING & SEA LEVEL RISE



FLOODING



WILDFIRES & SMOKE



SEVERE WEATHER

COASTAL FLOODING & SEA LEVEL RISE

All Port facilities on Bellingham Bay and Blaine Harbor are subject to coastal flooding risk, with increasing risk associated with sea level rise.³

High-Risk Flood Areas

- Squalicum Parkway Industrial Area
- Bellingham Shipping Terminal
- Marine Trades Area Near the I & J Waterway
- Fairhaven Marine Industrial Park

(These include parking areas, offices, businesses, boatyards, recreational facilities, railways, roads, and utility systems)

Coastal flooding occurs when saltwater inundates land that is typically above water, posing threats to life and property and potentially impacting unprotected low-lying communities and infrastructure. Coastal flooding often occurs during high tides when storm surge or wave run-up amplifies water levels and can persist through successive high tides if storm conditions continue. In Washington, coastal flooding is more prevalent during winter, particularly during King Tide season, when tides are highest.²¹



King tide at Blaine Harbor wave wall, December 2022

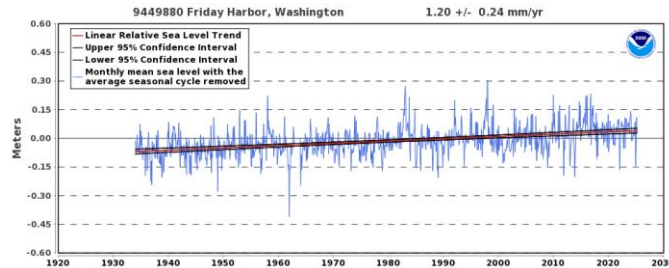
Global **sea level rise** (SLR), primarily driven by climate change, results from thermal expansion as oceans warm and ice sheets and glaciers melt. SLR increases the risk of coastal flooding and can worsen other hazards such as coastal erosion, landslides, and inland flooding, which includes riverine, stormwater, and groundwater flooding. Historically, global mean sea level has risen approximately 3 millimeters (mm) per year since the mid-1980s, and this rate is projected to accelerate with ongoing climate change.¹⁰

²¹ Northwest Seaport Alliance, Port of Seattle, and Port of Tacoma. “Resilient Gateway Vulnerability Assessment and Response Framework Summary,” 2023.

Bellingham's shoreline is projected to experience a rise of up to one meter in relative sea level rise (RSLR) by 2083–2119, with a 17% chance of a 0.9-foot increase and a 1% chance of a 1.4-foot increase by 2050. When combined with storm surges, this creates a significant flooding risk for nearly all Port facilities.²³

King Tide scenarios for Squilicum Parkway, potential flooding impacts of rising sea levels and increasing storm intensity.²³

Localized changes, called relative sea level rise (RSLR), reflect variations influenced by vertical land movement (subsidence or uplift) and shifts in regional ocean currents.¹⁰ **The RSLR trend in Friday Harbor, Washington, is approximately 1.2 mm per year, based on monthly mean sea level data from 1934 to 2024, equivalent to a change of 0.39 feet in 100 years.**²²



RSLR trend in Friday Harbor, National Oceanic and Atmospheric Administration (NOAA)

Port properties were overlaid with outputs from the U.S. Geological Survey's (USGS) Coastal Storm Modeling System (CoSMoS), which integrates global, regional, and local-scale numerical models to find areas of the Port vulnerable to flooding under many scenarios. An Exposure, Sensitivity, and Adaptive Capacity (ESA) analysis assessed the vulnerability of Port assets, focusing on the Central Maintenance Facility and surrounding areas. The analysis found that **52% of**



evaluated assets, including fuel tanks and equipment, had a “High” vulnerability rating, indicating they are likely to be frequently and more immediately impacted by 10, 50, and 100-year storm events.²³

²² National Oceanic and Atmospheric Administration. “Relative Sea Level Trend 9449880 Friday Harbor, Washington.” Tides and Currents, n.d. https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=9449880.

²³ EA Engineering, Science, and Technology, Inc. “Port of Bellingham Coastal Vulnerability Assessment,” 2023

FLOODING

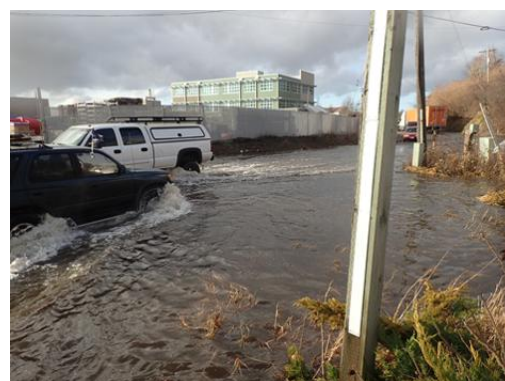
Flooding occurs when land that is typically above water becomes inundated. It is the most common and costly natural disaster in the United States and is often linked to meteorological events. Typically, flooding is caused by heavy precipitation or snowmelt, and in Western Washington, it is most frequent during the wet winter months when large rainstorms occur.²¹



Squalicum Way flooded, November 2021

In any given year, in Washington, there is more than an 80% chance that 10 or more floods will occur.²⁴ Climate change is expected to increase the frequency and intensity of heavy precipitation events, further elevating the risk of flooding. By the 2080s, under a high-emissions scenario, intense precipitation events west of the Cascades could increase by 22% and occur more frequently, with an additional five days of heavy rainfall per year.¹ SLR is anticipated to hinder the drainage capacity of Port facilities, exacerbating flooding from precipitation events. This combination of SLR and heavy rainfall, known as compound flooding, presents a significant risk to Port facilities, especially those susceptible to frequent or permanent inundation. These facilities could face heightened vulnerability to corrosion due to increased ocean acidification and more frequent saltwater intrusion.¹⁰

In any given year, in Washington, there is more than an 80% chance that 10 or more floods will occur.



Roeder Avenue flooded, November 2021

²⁴ "Floods & floodplain planning," n.d. <https://ecology.wa.gov/water-shorelines/shoreline-coastal-management/hazards/floods-floodplain-planning>.

In November 2021, back-to-back **atmospheric rivers struck the Pacific Northwest**, bringing record rainfall and hurricane-force winds. **Bellingham saw 2.8 inches of rain in 24 hours, 300% above the previous record. The Nooksack River crested at nearly 24 feet**, causing widespread flooding. Schools and portions of I-5 were closed, and residents in Sumas required rescue. Former governor Jay Inslee declared a severe weather state of emergency in 14 counties.²⁵ Overall, with more than **300 businesses** reporting **physical or economic damage**, the floods caused approximately \$45,000,000 in impacts to local businesses.²⁶



Nooksack River flooding, November 2021. NASA Earth Observatory



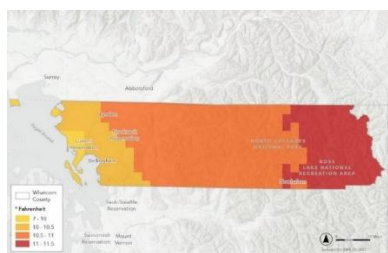
North Fork Road after being washed away by the Nooksack River. December 2021, Bellingham Herald

²⁵ Washington State Military Department and Emergency Management Division. "Washington State Enhanced Hazard Mitigation Plan," 2023.

²⁶ Whatcom County, "Flood Recovery Information," n.d., <https://www.whatcomcounty.us/3827/Flood-Recovery-Information>.

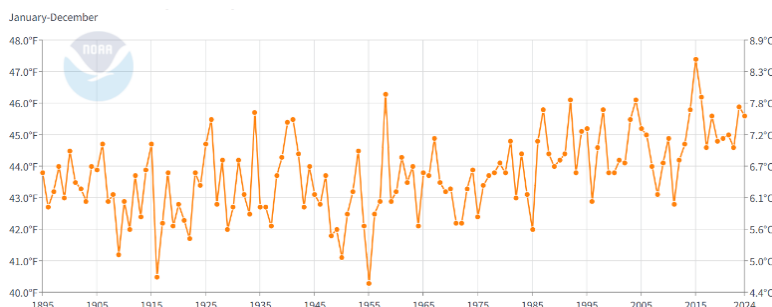
SEVERE WEATHER

The 2021 Heat Dome, from June 26 to July 2, brought record temperatures to Whatcom County, ranging from **96°F in Blaine** to **107°F in Sumas**.



Whatcom County summer temperature projections by 2100, data CIG 2023.²⁸

Severe weather events are extreme meteorological phenomena that can create hazardous conditions. Projections indicate that average annual precipitation in the region is expected to increase by 4% to 5% by the 2050s, depending on whether low- or high-emissions scenarios occur, compared to the 1970-1999 baseline.¹ This shift is expected to result in wetter conditions during spring, fall, and winter, while summers are projected to become drier and warmer, with a potential 50% reduction in precipitation by the 2050s under a high-emissions scenario.¹⁰



Whatcom County, WA Average Temperature. NOAA

The average temperature in Whatcom County has risen by 1.9°F over the last century and is projected to increase at a faster rate in the future.²⁷ By the 2050s, average summer temperatures are projected to rise 6.6°F above the 1980–2009 baseline of 68°F, increasing by 11°F by 2100, with higher increases in eastern Whatcom County.²⁸ The 2021 Heat Dome, from June 26 to July 2, brought record temperatures to the County, ranging from 96°F in Blaine to 107°F in Sumas.²⁸

²⁷ NOAA National Centers for Environmental Information. “Climate at a Glance: County Time Series,” 2024. <https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/county/time-series/WA-073/tavg/ytd/12/1895-2025>.

²⁸ “Whatcom County is Building Resilience Against Smoke and Heat.” Whatcom County Health & Community Services, n.d. <https://storymaps.arcgis.com/stories/d49b0b0b88e34519be977ffd0ca650d7>.

Intense storms and increased wind speeds may disrupt transportation and shipping services and jeopardize infrastructure.



A lightning strike caused a 5-acre wildfire along the east side of Lake Whatcom. August 2023, Bellingham Herald



Northbound lanes of I-5 in Bellingham blocked by debris after heavy rains. October 2024, WSDOT

Climate change is also expected to contribute to coastal and inland flooding, with a higher frequency of storms with strong winds. These intense storms and increased wind speeds may disrupt transportation and shipping services and jeopardize infrastructure.²³

As global temperatures rise, sea levels increase, and atmospheric energy intensifies, the frequency of high-intensity coastal storm events is expected to grow. What was once a rare occurrence could become more frequent as the climate changes. For example, as storm frequency rises, events previously categorized as 1% annual exceedance probability storms (100-year storms) may begin to occur more regularly.¹⁰

WILDFIRES & SMOKE

In western Washington, rising temperatures, reduced summer precipitation, and earlier snowmelt are expected to create drier fuel conditions during the summer months, significantly increasing the risk of **wildland fires**. For western Washington specifically, the number of “very high fire danger days” is projected to increase from 36 days (recorded between 1971 and 2000) to 48 days by the 2050s.²⁹ Additionally, the Pacific Northwest is anticipated to see more than a threefold increase in the average area burned annually by the 2040s compared to the period between 1916 and 2006.¹⁰ Climate change is expected to further intensify wildfire risk by altering temperature, humidity, soil moisture, and vegetation.

As wildfire activity intensifies in the region, air quality in Whatcom County is expected to worsen, particularly during summer and early fall, which could disrupt Port operations. Wildfire smoke and related impacts may result in flight cancellations or delays and closures on key freight corridors, posing significant challenges to cargo operations.²¹ Rising temperatures and ozone pollution will exacerbate these challenges.



Wildfire risk primarily impacts **Bellingham International Airport**, where mitigation includes buffers between airport infrastructure and nearby forests.

Smokey Skies, Port of Bellingham, August 2018

²⁹ Northwest Climate Adaptation Science Center and University of Washington Climate Impacts Group. “Managing Western Washington Wildfire Risk in a Changing Climate,” 2019.

Over the past decade, wildfire smoke from fires in eastern Washington, Idaho, Montana, and British Columbia has led to prolonged poor air quality, with "Very Unhealthy" levels during the 2020 and 2022 wildfire seasons. By the mid-to-late century, wildfires are projected to increase, especially in eastern Whatcom County near the North Cascades National Park, with surrounding counties such as Okanogan, Chelan, and Douglas seeing even greater wildfire activity.²⁸

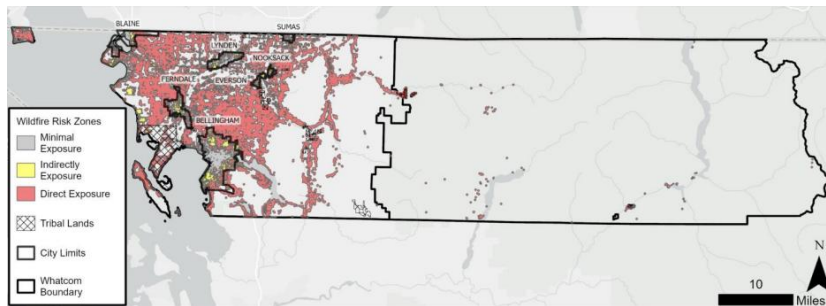


Figure 21 of Climate Hazards and Impacts in Whatcom County, WA. Wildfire risk zones in Whatcom County. Direct exposure is symbolized in red, indirect exposure is yellow, and areas of minimal exposure are depicted in grey.³⁰

In 2024, the Port updated its Accident Prevention Program (APP) to include a wildfire smoke safety program, which dictates the L&I requirements and Air Quality Index (AQI) for wildfire and smoke protection for staff who work outdoors.



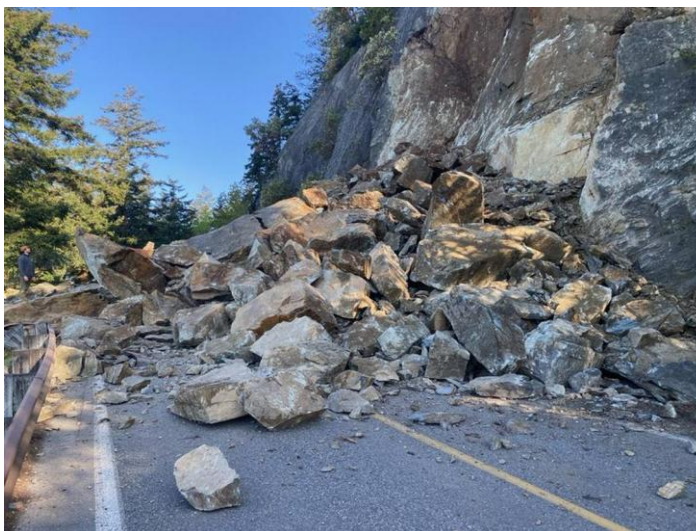
Smoky skies from regional wildfires over the Port's digester tanks, August 2021, Bellingham Herald

12.3% of the Port faces wildfire risk with **low** severity for community impacts.³

LANDSLIDES & EROSION

Landslides pose a major risk to railways during a CSZ earthquake, as they frequently occur along the Seattle-Everett rail corridor under normal conditions.³¹

Landslides involve the downslope movement of earthen materials and are commonly triggered by heavy precipitation, earthquakes, water level changes, or human activities. Landslides can also cause secondary hazards, including flooding and tsunamis.



Rockslide on Chuckanut Drive in Skagit County, April 2025 WSDOT

Compared to counties nationwide, **Whatcom County ranks in the 96th percentile for landslide risk.** This emphasizes the region's heightened landslide vulnerability. Across the Puget Sound region, more frequent and intense heavy rain events, a higher frequency of wildfires, and decreasing snowpack are all expected to increase landslides and sediment transport rates.³⁰

³⁰ Whatcom County and Cascadia Consulting Group. "Climate Hazards and Impacts in Whatcom County, WA," 2025.

Shoreline erosion mitigation was required at Fairhaven Station following winter storm-induced coastal flooding in 2015-2016.³



Erosion at Marine Park, 2018

Erosion occurs when water, wind, or ice loosens surface materials on hillslopes and shorelines. Unlike landslides, which result directly from gravitational forces (and saturated conditions, earthquakes, etc.), severe erosion can gradually destabilize slopes, potentially leading to slope failures.²¹

Landslides and erosion are frequent occurrences in Washington due to the state's mountainous terrain, coastal bluffs, river valleys, and shorelines, making them high-probability hazards for Port operations.²¹ Port property is located next to the historic coastal bluff, which is susceptible to failure. At Squalicum and Blaine Harbors, the Port's primary erosion hazards are the breakwater structures, which are vulnerable to seismically induced landslides.³



Three cars trapped in a mudslide along Interstate 5, south of Bellingham. November 2021, Washington State Patrol

Landslides, debris flows, and rockfalls can also be triggered by earthquakes. In Washington, these failures frequently occur along state highways even under normal conditions and are addressed by the Washington State Department of Transportation (WSDOT) as part of regular

highway operations and maintenance. However, a major earthquake could lead to a significant increase in slope failures.³¹

Relative Sea Level Rise (RSLR) and shifting weather patterns are expected to impact coastal erosion and sedimentation, posing risks to Port infrastructure and shipping channels. Increased precipitation and coastal watershed development may further elevate sediment flow into Bellingham Bay and Puget Sound, intensifying sedimentation-related impacts²³, such as infrastructure damage, decreased navigability, degraded water quality, among others.

³¹ U.S. Department of Homeland Security's Cybersecurity Infrastructure Security Agency and Washington Emergency Management Division. "Resiliency Assessment Washington State Transportation Systems," 2019.

NATURAL HAZARDS



EARTHQUAKES



TSUNAMIS



VOLCANIC ACTIVITY



LIQUEFACTION

EARTHQUAKES

Washington has the second-highest earthquake risk in the U.S.² The Cascadia Subduction Zone (CSZ) is a 1,000-kilometer fault off the Pacific Northwest coast where the Juan de Fuca and North American plates meet, extending from central Vancouver Island to northern California. The CSZ has the potential to produce Magnitude 9.0 (M9.0) earthquakes that could impact vast areas of the Pacific Northwest and would likely generate a significant tsunami.²¹

A M9.0 CSZ earthquake will have a broad regional impact, stretching over 700 miles from British Columbia to Northern California. The shaking duration during an earthquake of this magnitude is estimated to last between 2 and 6 minutes, significantly increasing the likelihood of structural damage or failure. These impacts are expected to severely disrupt regional transportation systems.

Direct seismic forces, ground failure, and tsunami flooding are predicted to cause extensive damage to roadways, rail networks, and port and airport facilities. Many of these systems are likely to be rendered inoperable immediately after an earthquake and may sustain further damage from strong aftershocks typical of subduction-zone events. In Washington, nearly 76% of evaluated bridges are expected to sustain some level of damage, with over 32% (670 bridges), including those along the I-5 freeway leading to Bellingham, projected to experience significant damage due to inadequate seismic design.³¹

Extensive damage to western Washington's transportation infrastructure will significantly impair regional mobility and supply chain operations, creating immense pressure on government and private sector

Subduction Zone Earthquakes

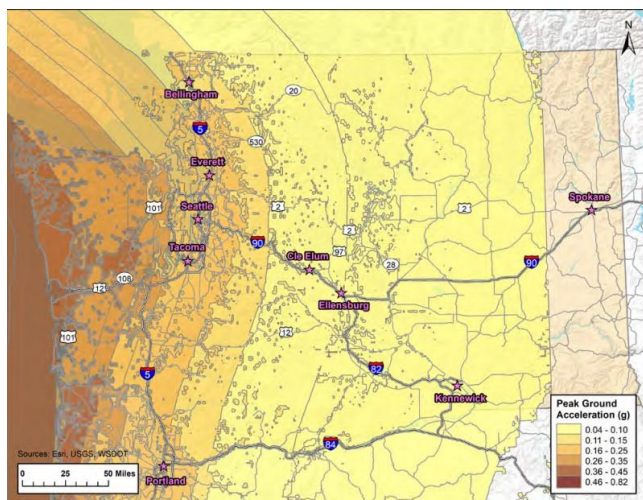
Also known as **megathrust earthquakes**, occur where an oceanic plate moves beneath a continental plate. These plate boundaries can accumulate immense stress, producing the world's most powerful quakes, like that of a M 9.0 from the CSZ, and trigger large tsunamis.²¹

Shallow Fault Earthquakes

Originate closer to the Earth's surface and can generate up to M7.5 earthquakes, causing intense shaking in a concentrated area. Their proximity to the surface makes them more destructive than deeper quakes of similar magnitude, such as the M6.8 Nisqually earthquake in 2001. They can also trigger dangerous tsunami waves.²¹

responses to deliver essential commodities and relief supplies to sustain disaster survivors.³¹ A key finding of Washington EMD's Resiliency Assessment is that commercial ports lack a clear understanding of their facilities' seismic vulnerabilities and have not evaluated their seismic resilience. These gaps hinder the inclusion of commercial maritime transportation infrastructure in regional earthquake response plans.³¹

A CSZ earthquake could severely damage water supply systems across western Washington. Aside from emergency supplies, the Department of Homeland Security estimates that 1.2 million people may lack potable water for several months to years; others will experience interruptions in their water supply for weeks or months. Infrastructure damage, grid outages, and impaired transportation systems will create a “black sky” event, or a catastrophic event that severely disrupts the normal functioning of critical infrastructure systems in multiple regions for long durations. The event will be further complicated by communication failures that hinder response and recovery.³²



1.2 million people may lack potable water for several months to years; others will experience interruptions in their water supply for weeks or months. Infrastructure damage, grid outages, and impaired transportation systems will create a “black sky” event.

³² Cybersecurity and Infrastructure Security Agency, “Resiliency Assessment Northwest Washington Water RRAP Project,” 2022.

³³ Washington State Department of Natural Resources, “Modeling a Magnitude 6.8 Earthquake on the Boulder Creek Fault Zone in Whatcom County,” 2013.

³⁴ Washington State Department of Natural Resources. “Modeling a Magnitude 7.1 Earthquake on the Darrington–Devils Mountain Fault Zone in Skagit County,” 2014.

Much of Washington’s port infrastructure predates modern seismic design standards, leaving its earthquake performance uncertain. Many docks and waterfront structures rely on aging wood piles, which deteriorate over time and are difficult to replace because of permitting delays, further compromising seismic resilience.³¹ The location of critical Port facilities on seismically sensitive soils and coastal fill makes these community-wide transportation infrastructure assets vulnerable to earthquake hazards.³ There are three active Holocene faults: Sandy Point, Birch Bay, and Drayton Harbor, all within the Bellingham Basin near the U.S.-Canadian border. These faults can generate M6.0–6.5 earthquakes, posing a seismic hazard to the urban corridor between Vancouver, Canada, and Bellingham.³⁵

Given its depth, Puget Sound’s main navigation channels are unlikely to be affected by CSZ earthquake impacts and obstructions, except for floating debris. Water-side impacts will likely be limited to coastal and submarine landslides and soil liquefaction, all occurring at shoreline locations. This relatively minor level of impact on the waterway could enable Puget Sound, the Strait of Juan de Fuca, and the Pacific Ocean to serve as conduits for emergency supplies and resources via maritime transportation. However, while the waterway may remain in serviceable condition, the state of shore-side maritime transportation infrastructure, maritime vessels, and intermodal connections will be affected by both direct and indirect seismic impacts.³¹

Notable Local Fault Lines

The **Boulder Creek fault** in Maple Falls could produce a M6.8 earthquake, causing extensive damage to 77 buildings in Skagit and Whatcom counties, and causing up to \$85 million in capital losses in Whatcom County.³³

The **Darrington–Devils Mountain fault** zone (DDMFZ) could produce a M7.1 earthquake with capital stock losses in Whatcom totaling about \$46.5 million.³⁴

Deep Fault Earthquakes

Occur where tectonic plates collide and one is forced beneath the other, typically at depths of tens to hundreds of miles. While their shaking is less intense at the surface, the energy can spread over a wider area. Deep earthquakes rarely generate tsunamis directly but may trigger them if they cause landslides near water.²¹

³⁵ Harvey M. Kelsey et al., “Active Faulting in the Bellingham Forearc Basin: North-south Shortening at the Northern End of the Cascadia Subduction Zone,” 2012.



The 2001 Nisqually Earthquake, an M 6.8 earthquake originating approximately 30 miles below Olympia in the subducting Juan de Fuca plate. This earthquake caused upwards of \$4 billion in damage, and about 400 injuries.³⁶

After simulating the effects of a major CSZ earthquake, ranging from 7.7 to 9.2 in magnitude, scientists found that a strong tremor could cause the ground to sink between 1.6 and 6.6 feet and dramatically change the region's floodplain, increasing the flood risk to local communities.³⁷

86.4% of the Port faces earthquake risk with **high** severity for community impacts.³

Scientists predict that there is about a **37% chance** that a megathrust earthquake of 7.1+ magnitude in the CSZ **will occur in the next 50 years** and be felt throughout the Pacific Northwest.³⁸

³⁶ Washington Military Department, "Remembering the anniversary of the Nisqually Earthquake," 2023, <https://mil.wa.gov/news/remembering-the-anniversary-of-the-nisqually-earthquake>.

³⁷ Tina Dura et al., "Increased flood exposure in the Pacific Northwest following earthquake-driven subsidence and sea-level rise," *Proceedings of the National Academy of Sciences*, 2025.

³⁸ Oregon Department of Emergency Management, "Cascadia Subduction Zone," n.d., <https://www.oregon.gov/oem/hazardsprep/pages/cascadia-subduction-zone.aspx>.

TSUMAMIS

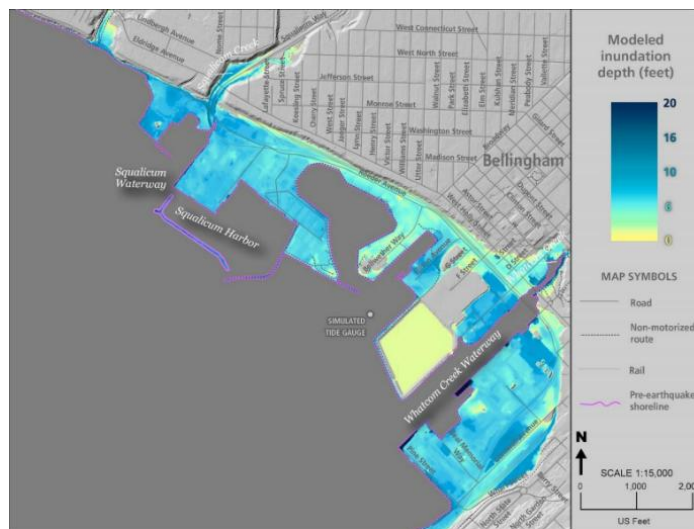
M9.0 CSZ Earthquake-Generated Local Tsunami

Squalicum Harbor, BST, and surrounding areas, would be inundated with water depths ranging from 1 to over 16 feet. BCT and nearby docks could experience flow depths exceeding 16 feet, while flooding up to Harris Avenue may surpass 10 feet.²

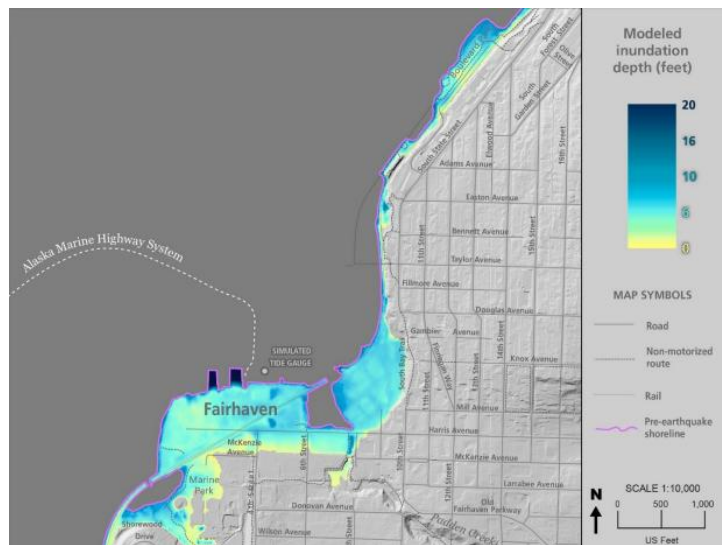
M9.24 Distant Source Tsunami from an Alaska-Aleutian Megathrust Earthquake

Squalicum Harbor, BST, and nearby areas would be inundated with water depths ranging from 1 to over 6 feet in some areas. BCT may see flooding exceeding 10 feet, with areas up to Harris Avenue at risk of over a foot of water.²

Washington Military Department's Emergency Management Division's Tsunami Team led the development of the Port's Tsunami Maritime Response and Mitigation Strategy. This strategy outlined tsunami response and mitigation actions for Port facilities around Bellingham Bay, addressing local and distant source risks, response guidance, alert levels, and natural warning signs.



Modeled inundation depth from a tsunami generated by the CSZ in Bellingham and Fairhaven.²



Soil liquefaction may worsen the effects of tsunami inundation through subsidence. This subsidence can increase the effective depth of tsunami inundation in affected areas.³¹

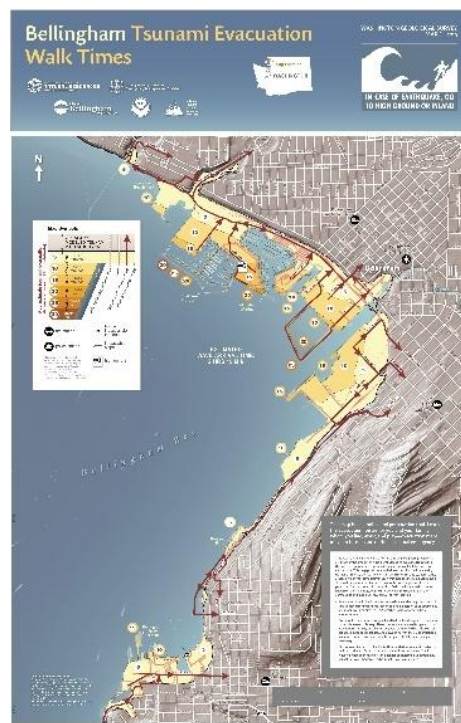


Tsunami Siren at Bellingham Cruise Terminal (BCT)

Tsunami Sirens – All Hazards Alert Broadcast (AHAB) warning sirens were installed at Squalicum and Blaine Harbors in 2017, with an additional siren added near Bellingham Cruise Terminal in Fairhaven in 2020.

A local CSZ earthquake-generated tsunami can create **waves exceeding 60 feet that could hit the Pacific coast of Washington within just 15 to 20 minutes** after the earth starts to shake. The tsunami, which consists of a series of waves, will strike the outer coast and then travel into the Strait of Juan de Fuca and inner coastal waters. This series of waves will affect the coastal areas of the Salish Sea within a few hours of the earthquake's onset and can last for over 12 hours.²

A locally generated tsunami could devastate Port infrastructure, destroy numerous vessels, and result in a high number of casualties within the inundation zone. This destruction could render the Port non-operational for an extended period, causing substantial economic loss for the surrounding region. While a tsunami from a distant source presents a lower probability, it still has the potential to cause widespread damage to the Port's infrastructure, including docks, and could destroy or damage many vessels in the harbors.



Evacuation Walk Map for Bellingham and Fairhaven areas, WA DNR

VOLCANIC ACTIVITY

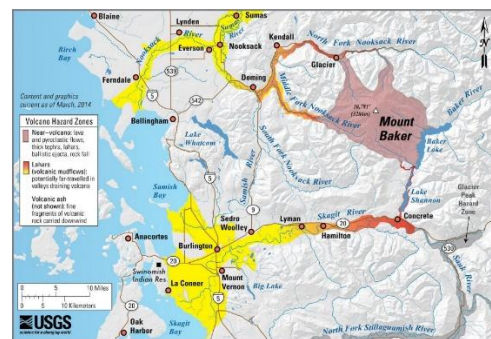
Volcanoes in Washington pose significant threats due to their explosivity, frequency, and proximity to populated areas and critical infrastructure. **Mount Baker and Glacier Peak rank 14th and 15th in the nation for overall threat.** Eruptions from Mount Baker, located in central Whatcom County, and Glacier Peak, found in Snohomish County, would severely impact Whatcom County. Both volcanoes have erupted in the past and are likely to do so again. Mount Baker presents a major threat because of its location and regional topography, with potential lahars, pyroclastic flows, lava, and ash affecting large areas. Glacier Peak could also produce ash fall that significantly impacts Whatcom County.³



Washington Volcanoes threat categories, ESRI, USGS

Lahars are mudflows that form when water from melted snow and ice mixes with volcanic ash and rock, occurring with little warning and even without an eruption. Lahars are a major concern at Mount Baker due to its history of frequent events, the ability of lahar flows to travel tens of miles, and the threat they pose to two reservoirs, Baker Lake and Lake Shannon, on the volcano's east side.³⁹

33.9% of Port areas are at risk of volcano impacts with **low** levels of severity for community impacts.



Potential impact area for ground-based hazards during a volcanic event at Mount Baker, USGS

Lahars can occur suddenly and without an eruption, making understanding their potential effects essential. Given the Port's proximity to the Nooksack Delta, Port operations would likely be significantly impacted due to debris in Bellingham Bay as a secondary impact from lahars or volcanic eruptions.

³⁹ Scott, Kevin M., Wes Hildreth, and Cynthia A. Gardner. "Mount Baker—Living with an Active Volcano." U.S. Geological Survey, 2000.

LIQUEFACTION

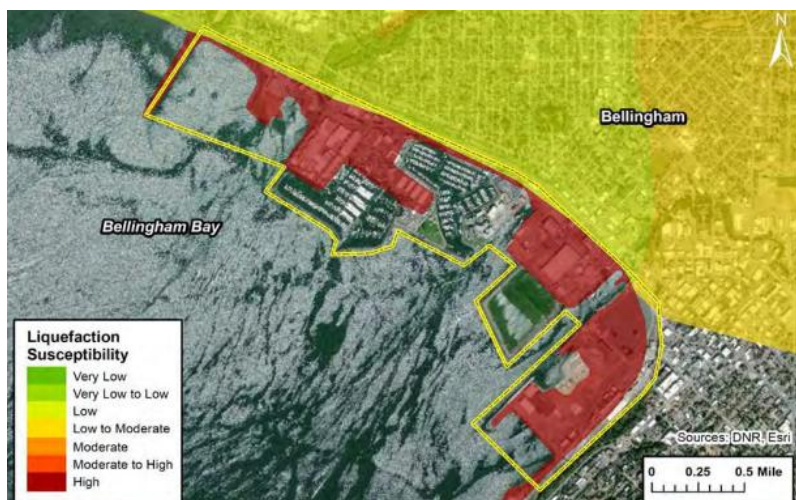
Nearly 100% of the Port's shoreside infrastructure and 25.5% of Port areas are at risk of liquefaction impacts, with high severity for community impacts (depending on the intensity of seismic activity).³

WA EMD's Resiliency Assessment categorizes liquefaction exposure across most of the Port's property to be **high**, with only limited areas classified as **low** or **low-to-moderate** risk.

Soil liquefaction happens when water-saturated soils act like a liquid during seismic shaking, leading to a loss of structural support, soil flows, and uneven ground settlement. It commonly occurs in alluvial soils, loose sand, and silty soils in river valleys and deltas.

Liquefaction can also occur in filled tidelands, which is where much of the Port is located.

Seismic-induced soil liquefaction leads to **permanent ground deformation (PGD)**, resulting in vertical and lateral soil displacement. This can significantly disrupt transportation systems, causing highways to experience bridge foundation failures, sunken or shifted roadbeds, cracked pavements, and collapsed slopes or retaining walls. Rail infrastructure may suffer from shifted or buckled tracks, rail yard settlement, and rail bridge failures. Ports and maritime infrastructure are susceptible to differential settlement, submarine landslides that affect navigation channels, and seawall failures that impede port operations.³¹



POB Liquefaction Susceptibility, Resiliency Assessment Washington State Transportation Systems

Imported fill materials placed in historic tidelands, former waterways, or river deltas to create buildable land are **highly** susceptible to liquefaction.

Many ports, including Bellingham, are constructed using imported fill materials placed in former waterways or river deltas to create buildable land. These materials are highly susceptible to liquefaction. Rail lines, yards, and bridges face seismic risks due to soil liquefaction and ground motion. Structures built on fill placed in historic tidelands may experience seawall failures, leading to soil displacement, significant ground deformation, and disruptions to waterway navigation.³¹

In Washington, approximately 80% of the state's 7,000+ miles of highways are built on soils prone to liquefaction, with 23% on soils classified as having moderate-to-high or high susceptibility. Furthermore, nearly 40% of bridges are anticipated to sustain significant liquefaction damage in the event of a CSZ scenario earthquake.

According to the USCG, Puget Sound's average depth of 450 feet makes major disruptions from liquefaction or submarine landslides unlikely. However, areas near docks and shore structures could experience partial or complete infill. This risk increases if port seawalls or earth retention structures fail, causing liquefiable soil or fill materials to spill into the waterway.³¹

CURRENT NATURAL HAZARD AND CLIMATE CHANGE INITIATIVES

This roadmap builds upon existing plans created internally and strategies developed by the City of Bellingham, Whatcom County, Washington Emergency Management Division, among others. These documents provide valuable insights into hazard vulnerabilities, emergency response, climate action, and related areas. Below is a list of related documents that contributed to developing this roadmap.

Roadmap to a Climate Action Plan

This report outlines a roadmap for creating the Port's Climate Action Plan, aimed at mitigating its climate impact and adapting to climate change. It provides context, background, and guidance on the process, scope, and key decisions to improve the Port's resilience.

Port of Bellingham Climate Action Strategy

The Climate Action Strategy sets clear targets to reduce the Port's emissions and strengthen resilience to protect its assets. Addressing vulnerabilities from climate change impacts such as shifting weather patterns, flooding, coastal erosion, wildfires, extreme temperatures, and ocean acidification. Informed by Whatcom County's climate action plan, the strategy outlines recommendations to mitigate these risks and details 10 goals with 35 strategies to achieve them. **Key resilience-building goals include:**

- Embedding and prioritizing climate resilience across all Port divisions, operations, and investments.
- Increasing the resilience of Port infrastructure to withstand changing climate conditions.
- Supporting a sustainable and climate-resilient local economy.
- Protecting and enhancing the health of Port employees, tenants, and facility users amid climate change impacts.

Port of Bellingham Coastal Vulnerability Assessment

The Vulnerability Assessment identifies the Port's most at-risk properties and develops adaptation strategies to address future sea level rise (SLR), storms, and river flooding. As an initial step, the assessment provides detailed maps and data on flood extents and vulnerabilities due to SLR and storm events. These insights will help the Port prioritize projects to enhance resilience through site-specific mitigation or adaptation strategies while identifying potential data gaps for further analysis.

Port of Bellingham Tsunami Maritime Response and Mitigation Strategy

This strategy outlines tsunami response and mitigation actions for the Port's facilities around Bellingham Bay, including guidance for small craft and commercial fishing vessels. It covers tsunami risks from local and distant sources, response guidance, alert levels, and natural warning signs. Recommended actions include evacuating to high ground and restricting access to the inundation zone. Site-specific mitigation measures to enhance resilience include strengthening cleats and moorings, installing tsunami signs, and raising dock piles. The strategy also includes response checklists, harbor information, and graphics, all specific to the Port.

Port of Bellingham Master List of Potential Climate Actions

The Master List of Potential Climate Actions outlines a wide variety of potential actions for the Port to integrate into budgets and work plans to support goals and targets identified in the Climate Action Strategy. **Key targets include:**

- **Mitigation:** Reduce Port-controlled GHG emissions by at least 90% from 2019 levels by 2030 and 100% by 2050.
- **Resilience:** Enhance preparedness and response to climate impacts through regional collaboration and Port-wide resilience efforts.

Port of Bellingham Airport Master Plan Update

The BLI Master Plan update reviews, revises, and reprioritizes development options to ensure BLI continues to support the regional economy and transportation system while meeting demand and considering environmental and feasibility criteria. BLI's environmental goals focus on maximizing land and building potential, minimizing environmental impact on surrounding areas, and balancing development with community and environmental needs. The Plan recognizes that considering environmental factors in planning processes helps identify areas where development might cause environmental impacts, which could affect implementation.

Whatcom County Natural Hazards Mitigation Plan

The 2021 update of the Port's section of Whatcom County's Natural Hazards Mitigation Plan involved the Port's Emergency Management, Environmental and Planning Services, Engineering, and Facilities/Maintenance teams reviewing mitigation actions and evaluating future actions based on updated hazard risk information. The plan outlines major hazards in Whatcom County (earthquake, liquefaction, landslide, tsunami, volcano, flooding, and wildfire) and provides a percentage of the Port's exposure, categorizes the severity of impacts on basic community function, and the services most significantly impacted. It also ranks critical facilities by their exposure to hazards. The update provided the status of the Port's 2016 Mitigation Plan actions and identifies Mitigation Actions for 2021-2025 for each hazard. The plan will be updated in 2026 in collaboration with Whatcom County to meet the requirements of the 2025 FEMA Natural Hazard Mitigation Plan administrative guidance.

The plan identifies **five mitigation goals**:

- Protect Life, Property, and Public Welfare
- Increase Public Awareness
- Preserve and Enhance Natural Systems
- Encourage Partnership for Implementation
- Ensure Continuity of Emergency Services

Whatcom County CEDS 2022-2026

The 2022–2026 Comprehensive Economic Development Strategy (CEDS) serves as a countywide economic development plan shaped through collaboration with a diverse range of stakeholders. Contributors included higher education institutions, business and workforce advisory groups, the seven incorporated cities, Tribal representatives, local chambers of commerce, municipalities, and regional service providers, among others. In the 2027-2031 updates, the CEDS will address economic resilience. It will be important to incorporate specific projects that highlight the actions the Port is taking, or planning to take, to enhance resilience.

Whatcom County Compound Flood Vulnerability Assessment

This assessment identifies coastal and lower Nooksack River areas of Whatcom County as most vulnerable to sea-level rise and changing rainfall patterns. Potential adaptation strategies are identified to reduce the County's vulnerability, along with an action plan including recommended tools, policies, and funding to support implementation. Whatcom County completed the second phase of the analysis, the Future Shorelines analysis, in June 2025.

The Northwest Seaport Alliance Resilient Gateway

The Resilient Gateway, developed by the Northwest Seaport Alliance, includes a Vulnerability Assessment and Response Framework to guide policy and strategic decision-making and provides a framework for an Implementation Plan. The Vulnerability Assessment evaluates exposure to eight major hazards including coastal flooding, riverine and urban flooding, severe weather, wildfires, landslides, earthquakes, tsunamis, and volcanic activity for the Northwest region. The Response Framework outlines preparedness, mitigation, and adaptation strategies for the Ports of Seattle and Tacoma. The program addresses risks both on-terminal and across the gateway, ensuring resiliency goals translate into project design, prioritization, and asset management.

Washington Emergency Management's Resiliency Assessment

The Washington State Transportation Systems project evaluated the resilience of the state's surface transportation systems to a CSZ earthquake and their ability to support post-disaster response and recovery. The Regional Resiliency Assessment Program (RRAP) project prioritized highway routes likely to reopen quickly, ensuring emergency supply chains between Incident Support Bases (ISBs) in central/eastern Washington and Federal Staging Areas (FSAs) in western Washington. The project also evaluated the earthquake hazard exposure of Washington's maritime and rail transportation systems and summarized insights from extensive stakeholder engagement across transportation sectors.

Key findings include the identification of seismically resilient highway routes and the lack of seismic vulnerability assessments for ports, limiting their integration into regional earthquake response plans. In contrast, Washington State Ferries (WSF) has made significant progress in seismic analysis and retrofitting. The report concludes with recommendations to enhance the seismic resilience of Washington's surface transportation systems to support more effective disaster response and recovery following a major CSZ earthquake in the region.

Upcoming projects to monitor: WSDOT is in the process of developing a Coastal Transportation Vulnerability & Planning Study, I-5 Corridor Vulnerability Assessment, and Transportation Resilience Improvement Plan that may inform Port resilience planning.

Washington State Climate Resilience Strategy

Washington's climate resilience strategy outlines eight state agency-led strategies to prepare communities, infrastructure, and natural lands for climate impacts such as reduced water availability and drought, marine and coastal changes, flooding, extreme heat, wildfire and smoke. These strategies prioritize urgent needs, align with Tribal and local governments, and guide state agency actions to enhance climate resilience. This strategy will be updated every four years to adapt to meet new challenges and emerging needs.

FEMA's National Resilience Guidance

The National Resilience Guidance (NRG) provides a national vision for resilience, outlining key principles, stakeholders, and strategies to strengthen resilience across communities and organizations. It offers guidance on organizing efforts, integrating resilience into planning, shaping policies, prioritizing projects, securing funding, and measuring progress.

The Resilience Maturity Model illustrates how communities evolve in their resilience approach. While disasters often drive action, resilience requires collective, cross-sector efforts beyond emergency management. The NRG is a high-level, flexible framework designed to accommodate diverse community needs. Recognizing that resilience varies by community, it offers adaptable approaches and strategies for individuals, organizations, and governments. It provides a broad, inclusive overview of resilience.

RESILIENCE STRATEGIES AND POTENTIAL ACTIONS

LEARNING FROM OTHERS: CLIMATE AND HAZARD STRATEGIES ACROSS JURISDICTIONS

This section highlights best practices and key lessons from disruptions to other jurisdictions, including the nature of the events, their causes and impacts, and responses. The Port can leverage these case studies to gain valuable insights, enhance resilience planning, and implement informed adaptation measures.

Case Study: Vancouver International Airport, situated on Sea Island in southwestern British Columbia, is at risk of flooding and erosion from the Fraser River and coastal processes of the Strait of Georgia. The island, which is below the 200-year flood level return period, is protected by a 15-kilometer-long system of dikes, incidental bank protection works, pump stations, and floodboxes. To prevent lowland flooding from rainfall, an extensive drainage system channels water from roads and airside areas into ditches.⁴⁰ The Sea Island Climate Resilience Project will raise the existing perimeter dikes by approximately one meter (a total height of 4.7 meters) to improve overall drainage and geotechnical stability.⁴¹

Case Study: The Port of Alaska's Modernization Program has completed engineering the Petroleum and Cement Terminal to withstand a 1,000-year seismic event (i.e., an earthquake that has a 0.1 percent chance of occurring in any given year). The previous terminal's pilings showed signs of serious erosion and were further damaged in a 2018 earthquake. The new terminal is a pile-supported dock including 123 precast concrete units and 2,903 cubic yards of concrete.⁴²

Case Study: The Port of Everett's Waterfront Place was built to support climate change initiatives and address SLR by raising overall site elevations, including bulkhead segments, by about 3 feet. Additionally, the elevation of the Riverside Business Park was raised by 3 to 5 feet, effectively removing it from the floodplain, and the elevations of stormwater and

⁴⁰ Vancouver International Airport, "2023 Climate Change Resilience Report,"

⁴¹ Vancouver International Airport, "Sea Island Climate Resilience Project," 2024, <https://news.yvr.ca/sea-island-climate-resilience-project>.

⁴² "Port of Alaska Makes Major Modern Move," Civil+ Structural Engineer Media, 2022, <https://cseengineermag.com/port-of-alaska-makes-major-modern-move/>.

other utilities were increased to accommodate SLR.⁴³ As noted in the WA EMD's Resiliency Assessment, the Port of Everett indicated that most piles on which its commercial port is constructed extend through the liquefiable soil layers into the underlying glacial till soil. Although further study is necessary, this could mitigate the impacts of soil liquefaction in the overlying soil layers.³¹

Case Study: The City of Bainbridge Island's Flotilla Team provides essential support to the community during emergencies, ensuring critical connections and assistance when traditional access points may be disrupted. The team comprises volunteer recreational and commercial vessels, captains, and crew members trained by emergency professionals to transport supplies, responders, and patients, while also contributing to environmental monitoring. Volunteers are insured, registered with the State, and eligible for fuel reimbursement during activations and City-sponsored training sessions. The team's local expertise and capability to safely navigate waterways, beaches, and ports create alternative routes for supply delivery.⁴⁴

Case Study: The City of Bainbridge Island has upgraded its maritime infrastructure at the City Dock to address sea level rise, incorporating improvements that also help reduce potential tsunami damage. The dock renovation included the installation of electrical systems that automatically shut off power when stray currents or faulty wiring are detected.⁴⁵

Case Study: The Port of Olympia adheres to international and local building codes for new constructions and remodels, designing projects to withstand major earthquakes with minimal damage. During the 2001 M6.8 Nisqually earthquake, the Marine Terminal sustained no damage to its berths and only minor damage to the warehouse, ensuring full operational readiness. The Cascade Pole sediment containment cells are engineered to endure a 100–200-year earthquake, with shoreline berms constructed for 300–400-year events. As part of the ongoing Cascade Pole Site cleanup, the Port has either raised or is planning to raise approximately 1,110 feet of shoreline on the northeastern Port Peninsula by 3 to 5 feet.⁴⁶

Case Study: The Port of Portland conducted a seismic risk assessment of key assets to evaluate their performance under various earthquake scenarios, identify potential resilience improvements, and compare the benefits of those upgrades to their

⁴³ Port of Everett, "Environmental Stewardship & Sustainability Report 2020,"

⁴⁴ "Flotilla," Bainbridge Prepares, n.d., <https://www.bainbridgeprepares.org/flotilla>.

⁴⁵ Washington Military Department. "A New Tsunami Strategy Launched for Bainbridge Island," n.d. <https://mil.wa.gov/news/a-new-tsunami-strategy-launched-for-bainbridge-island>.

⁴⁶ Port of Olympia, "Environment," n.d., <https://portolympia.com/about-us/environment/>.

implementation costs. The study aimed to clarify the vulnerability of Port facilities and the economic value of seismic mitigation efforts.⁴⁷

Case Study: The Port of San Diego partnered with EConcrete Tech Ltd. on a pilot project to demonstrate an innovative, eco-friendly approach to shoreline protection. The project aimed to enhance structural resilience while supporting native marine habitats by using bio-enhancing concrete that mimics natural rock pools. This collaboration integrated engineering needs with ecological restoration to promote biodiversity and stabilize the shoreline.⁴⁸

Case Study: In response to Hurricane Katrina, the City of New Orleans developed a Comprehensive Recovery Framework (CRF) that establishes structures for organized disaster management for local government and its partners. The CRF provides an optimal organizational structure for recovery decision-making, information flow, communications, and service delivery. It includes desired outcomes, goals, and metrics organized by Recovery Support Function (RSF) and a continuous improvement framework for reviewing and updating recovery policies, plans, and procedures, along with initial improvement actions to take in the short-to-medium term.⁴⁹

Case Study: The Port Authority (PA) of New York and New Jersey implemented Climate Resilience Design Guidelines to incorporate climate change projections, such as sea level rise, into PA engineering and architectural design standards. These guidelines aim to increase long-term safety, service, and resilience of PA assets. In addition, the PA developed a “Flood Product Library” to support design teams in efficiently identifying possible flood resilience solutions.⁵⁰

⁴⁷ HNTB Corporation, “Port of Portland Corporate Seismic Risk Assessment Study,” 2015.

⁴⁸ Gutiérrez et al., “Eco-Engineering Solution for Nature-Based Shoreline Protection at the Port of San Diego (USA).”

⁴⁹ New Orleans Office of Homeland Security and Emergency Preparedness, “City Of New Orleans Comprehensive Recovery Framework,” 2022.

⁵⁰ Port Authority of New York and New Jersey, “Climate Resilience.”

RECOMMENDED ACTIONS

This list is intended to address natural and climate-exacerbated hazards, guide short- and long-term resilience efforts, and incorporate resilience guidelines into all planning processes, including capital improvement planning and future project developments. These recommendations were compiled following meetings with Port staff and stakeholders and include alignment with the Port’s Master List of Potential Climate Actions. Many of these **recommendations are currently underway or to be incorporated into a future Port-wide resilience strategy**. As conditions evolve and uncertainties become clearer, these recommendations may need to be adapted to maintain effectiveness.

1. Restore and Develop Waterfront Areas and Reinforce Infrastructure

In 2025, the Port completed two project proposals seeking funding from the Northwest Clean Air Agency (NWCAA) that were not approved. One project involved design and construction of a solar-plus-storage BESS system for Whatcom County’s emergency operations center, the Whatcom Unified Coordination Center (WUCC).⁵¹ This project would provide reliable backup power, improve generator redundancy, and reduce baseline fuel consumption and energy costs, ensuring continuous operations while stabilizing the grid’s power supply. The other project focused on converting Bellingham Shipping Terminal’s (BST) diesel-powered Liebherr LHM 420 mobile harbor crane to hybrid-electric power to create a cleaner, quieter terminal while reducing industrial pollution.⁵²

- a. Identify funding sources to finalize the WUCC’s solar-plus-storage system and BST crane hybrid-electric power upgrades, and other energy resilience projects.
- b. Assess the BESS feasibility study for potential replication at other Port facilities to improve disaster response and community safety.
- c. Adapt current infrastructure to endure natural hazards or move essential capital facilities at highest risk, as identified by the Vulnerability Assessment and the NHMP.

⁵¹ Port of Bellingham, “Solar Plus Storage for the Whatcom Unified Command Center Proposal,” 2025.

⁵² Port of Bellingham, “Bellingham Shipping Terminal Crane Electrification Proposal,” 2025.

- d. Strengthen or relocate Port infrastructure in areas identified by the Tsunami Maritime Response and Mitigation Strategy to better withstand tsunami hazards.
- e. When modifying existing infrastructure or developing new projects, prioritize nature-based solutions where feasible, and promote the removal of hard armoring to support natural shoreline resilience. Depending on site conditions, different strategies may be appropriate, and, in some cases, a hybrid approach may offer the most effective solution.

2. Strengthen Relationships with Regional Partners and Enhance Emergency Coordination

The Port has an Emergency Management Council Interlocal Agreement (ILA) with Whatcom County and is part of the County's Comprehensive Emergency Management Plan. However, these agreements could be strengthened and made more specific in detailing the roles of each party during emergencies.

- a. Seek additional agreements to further clarify the Port's role in enhancing community resilience, integrating with regional emergency plans, and coordinating with other jurisdictions during crises. The agreement(s) should specify the use of Port assets, including Bellingham International Airport (BLI) and Bellingham Shipping Terminal (BST), in disaster response scenarios. These could include mutual aid agreements, memorandums of understanding (MOU), or other formal partnerships, while ensuring alignment with existing County and state emergency response frameworks and with Action 10.3.6 from the Port's Master List of Potential Climate Actions.

3. Increase Hazard Education, Communication, Coordination and Risk Awareness

A survey was conducted by WWU students to coordinate resilience planning across all departments and assess Port employees' knowledge of disaster and resilience plans. The survey revealed that many employees perceive a lack of communication both within departments and between the Port and its tenants. Enhancing communication within Port divisions is essential to ensure effective responses to natural disasters and other emergency events. Furthermore, better communication between Port departments and

tenants would create opportunities for collaboration on potential solutions to address gaps in disaster preparedness plans.

Improving Interdepartmental Communication and Coordination:

- a. Continue to hold regular Port-wide Resilience Meetings with Emergency Management, Environmental Planning, Economic Development, and Real Estate divisions to coordinate efforts and share updates.
- b. Consider conducting periodic internal and external stakeholder engagement conversations to share evolving concerns, insights, and ideas for enhancing resilience, and identify strengths in current industry best practices.
- c. Develop a Port-wide resilience statement that incorporates staff feedback from all departments, fosters buy-in, and ensures personnel are informed and aligned with long-term resilience goals.
- d. Review and revise the Port's Emergency Operations Plan (EOP), which was last updated in 2019, every two years. Updates should clearly define roles for each division, include current emergency contacts, and revise staff accountability checklists to reflect personnel changes. Emergency roles listed by job title should be verified and updated as needed. Once revised, the EOP should be shared across divisions to ensure staff are informed, trained and prepared for emergency responsibilities.
- e. Continue developing an emergency communications platform for the Port. Examples include Verkada, Alert Sense, etc.
- f. Ensure that all Port staff are signed up for natural hazard alert systems and have access to current tsunami evacuation walk maps.
- g. Consider adopting a Port-wide resilience project management platform with a related deliverables dashboard to monitor implementation progress and enhance accountability across Port divisions.

Improving Port-Tenant Communication:

- a. Real Estate, Economic Development, Emergency Response, and Environmental & Planning divisions should consider developing technical assistance for Port tenants to ensure they are informed and equipped with the tools necessary to address climate and natural hazards. This assistance, provided by Port property managers, can include:

- Regularly sharing community resources, such as Whatcom County Library System’s emergency help database, Firewise resources, countywide emergency management resources, Whatcom Community Foundation, and CERT training as well as FEMA business resources, Small Business Development Center (SBDC) resources, among others.
 - Providing guidance on the importance of insurance coverage and how to prepare for emergencies.
 - Ensuring that tenants are registered for natural hazard alerts and have access to tsunami evacuation walk maps.
 - Utilizing various communication channels (e.g., tenant BBQs, digital newsletters) and providing technical guidance through resources like a Tenant’s Guide to Preparing for Natural Hazards, which includes information on permitting, compliance, and adaptation strategies such as retrofitting or elevation.
- b.** Encourage tenants to maintain Business Contingency Plans as part of lease agreements to promote preparedness and adaptability.
 - c.** Identify tenants that can be classified as essential public facilities, and ensure they have strong emergency plans.
 - d.** Encourage tenants to invest in resilient infrastructure and apply individual business resilience strategies.

4. Expand Resilience Planning

Strategic Planning & Policy Integration

- a.** Ensure that updates of the NHMP align with FEMA best practices.
- b.** Ensure that updates of the CEDS align with EDA best practices.
- c.** Review and update plans to incorporate new data and changing conditions.
- d.** Develop a Port of Bellingham Coastal Adaptation Strategy that balances site-specific and case-specific approaches with a comprehensive framework for resilience planning in response to SLR. Establish a time horizon, evaluate capital projects, assign cost estimates, and integrate budgeting priorities.
- e.** Develop a short- and long-term Port of Bellingham Energy Strategy with key partners and stakeholders, particularly utilities.
- f.** Update existing Port specific studies and modeling such as vulnerability assessments and SLR modeling as new science becomes available.

- g. Reduce the heat island effect by improving tree canopy coverage across Port properties, in alignment with Action 11.3.1 from the Port's Master List of Potential Climate Actions.
-

Risk Assessments & Infrastructure Resilience

- a. Conduct localized analyses of threats and detailed, property-specific assessments, utilizing COSMOS to downscale data for a more thorough regional evaluation.
 - b. Use the Marine Transportation System Resilience Assessment Guide to carry out a Marine Transportation System Resilience Assessment.
 - c. Coordinate with the City of Bellingham to assess seismic risk to bridges that serve Port property.
 - d. Assess critical infrastructure such as Bellingham Shipping Terminal (BST), Bellingham Cruise Terminal (BCT), and Bellingham International Airport (BLI) for seismic risks to structures and access points. For example, access to both BST and BCT is over filled tidelands and subject to liquefaction during high-magnitude earthquakes.
 - e. Conduct comprehensive seismic and geotechnical assessments of Port facilities, including infrastructure, soil conditions, and liquefaction risks, to evaluate vulnerability and guide disaster-resistant design.
 - f. Inventory and assess seismic risk for structural supports (e.g., stone columns, pilings, concrete footings) of Port facilities, using asset management conditions to inform this work.
-

Environmental Monitoring & Climate Data

- a. As recommended in the Coastal Vulnerability Assessment, monitor shoreline and sediment dynamics by analyzing change trends via aerial imagery and sediment transport rates under current and projected climate conditions.
 - b. Incorporate the best available science to maximize resilience to sea level rise in capital project planning.
 - c. Install a tide gauge on Port infrastructure to monitor long-term trends in Bellingham Bay to help inform capital project design.
-

Emergency Preparedness & Response

- a. Establish an emergency preparedness team to exercise annual simulations, specifically before the flood season.
- b. Explore a StormReady certification to strengthen local safety programs.
- c. Establish a Port-wide emergency preparedness team to initiate natural hazards training and conduct annual emergency readiness drills. Ensure staff involved in emergency responses have a robust understanding of the disaster recovery system, the expectations of local governments, and Coast Guard involvement in disaster scenarios.
- d. Ensure emergency response leaders complete Community Emergency Response Team (CERT) training, which provides disaster preparedness techniques and response skills needed in emergencies.
- e. Review tsunami evacuation maps to ensure they continue to be effective as inundation projections change.
- f. Organize a tsunami awareness day for Port staff to walk the evacuation routes and enhance preparedness.
- g. Reduce the heat island effect by improving tree canopy coverage across Port properties, in alignment with Action 11.3.1 from the Port's Master List of Potential Climate Actions.
- h. Develop a plan to utilize BST for emergency supply transport.
- i. Review best practices from other Ports having had damage and recovery from natural disasters such as the Port of Hueneme, which suffered significant damage and loss of \$30 million during the December 2021 atmospheric river.⁵³

Partnerships & Collaboration

- a. Collaborate with local utilities to improve regional strategies for reducing brownouts and ensure that Port operations continue during outages.
- b. Coordinate with local partners, such as Whatcom County and the City of Bellingham, to develop a Comprehensive Recovery Framework (CRF) that

⁵³ The Port of Hueneme, "Port of Hueneme, Labor and Community Leaders Join Forces in 'Powerwall' Response to Infrastructure Emergency."

establishes structures for the Port and its partners to leverage and address community recovery needs following a centralized disaster response.

- c. Organize task force meetings like those held during the Nooksack flooding events, involving local partners such as the Whatcom Community Foundation, the City of Bellingham, Whatcom County, the Lummi Indian Business Council, Western Washington University's Small Business Development Center, and others.

Financial & Operational Resilience

- a. Identify primary revenue sources and evaluate diversification. Assess departmental funding structures, sustainability, and vulnerabilities to changes in external funding.
- b. Regularly evaluate risk exposure and insurance coverage to effectively protect against evolving hazards.

5. Engage the Community

Ongoing engagement and communication with the community are crucial for the successful and efficient implementation of adaptation strategies. Public involvement creates opportunities to educate stakeholders, foster commitment, and build consensus among decision-makers and community members.

- a. Establish a climate and hazard monitoring program that documents impacts, supports data collection, and engages community volunteers in resilience-building activities, such as environmental monitoring, native planting, and public education, in alignment with Action 7.2.5 from the Port's Master List of Potential Climate Actions.
- b. Develop an inclusive community engagement strategy that offers opportunities for public input on resilience initiatives and programs through surveys, focus groups, and events. Ensure materials are available in all relevant languages and accessible to individuals with disabilities. Utilize multiple communication channels to effectively reach all communities, especially those historically underrepresented in decision-making.
- c. Collaborate with local jurisdictions, nonprofit organizations, and public-private partnerships to broaden public education and outreach on climate-exacerbated and natural hazards. Consider implementing seasonal

awareness campaigns, such as hazard awareness months, to inform communities about risks and encourage preparedness.

- d.** Explore opportunities to open the Commission Chambers and BCT as cooling centers during extreme heat and smoke events, especially for liveaboards and Fairhaven residents. Coordinate closely with the City of Bellingham regarding logistics and public safety.

BELLINGHAM INTERNATIONAL AIRPORT

Bellingham

International Airport

(BLI) serves over 800,000 travelers annually and is the only commercial aviation terminal between Everett, WA, and Vancouver, B.C.⁵⁴



BLI Solar Panel Installation,
October 2024

FEMA has identified BLI as a federal staging area (FSA), serving as a central hub for receiving and organizing disaster relief supplies and equipment.³¹



BLI, February 2025

BLI is committed to environmental responsibility and continues to make significant progress in both mitigating and adapting to the impacts of climate change. BLI has eliminated PFAS from firefighting foam by shifting to using fluorine-free foam. Additionally, BLI recently implemented a signature clean energy project with the installation of a high-efficiency, 250-panel solar array, which is expected to generate 100,000 kilowatt-hours annually, supplying clean, renewable energy to support airport operations.

To aid in regional resilience efforts, BLI collaborates with the Emergency Volunteer Air Corps (EVAC) Disaster Assistance Response Team (DART) to host annual exercises that involve the shipment of food across Washington, Oregon, and Canada, effectively coordinating General Aviation volunteer participation during emergency relief efforts following disasters.

⁵⁴ Port of Bellingham. "Airport Administration," n.d. <https://www.portofbelllingham.com/82/Airport-Administration>.

BLI VULNERABILITIES



BLI, February 2025



BLI, February 2025

In a natural disaster event, BLI would serve as a key hub for incoming air resources for Whatcom County. However, it's important to note that certain aircraft, such as C-17s, when arriving fully loaded with supplies, exceed BLI's pavement strength limits.

The Washington State Airports Seismic Resilience Project assigned BLI an average **risk rating of 6 out of 12 for permanent ground deformation (PGD) in a CSZ event**. Large water supply lines that bisect the runways could be damaged by seismic ground motions, potentially compromising runway pavements and the underlying soil structures.⁵⁵

BLI's onsite fuel storage tanks have permanent connection points for portable generators. However, if utility power is compromised, the generators will provide power to the commercial terminal and the Aircraft Rescue and Fire Fighting (ARFF) station. The Air Traffic Control Tower (ATCT) is equipped with an independent generator owned by the Federal Aviation Administration (FAA).

Some navigational aids operated by the FAA will be out of service until utility power is restored, which will restrict certain flight profiles. Liquid fuel is a vital resource for airports to support sustained post-disaster logistics, but the related infrastructure and supply chains are vulnerable to the effects of a CSZ earthquake. Another concern arises if Mount Baker were to erupt, as the volcanic ash reaching facilities could damage aircraft engine intakes and affect visibility.

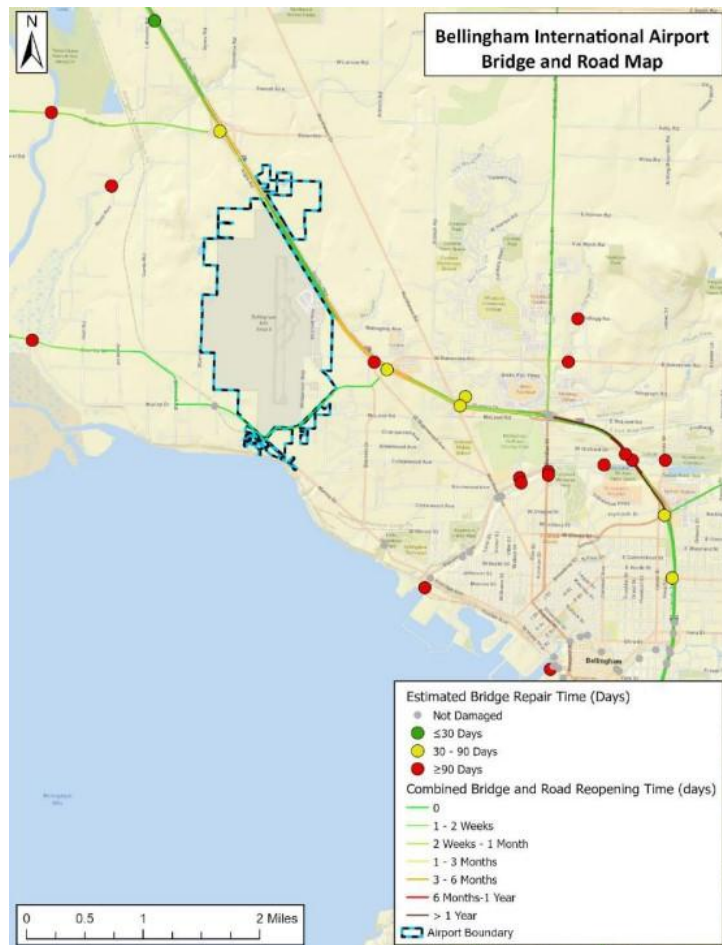
⁵⁵ Cybersecurity and Infrastructure Security Agency, "Washington State Airports Seismic Resilience Project," 2021.

Compared to other regional airports, BLI has a lower risk of runway damage from a CSZ event. The Washington State Airports Seismic Resilience Project identifies BLI as having low levels of liquefaction susceptibility.⁵⁵



BLI liquefaction susceptibility map, Washington State Airports Seismic Resilience Project

BLI's surrounding bridges and roads are highly vulnerable, with some estimated repair times exceeding 90 days.⁵⁵



BLI Bridge and Road Map, Washington State Airports Seismic Resilience Project

BLI RECOMMENDATIONS

These recommendations were compiled following a discussion between Environmental Planning and BLI Operations Management in March 2025 to strengthen preparedness and response measures at BLI.

GENERAL DISASTER PLANNING

- Conduct a seismic resilience assessment to evaluate how a CSZ earthquake could impact BLI's ability to function as a Federal Staging Area (FSA).
- Assess the potential impacts of a CSZ event on radio repeaters and identify solutions to maintain or restore critical communications.
- Develop a plan to establish procedures for safeguarding air intakes and preventing engine damage in the event of heavy ashfall.
- Bolster communication between BLI and WA EMD to enhance collaboration on resilience-building efforts and identify potential synergies.
- Create a site plan and Standard Operating Protocols to define the roles and responsibilities of BLI and WA EMD and how these entities collaborate in an emergency.
- Establish a reimbursement agreement with WA EMD to ensure compensation for space and power usage during a disaster.
- Initiate a pavement study to assess load-bearing thresholds for incoming supply aircraft, including acceptable weight limits and the number of repetitions the roadway can endure before fatigue.
- Expand connections to existing backup generation to support a broader array of airfield systems and strengthen existing backup systems to withstand seismic impacts.
- Evaluate critical energy loads and determine additional backup power as necessary. This may include solar and battery storage systems.

MANAGING ELECTRICITY AND WATER SUPPLY RISK

- Engage with Puget Sound Energy to better understand how a natural disaster or climate impact could affect the electric grid supporting BLI. These should include discussions of power restoration timelines and contingency planning in a CSZ event.

- Collaborate with local electric utilities on initiatives that build greater redundancy and resilience in airport electric power supplies. This could involve BLI working with utilities to ensure that, where power is delivered from a single primary substation, backup or redundant feeder lines are connected to alternate substations. Where feasible, redundant power could also be supplied by separate distribution substations linked to different transmission line systems.
- Fund battery and electric storage systems and renewable energy production at the airport and critical nearby tenant-occupied buildings such as the Whatcom Unified Coordination Center (WUCC).
- Formalize an agreement with Bellingham Public Works to ensure that BLI is prioritized for water supply access, including maintaining critical firefighting capability during and after an emergency.

FUEL STORAGE

- Invest in enhancing the seismic resilience of onsite fuel storage facilities. This could include assessing the seismic integrity of storage tanks and supporting infrastructure (e.g., foundations, piping systems), implementing necessary seismic retrofits (e.g., anchoring systems), and ensuring the capability to pump fuel during utility outages (such as through backup generators, permanent power hookups, manual pumps, or gravity-fed systems).
- Coordinate with fuel providers to establish contingency plans that ensure fuel deliveries can originate from terminals and bulk storage facilities located, at a minimum, east of the Cascade Mountains to support a more resilient supply chain following a CSZ earthquake.
- Create a plan to outline how BLI will receive and store fuel through alternative means if bridges become impassable during a CSZ event and fuel deliveries are disrupted.

ECONOMIC RESILIENCE

PREPAREDNESS

The Port is actively contributing to a resilient economy. In the Port's Master List of Potential Climate Actions, one resilience-building goal is to support a local economy based on sustainable practices and resilient to the impacts of climate change. Strategies to achieve this include supporting and expanding climate-resilient businesses and economic opportunities and fostering climate resilience throughout the Port's economic network.

The Port acts as the Associate Development Organization (ADO) for Whatcom County, leading economic development in partnership with the City of Bellingham and Whatcom County. In 2017, the Port, County, and City established the Regional Economic Partnership (REP), responsible for restoring economic and business activities to a healthy state and developing new business and employment opportunities that contribute to an economically viable community. The REP also implements programs supported by the DOC to cultivate a resilient regional economy characterized by a dynamic and inclusive business community, a commitment to living-wage jobs and equity, and the physical, social, and economic infrastructure necessary to support it.¹⁵

As stated in the 2024-2025 Property Action Memo, to safeguard against natural hazards, the Port has \$50 million in coverage for earthquake damage (with a deductible of 5% of the replacement value) and \$50 million in coverage for flood damage (with a deductible of \$250,000). In addition to these events, the Port has \$500 million in coverage for property damage (with a deductible of \$50,000 per occurrence). Furthermore, the Port's financial policies require maintaining a reserve equal to three months of operating expenses and an additional \$1 million for emergencies. With properties ranging from Blaine to Fairhaven, the Port is uniquely positioned to minimize the likelihood of total loss.

RESPONSE

By owning and managing 90 buildings and structures that support 215 businesses, the Port plays a crucial role in supporting countywide economic resilience and recovery efforts. The Port must take proactive steps to prepare businesses for future challenges and improve communication about natural hazards and climate change resilience planning with tenants. These actions will help the Port foster a stronger, more resilient local economy, ensuring tenants are well-equipped to navigate the challenges posed by climate change and natural hazards.

Nooksack River Flood 2021: Business Recovery Task Force

To combat the November 2021 floods, the Business Recovery Task Force was established. This group was organized as part of Whatcom County's flood response and was co-led by WWU's Small Business Development Center (SBDC) and the Port. Comprising representatives from Tribal and local government, including the cities hardest hit by the flooding, the Washington State DOC, FEMA, and the Long Term Recovery Group (LTRG), among others, this group provided guidance on developing priorities for grant funds and related application processes for businesses affected by the floods.⁵⁶

⁵⁶ Whatcom Community Foundation. "Whatcom County Businesses Impacted by November Floods Can Now Apply for Grant Assistance," n.d. <https://whatcomcf.org/whatcom-county-businesses-impacted-by-november-floods-can-now-apply-for-grant-assistance/#:~:text=Qualified%20businesses%20can%20apply%20at,2022%20press%20release%2C%20click%20here.>

FUNDING PORT RESILIENCE

One recommendation within the Whatcom County Compound Flood Vulnerability Assessment is that a community should develop a layered funding strategy that begins with local investment and leverages those funds through grants, loans, and private sector investment to sustainably implement adaptation strategies. This highlights the community's commitment to a more self-reliant financial future while increasing the likelihood of securing grants, which are often contingent upon a local funding match.⁵⁷ This section identifies grant funding mechanisms and opportunities for the Port to enhance resilience. Successful procurement or implementation will require proactive planning by the Port, leveraging the identified resources to expand Port-wide resilience planning.

GRANTS

The National Coastal Resilience Fund: The National Fish and Wildlife Foundation and NOAA provide funds to enhance fish and wildlife habitats and protect coastal communities. The focus of these projects includes restoring, increasing, and strengthening natural infrastructure to protect communities from coastal hazards, such as rising sea and lake levels, changing flood patterns, increased frequency and intensity of storms, and other environmental stressors, while enhancing habitats for fish and wildlife. Average awards for projects involving Community Capacity Building and Planning, Site Assessment and Preliminary Design, and Final Design and Permitting range from \$100,000 to \$1 million. In contrast, Restoration Implementation projects range from \$1 million to \$10 million. Funding is supported by the Bipartisan Infrastructure Law (BIL), the Inflation Reduction Act, base appropriations, the Department of Defense, and additional partner contributions.⁵⁸

Airport Improvement Program (AIP) Grant: The FAA provides eligible airports across the United States with funds to develop projects that enhance airport safety, capacity, security, and environmental concerns. For small primary aviation airports, such as the BLI, the grant covers a range of 90-95 percent of eligible costs.⁵⁹ The FAA's National Plan of Integrated Airport Systems (NPIAS) recognizes BLI as essential to the nation's air transportation infrastructure and is eligible for Federal Development Grants under the AIP.

Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program (PROTECT) Grants: Units of local governments are eligible to fund projects that ensure surface transportation resilience to natural hazards, including

⁵⁷ Environmental Science Associates. "Whatcom County Compound Flood Vulnerability Assessment," 2023

⁵⁸ NOAA Office for Coastal Management. "National Coastal Resilience Fund."

⁵⁹ Federal Aviation Administration, "Airport Improvement Program (AIP)."

climate change, SLR, flooding, extreme weather events, and other natural disasters, as provided under the Bipartisan Infrastructure Law. The four types of PROTECT grants include Planning, Resilience Improvement, Community Resilience and Evacuation Routes, and At-Risk Coastal Infrastructure.⁶⁰

Port Infrastructure Development Program (PIDP): As funded by the Infrastructure Investment and Jobs Act (IIJA) and the FY 2025 Appropriations Act, the Maritime Administration administers funds on a competitive basis for projects that improve the safety, efficiency, or reliability of the movement of goods into, out of, around, or within a port. There is no minimum award size for funding awarded under IIJA, however, for all projects funded under the FY 2025 Appropriations Act, the minimum award size is \$1 million.⁶¹

FEMA FUNDING

FEMA acknowledges that mitigation planning and actions break the cycle of disaster damage, reconstruction, and repeated losses. At the current time of writing, FEMA provides funding for eligible long-term solutions that reduce the impact of future disasters. The Port can benefit from these funding opportunities through sub-grants or by applying directly to FEMA on behalf of state or local agencies.⁶²

Flood Mitigation Assistance (FMA) funds support projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program (NFIP).

The Hazard Mitigation Grant Program provides funding to state, local, Tribal and territorial governments to develop HMPs and rebuild in ways that reduce future disaster losses following a presidentially declared disaster.

The Pre-Disaster Mitigation (PDM) grant program makes federal funds available to state, local, Tribal, and territorial governments to plan and implement sustainable, cost-effective measures that reduce risk to people and property from future natural hazards, while also reducing reliance on federal funding for disaster assistance.

⁶⁰ U.S. Department of Transportation, “Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program (PROTECT).”

⁶¹ Maritime Administration and US Department of Transportation, “FY 2025 Notice of Funding Opportunity- Port Infrastructure Development Program,” 2025.

⁶² U.S. Department of Homeland Security, “FEMA Grants.”

The National Earthquake Hazards Reduction Program’s State Assistance Program

supports the effective implementation of earthquake risk reduction at the local, state, and national levels. It offers two funding opportunities: the Individual State Earthquake Assistance (ISEA) and Multi-State and National Earthquake Assistance (MSNEA).

The Port Security Grant Program provides funding to state, local, and private-sector partners to protect critical port infrastructure from terrorism, enhance maritime domain awareness, improve port-wide security risk management, and support recovery and resilience by maintaining or reestablishing maritime security mitigation protocols.

The Emergency Management Performance Grant (EMPG) provides funding to state, local, Tribal, and territorial emergency management agencies to support the implementation of the National Preparedness System and advance the National Preparedness Goal of a secure and resilient nation. Allowable costs under EMPG assist in building and sustaining core capabilities across the five mission areas: prevention, protection, mitigation, response, and recovery.

The Regional Catastrophic Preparedness Grant Program (RCPGP) supports the National Preparedness System through funding efforts to close capability gaps in Housing and Logistics, promote innovative regional solutions to catastrophic incidents, and strengthen existing regional resilience initiatives.

FUNDING TOOLS

American Society of Adaptation Professionals (ASAP)'s **Funding and Finance Peer Learning Group** holds monthly meetings to establish strategies to assist small and medium-sized local governments in the U.S. in integrating key characteristics into their climate resilience projects to make them fundable.⁶³

The **FundHubWA** portal, administered by the Washington DOC, provides funding opportunities for individuals, businesses, nonprofits, public agencies, and Tribal governments regarding climate and clean energy to make Washington cleaner, healthier, and more resilient.⁶⁴

The **Puget Sound Recovery Acceleration Funding Tool (PS RAFT)** is a service of the Puget Sound Partnership’s Strategic Funding Team, which aims to integrate transportation, land use, habitat restoration and protection, agriculture, climate change mitigation, flood hazard reduction, and stormwater infrastructure. The team enhances partners’ ability to

⁶³ American Society of Adaptation Professionals, “Funding and Finance.”

⁶⁴ Washington Department of Commerce. “Find Funding.”

respond quickly to emerging funding opportunities, helping expedite and successfully execute high-priority projects.⁶⁵

The **Federal Funds Grant Writing Assistance Program** is designed for Tribes, community-based organizations, local government agencies, and other entities to help prepare and submit federal grant applications. The Washington DOC provides this resource to include services such as grant application planning, writing, review, and guidance for managing federal awards.⁶⁶

⁶⁵ Puget Sound Partnership. “Puget Sound Recovery Acceleration Funding Tool.”

⁶⁶ Washington State Department of Commerce. “Federal Funds Grant Writing Assistance Program.”

STAKEHOLDER ENGAGEMENT

As discussed in FEMA’s National Resilience Guidance (NRG), building resilience requires strong leadership and collaboration across organizations, jurisdictions, and areas of expertise. Identifying key leaders, stakeholders, and community partners is essential to ensure representation from diverse perspectives. Engaging existing community networks, such as emergency preparedness groups, environmental and human service organizations, civic groups, and cultural institutions, can strengthen efforts without starting from scratch. A phased, layered approach allows teams to expand over time, fostering inclusive and sustainable resilience initiatives.

FEMA’s NRG emphasizes the importance of recognizing all community members' unique needs and contributions, especially those who are underserved, disproportionately impacted, and the most socially vulnerable. Furthermore, it is particularly crucial in areas where Indigenous Peoples maintain place-based knowledge that encompasses thousands of years of sociocultural, economic, political, and natural resource relationships. Ensuring inclusion in decision-making will lead to a better understanding of risks and the development of effective solutions.⁷

Effective engagement can include public events at town halls, surveys, outreach at local events, and culturally sensitive facilitation. Engagement efforts should provide clear, accessible, and community-specific informational materials. Meeting facilitators should be trained to interact effectively with community members, ensuring cultural sensitivities are respected and community needs are addressed.⁷ The Port’s resilience efforts should include input and coordination with the stakeholders listed below.

INTERNAL STAKEHOLDERS AND KEY PARTNERS

Bonneville Power Authority (BPA)

City of Bellingham

City of Blaine

Lummi Nation

Nooksack Tribe

Port Commissioners

Port staff

Port tenants and customers

Puget Sound Energy

EXTERNAL STAKEHOLDERS

FEMA Region 10

Local Business

Port tenant's customers

Public Advisory Boards and Committees

Public Utility Districts

Regional Planning Groups

U.S. Coast Guard (USCG) District 13

U.S. Department of Transportation (USDOT) Region 10

Washington State Military Department's Emergency Management Division (EMD)

WSDOT

COLLABORATION

Creating a community response network with strong, pre-established relationships is vital to ensuring effective coordination and communication during a natural disaster. Such a network streamlines decision-making and enables a unified response to protect lives, infrastructure, and resources. By focusing on partnering with organizations that actively engage disadvantaged communities, the Port can ensure its efforts are inclusive and equitable in emergencies.

The Port is a member of the Whatcom County Emergency Management Council and supports the Whatcom County Sheriff's Office Division of Emergency Management (WCSO-DEM) with annual funding based on the Division's budget needs, granting the Port voting rights. The Port actively participates in the Division's ongoing public education, planning, training, and exercise programs, which include presentations about various risks within the Port, such as earthquakes, tsunamis, and floods, along with examinations of other natural hazard risks and risk mitigation strategies. This coordination allows the Port

to work with other jurisdictions on natural hazard mitigation efforts and provides additional opportunities to engage visitors and County residents.³

Whatcom County staff lead a **Joint Climate Action Team (JCAT)** in collaboration with the Port and City of Bellingham to coordinate staff-level efforts on implementing each jurisdiction's Climate Action Plan. The County also facilitates monthly meetings of the **Whatcom Climate Coordination Committee (WC4)**, bringing together staff from public agencies and Tribal nations with adopted climate plans to align key climate priorities, projects, and programs. The Port actively participates in and contributes to these meetings.

OTHER COLLABORATION IN ACTION

The **Puget Sound Climate Preparedness Collaborative** is a network of over 30 partners, including local and Tribal governments, regional agencies, and organizations. Together, they strengthen community, economic, and environmental resilience against the impacts of climate change. The Collaborative aims to maximize limited resources, reduce duplication, promote institutional learning, and elevate its members' preparedness priorities and needs to broader stakeholder audiences, including state and federal agencies. It hosts monthly climate preparedness calls focused on adaptation topics relevant to member communities and fosters peer learning and capacity building by connecting subject matter experts and partners engaged in climate resilience work.⁶⁷

The **Olympia Sea Level Rise Response Collaborative** was established through an Interlocal Agreement (ILA) involving the City of Olympia, the Port of Olympia, and four government partners, including Lacey, Tumwater, and Thurston County (the LOTT Clean Water Alliance). Together, they developed the Sea Level Rise Response Plan to ensure a coordinated strategy for protecting downtown Olympia and the Port peninsula from the impacts of SLR. The plan identifies necessary actions, estimates costs, outlines implementation schedules, and assigns responsibilities, which the partners continue to execute collaboratively.⁶⁸

⁶⁷ King County. "Puget Sound Climate Preparedness Collaborative."

⁶⁸ City of Olympia, LOTT Clean Water Alliance, and Port of Olympia. "Olympia Sea Level Rise Response Plan," 2018.

The **Coastal Hazards Organizational Resilience Team (COHORT)** is an interagency partnership created to strengthen the resilience of Washington’s coastal communities and Tribes. Comprising Ecology, Washington Sea Grant, WSU Extension, and Emergency Management Division staff, COHORT provides coordinated technical assistance and hands-on planning support to address flooding, erosion, SLR, and other coastal challenges. The team helps communities understand hazards, access funding, and explore adaptation options, while also promoting regional strategies that integrate social, economic, and ecological resilience goals.⁶⁹

POTENTIAL COLLABORATORS FOR STRATEGY FORMATION

Bellingham Bay Action Team

Cascadia Region Earthquake Science Center (CRESCENT)

Community Response Network

FEMA

Floodplain Integrated Planning (FLIP) Team

Joint Climate Action Team (JCAT)

Nooksack River Flood Business Recovery Task Force

Northwest Innovation Resource Center

Northwest Straits Shore Friendly Program

UW Climate Impacts Group

WA Emergency Management Division

WA Maritime Blue

Washington Coastal Hazards Resilience Network- Coastal Hazards Organizational Resilience Team (COHORT)

Western Washington University Small Business Development Center (WWU SBDC)

Whatcom Community Foundation

Whatcom Conservation District

⁶⁹ Washington Coastal Hazards Resilience Network. “Coastal Hazards Organizational Resilience Team (COHORT).”

Whatcom County Business and Commerce Advisory Committee

Whatcom County Climate Coordination Committee (WC4)

Whatcom Health and Community Services

Whatcom Long Term Recovery Group

Whatcom Watersheds Information Network (WWIN)

Working Waterfront Coalition

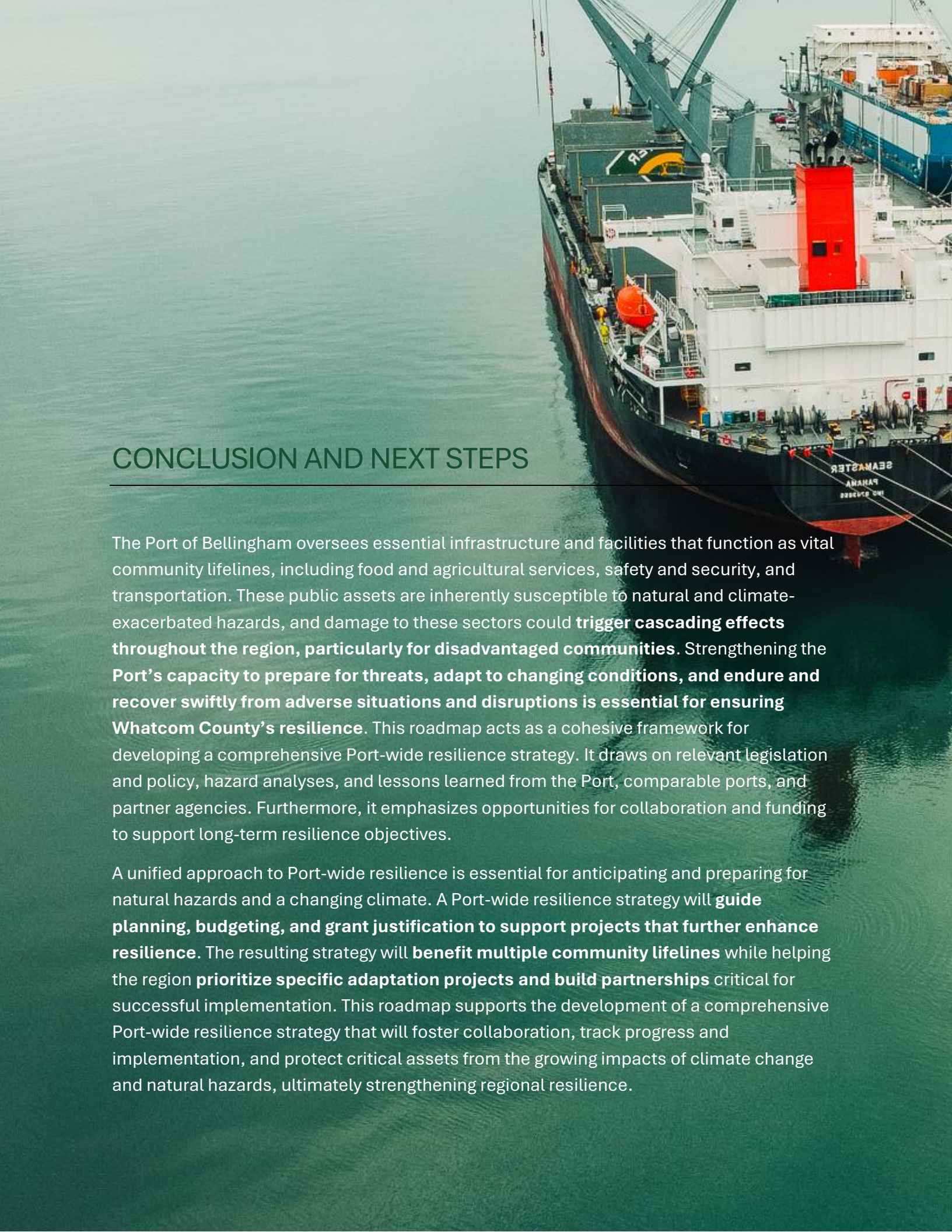
MEASURING PROGRESS AND IMPLEMENTATION

FEMA’s NRG emphasizes the importance of measurement and evaluation when building resilience. Since resilience varies across different contexts, there is no single standardized measure. Metrics and indicators should be tailored to reflect community-specific needs, goals, and outcomes. They play a key role in evaluating trade-offs, prioritizing actions, and tracking progress toward defined objectives.

A holistic approach to the measurement or evaluation of resilience should include measures from inputs, processes, outputs, and outcomes. Achieving resilience milestones provides an opportunity to publicize accomplishments and progress, which is important to sustain long-term public interest and investment in resilience efforts.

The NRG provides a **Resilience Maturity Model**, a tool to systematically examine current resilience efforts and provide insights into what organizations can do to bolster their resilience. The model suggests four tiers of activities—Ad Hoc, Emerging, Enhanced, and Integrated, identifying the key characteristics of resilience-related activities and how the Port can progress from the early stages of starting to think about resilience, to fully integrating resilience into all aspects of its functions.⁷ Early on, it's important to make goals as specific as possible so that progress can be measured.

As mentioned as a recommendation for improving interdepartmental communication and coordination, the Port can develop a deliverables dashboard to assess the progress of actions and ensure the accountability of Port divisions in implementation progress. By adopting a centralized tool, each department can input updates, define metrics, monitor progress, and stay informed about the efforts of others. This fosters transparency, enhances alignment toward shared resilience goals, and creates greater opportunities for interdepartmental collaboration and synergy. **Given the Port’s leadership role in Whatcom County, the Port can inspire other jurisdictions to adopt similar tools and practices, fostering regional alignment and a shared commitment to resilience.**



CONCLUSION AND NEXT STEPS

The Port of Bellingham oversees essential infrastructure and facilities that function as vital community lifelines, including food and agricultural services, safety and security, and transportation. These public assets are inherently susceptible to natural and climate-exacerbated hazards, and damage to these sectors could **trigger cascading effects throughout the region, particularly for disadvantaged communities**. Strengthening the **Port's capacity to prepare for threats, adapt to changing conditions, and endure and recover swiftly from adverse situations and disruptions is essential for ensuring Whatcom County's resilience**. This roadmap acts as a cohesive framework for developing a comprehensive Port-wide resilience strategy. It draws on relevant legislation and policy, hazard analyses, and lessons learned from the Port, comparable ports, and partner agencies. Furthermore, it emphasizes opportunities for collaboration and funding to support long-term resilience objectives.

A unified approach to Port-wide resilience is essential for anticipating and preparing for natural hazards and a changing climate. A Port-wide resilience strategy will **guide planning, budgeting, and grant justification to support projects that further enhance resilience**. The resulting strategy will **benefit multiple community lifelines** while helping the region **prioritize specific adaptation projects and build partnerships** critical for successful implementation. This roadmap supports the development of a comprehensive Port-wide resilience strategy that will foster collaboration, track progress and implementation, and protect critical assets from the growing impacts of climate change and natural hazards, ultimately strengthening regional resilience.

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