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Appendix A: Acronyms and Definitions

Acronyms

Acronym	Definition	Acronym	Definition
BFE	Base Flood Elevation	MCE	Maximum Creditable Earthquake
CEMP	Comprehensive Emergency Management plan	MM	Modified Mercalli Scale
CIP	Capital Improvements Plan	NEHRP	National Earthquake Hazards Reduction Program
CFR	Code of Federal Regulations	NFIP	National Flood Insurance Program
cfs	Cubic feet per second		
CRS	Community Rating System	NCDC	National Climatic Data Center
DEM	Department of Emergency Management	NGVD	National Geodetic Vertical Datum
DHS	Department of Homeland Security	NOAA	National Oceanic and Atmospheric Administration
DMA	Disaster Mitigation Act	NWS	National Weather Service
DNR	Department of Natural Resource	OFM	Office of Financial Management
DSO	Dam Safety Office	PDM	Pre-Disaster Mitigation Grant Program
EAP	Emergency Action Plan	PHMSA	Pipeline and Hazardous Materials Safety Administration
EPA	U.S. Environmental Protection Agency	PGA	Peak Ground Acceleration
ESCA	Emergency services Coordinating Agency	PUD	Planned Unit Developments
ESA	Endangered Species Act	RCW	Revised Code of Washington
FCAAP	Flood Control Account Assistance Program	SCNHMP	Snohomish County Natural Hazard Mitigation Plan
FCD	Flood Control District	SFHA	Special Flood Hazard Area
FEMA	Federal Emergency Management Agency	SHELDUS	Special Hazard Events and Losses Database for the US
FERC	Federal Energy Regulatory Commission	SMA	Shoreline Management Act
FIRM	Flood Insurance Rate Map	UBC	Uniform Building Code
GIS	Geographic Information System	UDC	Unified Development Code
GMA	Growth Management Act	UGA	Urban Growth Area
HAZUS-MH	Hazards, United States-Multi Hazard	USGS	United States Geological Survey
HIVA	Hazard Inventory and Vulnerability Analysis	WAS	Washington Administrative Code
HMGP	Hazard Mitigation Grant Program	WAEMD	Washington Emergency Management Division
IBC	International Building Code	WRIA	Water Resource Inventory Area
IRC	International Residential Code	WSDOT	Washington State Department of Transportation

Definitions

100-Year Floodplain—The area flooded by the flood that has a 1 percent chance of being equaled or exceeded each year. This is a statistical average only; in fact, a 100-year flood can occur more than once in a short period of time. The 1-percent annual chance flood is the standard used by most federal and state agencies.

500-year Floodplain—Also known as the 0.2 percent annual chance flood. The area inundated by floodwaters that has a 0.2 percent chance of being equaled or exceeded each year.

Active Assailant—An individual actively engaged in killing or attempting to kill people in a confined and populated area. In most cases, active shooters use firearm(s) and there is generally no pattern or method to their selection of victims.

Active Shooter—One or more individuals actively engage in killing or attempting to kill people in a populated area using one or more firearms.

Active—Both law enforcement personnel and citizens have the potential to affect the outcome of the event based upon their responses to the situation.

Aircraft Accident—An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage.

Aircraft Incident—An occurrence other than an accident, associated with the operation of an aircraft, which affects or could affect the safety of operations.

Aircraft—A vehicle, such as an airplane or balloon, for traveling through the air.

Ash fall—Volcanoes tend to erupt lavas so thick and charged with gases that they explode into ash rather than flow.

Asset—An asset is any manmade or natural feature that has value, including, but not limited to, people; buildings; infrastructure, such as bridges, roads, sewers, and water systems; lifelines, such as electricity and communication resources; and environmental, cultural, or recreational features such as parks, wetlands, and landmarks.

Benefit/Cost Analysis—A systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness.

Benefit—A benefit is a net project outcome and is usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of benefit-cost analysis of proposed mitigation measures, benefits are limited to specific, measurable, risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

Benioff Earthquake—Sometimes called “deep quakes,” these occur in the Pacific Northwest when the Juan de Fuca plate breaks up underneath the continental plate, approximately 30 miles beneath the earth’s surface.

Botnet—A collection of compromised machines under control of an attacker.

Building—A building is defined as a structure that is walled and roofed, principally aboveground, and permanently fixed to a site. The term includes manufactured homes on permanent foundations on which the wheels and axles carry no weight.

Capability Assessment—A capability assessment provides a description and analysis of a community's current capacity to address threats associated with hazards. The assessment includes two components: an inventory of an agency's mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community's actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified. The following capabilities were reviewed under this assessment: Legal and regulatory capability, administrative and technical capability, and fiscal capability.

Cluster—An aggregation of cases grouped in place and time that are suspected to be greater than the number expected.

Community Rating System (CRS)—The CRS is a voluntary program under the NFIP that rewards participating communities (provides incentives) for exceeding the minimum requirements of the NFIP and completing activities that reduce flood hazard risk by providing flood insurance premium discounts.

Conflagration—A fire that grows beyond its original source area to engulf adjoining regions. Wind, extremely dry or hazardous weather conditions, excessive fuel buildup, and explosions are usually the elements behind a wildfire conflagration.

Critical Area—An area defined by state or local regulations as deserving special protection because of unique natural features or its value as habitat for a wide range of species of flora and fauna. A sensitive/critical area is usually subject to more restrictive development regulations.

Critical Facility—Those facilities and infrastructure that are critical to the health and welfare of the population. These become especially important after any hazard event occurs. For the purposes of this plan update, critical facilities include the following: (1) structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water reactive materials; (2) hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a hazard event; (3) police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for disaster response before, during, and after hazard events; (4) public and private utilities, facilities, and infrastructure that are vital to maintaining or restoring normal services to areas damaged by hazard events, and; (4) government facilities, city hall, judicial, and emergency management.

Crustal Earthquake—Crustal quakes occur at a depth of 5 to 10 miles beneath the earth's surface and are associated with fault movement within a surface plate.

Cubic Feet per Second (cfs)—Discharge or river flow is commonly measured in cfs. One cubic foot is about 7.5 gallons of liquid.

Dam Failure—An uncontrolled release of impounded water due to structural deficiencies in the water barrier.

Dam—Any artificial barrier and/or any controlling works, together with appurtenant works, that can or do impound or divert water.

Debris Flow—A moving mass of loose mud, sand, soil, rock, water, and air moving down a slope under the influence of gravity.

Denial of Service—a method of attack from a single source that denies system access to legitimate users by overwhelming the computer with messages and blocking legitimate traffic.

Disaster Mitigation Act of 2000 (DMA) —The DMA is Public Law 106-390 and is the latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur. Under the DMA, a pre-disaster hazard mitigation program and new requirements for the national post-disaster hazard mitigation grant program (HMGP) were established.

Drainage Basin—A basin is the area within which all surface water (whether from rainfall, snowmelt, springs, or other sources) flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Drainage basins are also referred to as watersheds or basins.

Earthquake—The shaking of the ground caused by an abrupt shift of rock along a fracture in the earth or a contact zone between tectonic plates. Earthquakes are typically measured in both magnitude and intensity.

Ecosystem Services—Ecosystem services are the benefits people obtain from the ecosystem. They are grouped in four broad categories: (1) provisioning, such as the production of food and water; (2) regulating, such as control of the climate and disease; (3) supporting, such as the nutrient cycles and crop pollination; and (4) cultural, such as spiritual and recreational benefits. Ecosystem services associated with natural hazard mitigation include, but are not limited to, the following: vegetated land cover can intercept and absorb water, retaining it and slowing its movement, helping to reduce flooding and its subsequent effects; vegetated stream buffers can help absorb water along streams and rivers, which reduces flooding by holding excess water; vegetated stream buffers can reduce bank erosion; floodplains can spread high volume flows, reducing stream velocity and flood levels; wetlands, such as coral reefs and coastal marshes, can offer shoreline protection in coastal regions and help reduce the impacts of storms, including erosion, by acting as a physical barrier and reducing wind and wave energy; tree and forest cover can reduce surface wind velocities; vegetative cover can reduce temperatures on micro- and macro-scales; vegetation can help to shade areas and reduce surface temperatures, mitigating the potential public health effects of extreme heat.

Elevated temperature material—Materials which are in a liquid phase at a temperature at or above 212 degrees Fahrenheit (°F); or is in a liquid phase with a flash point at or above 100°F; or is in a solid phase at a temperature at or above 464°F.

Emergency Action Plan (EAP)—a formal document that identifies potential emergency conditions at a dam and specifies preplanned actions to be followed to minimize property damage and loss of life. The EAP contains specific actions the dam owner should take to moderate or alleviate the problems at the dam, procedures on issuing early warning and notification messages to responsible downstream emergency

management authorities, and inundation maps to show the emergency management authorities the critical areas for action in case of an emergency.

Endemic—Refers to the constant presence and/or usual prevalence of a disease or infectious agent in a population within a geographic area.

Epicenter—The point on the earth's surface directly above the hypocenter of an earthquake. The location of an earthquake is commonly described by the geographic position of its epicenter and by its focal depth.

Epidemic—An increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area.

Exploit tools—Publicly available and sophisticated tools that intruders of various skill levels can use to determine vulnerabilities and gain entry into targeted systems.

Extreme Risk Protection Orders—Designed to prevent individuals at high risk of harming themselves or others from accessing firearms, it allows family, household members, and police to obtain a court order when there is demonstrated evidence that the person poses a significant danger.

Fault—A fracture in the earth's crust along which two blocks of the crust have slipped with respect to each other. Most common is a strike-slip, normal, or thrust fault.

Firestorm—A fire that expands to cover a large area, often more than a square mile. A firestorm usually occurs when many individual fires grow together into one. The area involved becomes so hot that all combustible materials ignite, even if they are not exposed to direct flame. Temperatures may exceed 1,000 degrees Celsius. Superheated air and hot gases of combustion rise over the fire zone, drawing surface winds in from all sides, often at velocities approaching 50 miles per hour. Although firestorms seldom spread because of the inward direction of the winds, once started, there is no known way of stopping them.

Flood Insurance Rate Map (FIRM)—FIRMs are the official maps on which the Federal Emergency Management Agency (FEMA) has delineated the Special Flood Hazard Area (SFHA).

Flood Insurance Study—A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's FIRM. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Flood—Inundation of normally dry land resulting from rising and overflowing of a body of water.

Floodplain—Land area along the sides of a river that becomes inundated with water during a flood

Focal Depth—The depth from the earth's surface to the hypocenter.

Hazard Mitigation Grant Program (HMGP)—Authorized under Section 202 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.

Hazardous Substance—Those substances listed in Appendix A of 49 CFR §172.101; does not include petroleum, natural gas, liquefied natural gas, or fuel.

Hazardous waste—Materials subject to 40 CFR §262.

Hazards U.S. Multi-Hazard (HAZUS-MH) Loss Estimation Program—HAZUS-MH is a GIS-based program used to support the development of risk assessments as required under the DMA. The HAZUS-MH software program assesses risk in a quantitative manner to estimate damages and losses associated with natural hazards. HAZUS-MH is FEMA's nationally applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods, and wind hazards. HAZUS-MH has also been used to assess vulnerability (exposure) for other hazards.

High Hazard Dam—dams assigned the high hazard potential classification are those where failure or operational issues will probably cause loss of human life.

Hyperendemic—Persistent, high levels of disease occurrence.

Hypocenter—The region underground where an earthquake's energy originates.

Interface Area—An area susceptible to wildfires and where wildland vegetation and urban or suburban development occur together. An example would be smaller urban areas and dispersed rural housing in forested areas.

Inundation Area—The area of land that would be flooded following a dam failure.

Lahar—A rapidly flowing mixture of water and rock debris that originates from a volcano. While lahars are most commonly associated with eruptions, heavy rains, and debris accumulation, earthquakes may also trigger them.

Landslide—The sliding movement of masses of loosened rock and soil down a hillside or slope. Slope failures occur when the strength of the soils forming the slope is exceeded by the pressure, such as weight or saturation, acting upon them.

Lava Flow—The least hazardous threat posed by volcanoes. Cascades volcanoes are normally associated with slow moving andesite or dacite lava.

Local Government: Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Logic bombs—A form of sabotage in which a programmer inserts code that causes the program to perform a destructive action when a triggering event occurs.

Marine pollutant—Materials listed in Appendix B of 49 CFR §172.101.

Mass killings—Three or more killings in a single incident.

Mass Movement—A collective term for landslides, debris flows, falls and sinkholes.

Medical Countermeasures—life-saving medicines and medical supplies that can be used to diagnose, prevent, protect from, or treat conditions associated with chemical, biological, radiological, or nuclear threats, emerging infectious disease, or natural disaster.

Mitigation—A preventive action that can be taken in advance of an event that will reduce or eliminate the risk to life or property.

Mitigation Actions—Mitigation actions are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

Mudslide (or Mudflow)—A river of rock, earth, organic matter, and other materials saturated with water.

Navigable waters—Waters of the United States, including territorial seas.

Objective—For the purposes of this plan, an objective is defined as a short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

Outbreak—The same definition of epidemic but is often used for a more limited geographic area, jurisdiction, or group of people.

Pandemic—An epidemic that has spread over several countries or continents, usually affecting many people.

Peak Ground Acceleration—Peak Ground Acceleration (PGA) is a measure of the highest amplitude of ground shaking that accompanies an earthquake, based on a percentage of the force of gravity.

Phishing—The creation and use of emails and websites designed to deceive Internet users into disclosing their personal data, resulting in identity theft and fraud.

Planning Committee—The group that oversaw all phases of the HMP's development. The members of this committee included key city and tribal personnel, residents, and other stakeholders from within the planning area.

Preparedness—Actions that strengthen the capability of government, residents, and communities to respond to disasters.

Presidential Disaster Declaration—These declarations are typically made for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A presidential disaster declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, designed to help disaster victims, businesses, and public entities.

Probability of Occurrence—The probability of occurrence is a statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future. A probability factor based on yearly values of occurrence is used to estimate probability of occurrence.

Pyroclastic Flow—Pyroclastic flows are avalanches of hot (570–1470° F) ash, rock fragments, and gas that move at high speeds down the sides of a volcano during explosive eruptions or when the edge of a thick,

viscous, lava flow or dome breaks apart or collapses. Speeds range from 20 to more than 200 miles per hour.

Repetitive Loss Property—Any NFIP-insured property that, since 1978 and regardless of any changes of ownership during that period, has experienced the following: four or more paid flood losses in excess of \$1000.00; or two paid flood losses in excess of \$1000.00 within any 10-year period since 1978; or three or more paid losses that equal or exceed the current value of the insured property.

Return Period—The average period of time in years between occurrences of a particular hazard (equal to the inverse of the annual frequency of occurrence).

Risk—Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. Risk measures the likelihood of a hazard occurring and resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Runup—A measurement of the height of the water onshore observed above a reference sea level.

Seiche—A standing wave in an enclosed or partly enclosed body of water, normally caused by earthquake activity; can affect harbors, bays, lakes, rivers, and canals.

Severe Local Storm—Small atmospheric systems including tornadoes, thunderstorms, and windstorms. Typically, major impacts from a severe storm are on transportation infrastructure and utilities. These storms may cause a great deal of destruction and even death, but their impact is generally confined to a small area.

Significant Hazard Dam—Those dams where failure or operational issues result in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.

Sinkhole—A collapse depression in the ground with no visible outlet. Its drainage is subterranean. It is commonly vertical-sided or funnel-shaped.

Slab—This refers to one or more layers of snow in which the grains are bonded together. A slab initially fails over a large area instead of at a single point.

Sniffer—A program that intercepts routed data and examines each packet in search of specified information.

Sporadic—Refers to a disease that occurs infrequently or irregularly.

Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100-107, was signed into law on November 23, 1988. This law amended the Disaster Relief Act of 1974, Public Law 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

Stakeholder—Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact hazard mitigation.

Stratovolcano—Typically steep-sided, symmetrical cones of large dimension built of alternating layers of lava flows, volcanic ash, cinders, blocks, and bombs, rising as much as 8,000 feet above their bases. The volcanoes in the Cascade Range are all stratovolcanoes.

Stream Bank Erosion—Stream bank erosion is common along rivers, streams, and drains where banks have been eroded, sloughed, or undercut. However, it is important to remember that a stream is a dynamic and constantly changing system. It is natural for a stream to want to meander, so not all eroding banks are “bad” and in need of repair. Generally, stream bank erosion becomes a problem where development has limited the meandering nature of streams, where streams have been channelized, or where stream bank structures (like bridges, culverts, etc.) are located in places where they can actually cause damage to downstream areas. Stabilizing these areas can help protect watercourses from continued sedimentation, damage to adjacent land uses, control unwanted meander, and improvement of habitat for fish and wildlife.

Sustainable Hazard Mitigation—This concept includes the sound management of natural resources, local economic and social resiliency, and the recognition that hazards, and mitigation must be understood in the largest possible social and economic context.

Tephra—Ash and fragmented rock material ejected by a volcanic explosion

Thunderstorm—Typically 15 miles in diameter and lasting about 30 minutes, thunderstorms are underrated hazards. Lightning, which occurs with all thunderstorms, is a serious threat to human life. Heavy rains over a small area in a short time can lead to flash flooding. Strong winds, hail, and tornadoes are also dangers associated with thunderstorms.

Tier II Facility—A facility that stores any substance for which a facility must maintain a Safety Data Sheet under the OSHA Hazard Communication Standard. The reporting threshold requiring a Tier II report is 10,000 pounds for most chemicals. Extremely Hazardous Substances have a reporting threshold of 500 pounds or the Threshold Planning Quantity, whichever is lower. Tier II facilities can also store fuel but have higher reporting thresholds for gasoline and diesel fuel.

Trojan Horse—A computer program that conceals a harmful code.

Tsunami from a large undersea earthquake—The earthquake must cause significant vertical deformation on the seafloor in order for a tsunami to occur.

Tsunami Warning—Issued by Pacific Tsunami Warning Center when a potential tsunami with significant widespread inundation is imminent or expected.

Tsunami Watch—Issued when an event may later impact the watch area; may be upgraded to tsunami warning.

Tsunami—Comes from the Japanese words for harbor (“tsu”) and wave (“nami”); a long high sea wave caused by an earthquake, submarine landslide, or other disturbance.

Virus—A program that infects computer files by inserting a copy of itself into the file.

Volcano—A vent in the planetary crust.

Vulnerability—Vulnerability describes how exposed or susceptible an asset is to damage. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power. Flooding of an electric substation would affect not only the substation itself but businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

Water Resource Inventory Area (WRIA)—WRIs were formalized under Washington Administrative Code (WAC) 173-500-040 and authorized under the Water Resources Act of 1971, Revised Code of Washington 90.54. The Washington Department of Ecology was given the responsibility for the development and management of these administrative and planning boundaries. These boundaries represent the administrative underpinning of this agency's business activities. The original WRIA boundary agreements and judgments were reached jointly by Washington's natural resource agencies (Ecology, Natural Resources, Fish and Wildlife) in 1970.

Watershed—A watershed is an area that drains downgradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

Wild and Scenic River—A federal designation that is intended to protect the natural character of rivers and their habitat without adversely affecting surrounding property.

Wildfire—Fires that result in uncontrolled destruction of forests, brush, field crops, grasslands, and real and personal property in non-urban areas. Because of their distance from firefighting resources, they can be difficult to contain and cause a great deal of destruction.

Windstorm—A storm featuring violent winds. Southwesterly winds are associated with strong storms moving onto the coast from the Pacific Ocean. Southern winds parallel to the coastal mountains are the strongest and most destructive winds. Windstorms tend to damage ridgelines that face into the winds.

Winter Storm—A storm having significant snowfall, ice, and/or freezing rain; the quantity of precipitation varies by elevation.

Worm—An independent computer program that reproduces by copying itself.

Zero-Rise Floodway—An area reserved to carry the discharge of a flood without raising the base flood elevation. Some communities have chosen to implement zero-rise floodways because they provide greater flood protection than the floodway described above, which allows a 1-foot rise in the base flood elevation.

Zoning Ordinance—The zoning ordinance designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

Appendix B: 2020 Snohomish County Hazard Mitigation Plan Update Public Survey and Results

Summary of Survey

Limitations and Caveats:

The sample size was small (115 respondents). With this small number of respondents, it is difficult to make detailed deductions. The survey was useful to establish hypotheses and possible broad themes and warnings.

Respondent Profile:

- Respondents were mainly residents (71.3%): 43.5% were government employees; 17.4% were landowners; and business owners, elected officials, and others made up the remainder.

Hazards Summary:

- About half of the responses were “Very Concerned” about impacts of natural disasters in the community: 42.6% were “Somewhat Concerned,” and 7.8% were “Not Concerned.”
- The number of those impacted by a natural disaster was close to even: 48.7% said “Yes,” and 51.3% answered “No.”
- The most common disaster experienced was a Power Outage, followed closely by Winter Storms, Windstorms, and Earthquakes.
- The least experienced disaster was a Hazardous Materials Accident, followed by Landslide, Disease, Drought, Wildfire, Flooding, and Acts of Violence.
- Reflecting the Steering Committee hazard ranking, respondents ranked Earthquakes, Windstorms, Winter Storms, Acts of Violence, Power Outages, and Flooding highest.
- The percentage of respondents that do not live in a designated floodplain or flood zone is 82.6%, 10.4% didn’t know, and 7% said yes.

Insurance:

- Eight respondents that answered “yes” to having a home or business located in a designated floodplain or flood zone; nine respondents responded “yes” to having flood insurance.

Mitigation Actions:

- Sixty respondents have taken actions to protect their home and/or business from the impacts of hazards; 55 have not.
- Twenty-six respondents marked that they had project ideas for how to protect the community from the impact of hazards.

Outreach:

Under half (46 respondents) were interested in staying up to date with the County’s update progress.

Survey Results

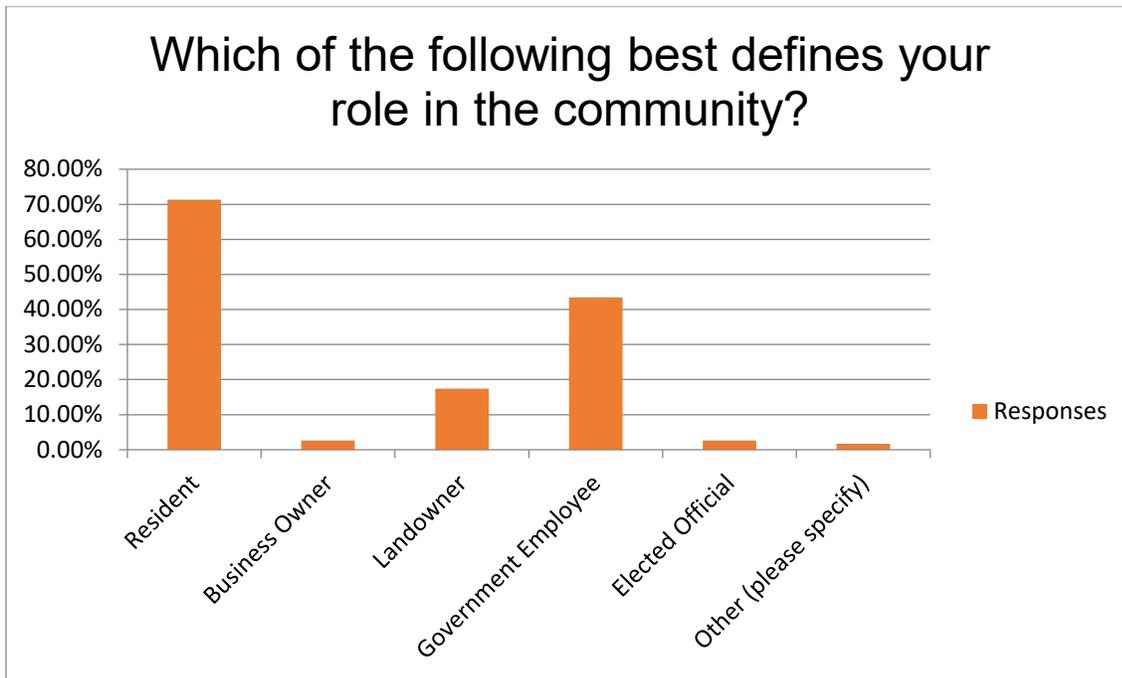
1. What city, town, or community do you live in?

-115 Answered

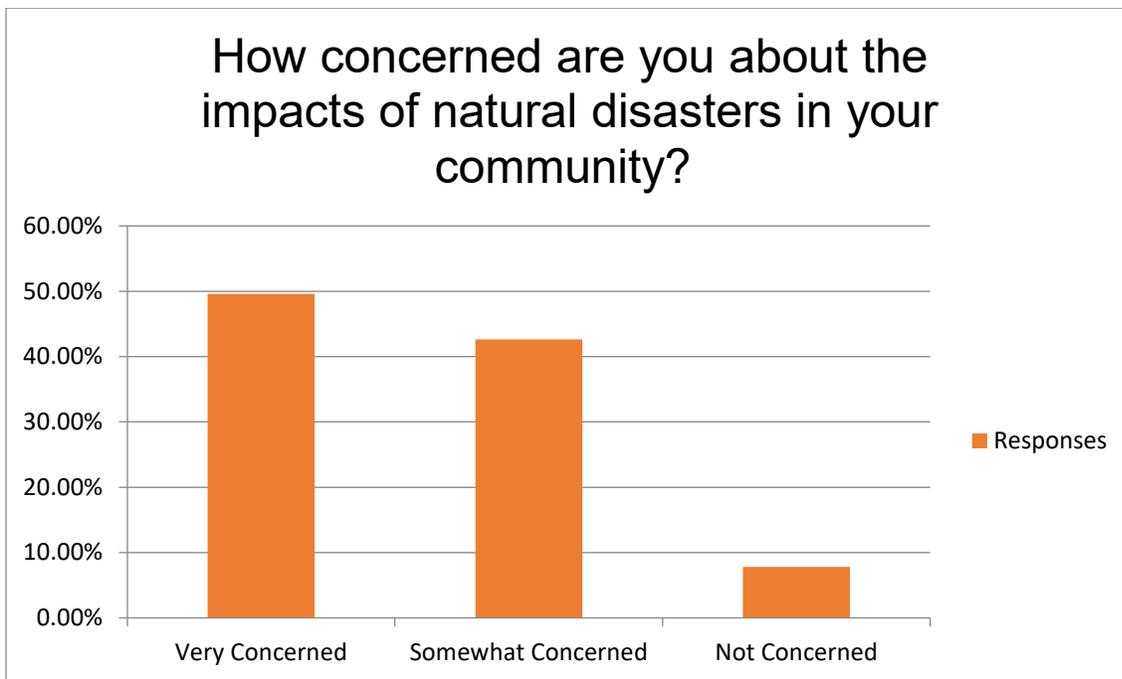
2. In what zip code do you live?

-115 Answered

3. Which of the following best defines your role in the community?

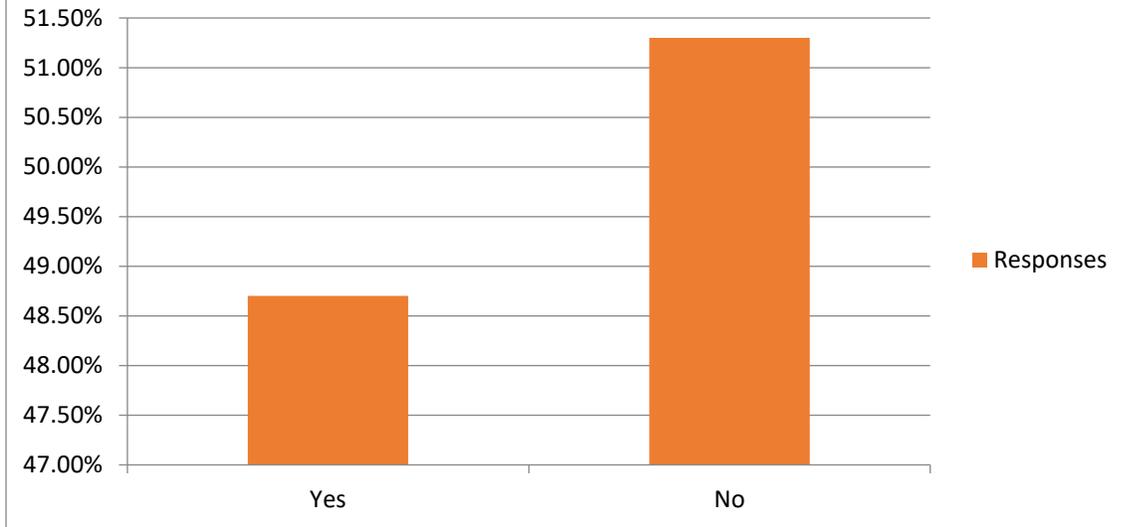


4. How concerned are you about the impacts of natural disasters in your community?



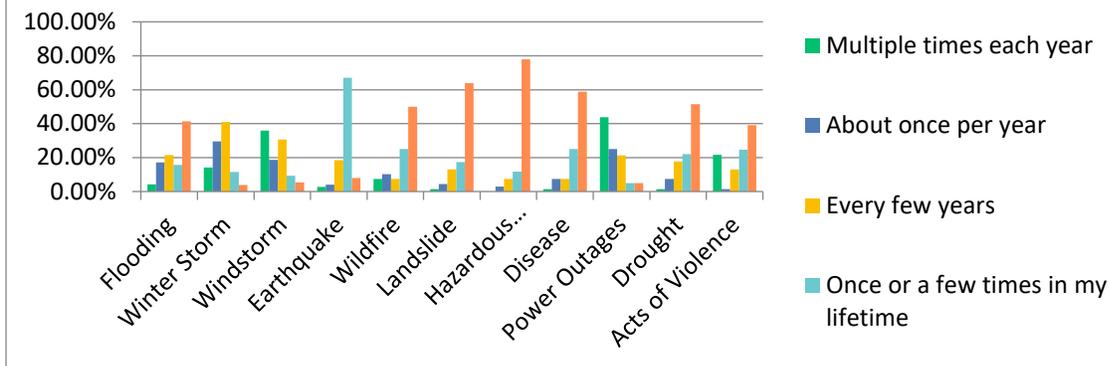
5. Have you been impacted by a natural disaster in your community?

Have you been impacted by a natural disaster in your community?



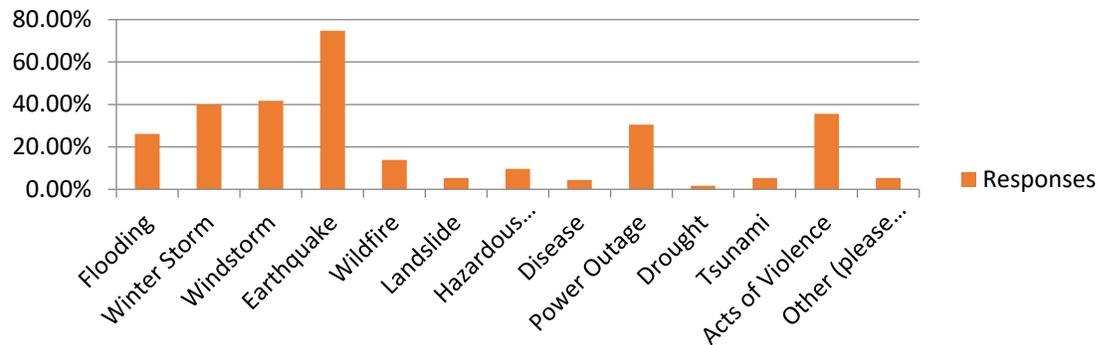
6. If you answered 'yes' to the previous question, please indicate the type(s) of disasters and the frequency with which you have experienced them in your community.

If you answered 'yes' to the previous questions, please indicate the type(s) of disasters and the frequency with which you have experienced them in your community

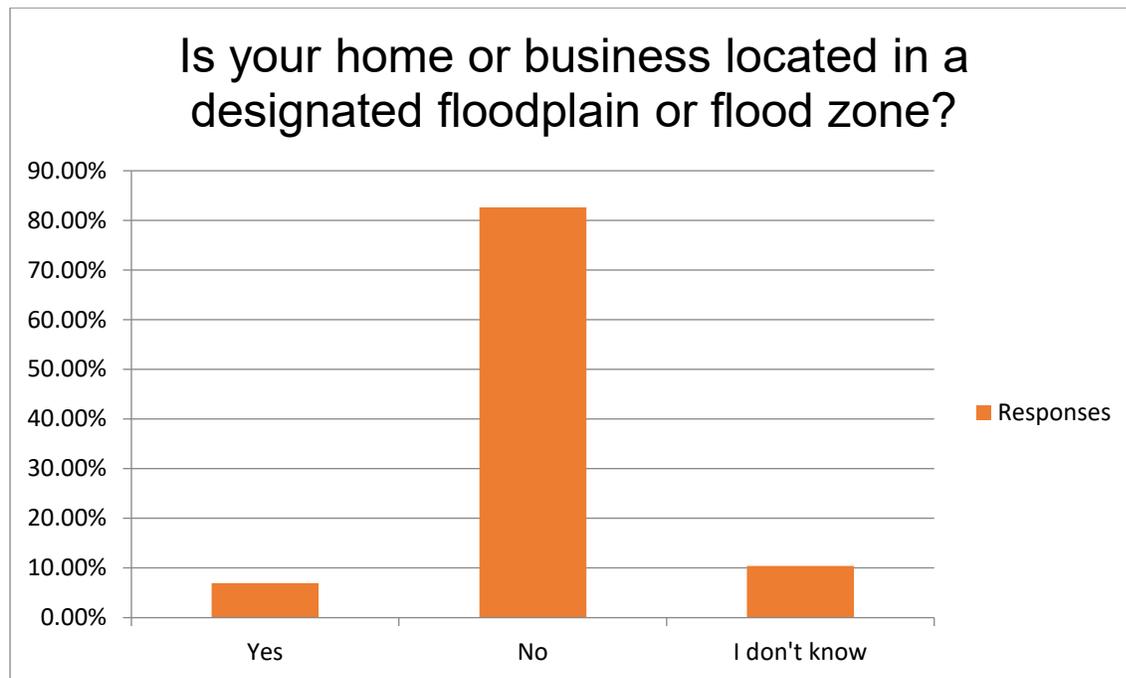


7. Please selected the top THREE (3) hazards you think are the GREATEST THREAT to your community, considering both frequency of occurrence and potential for severe damage.

Please selected the top THREE (3) hazards you think are the GREATEST THREAT to your community, considering both frequency of occurrence and potential for severe damage

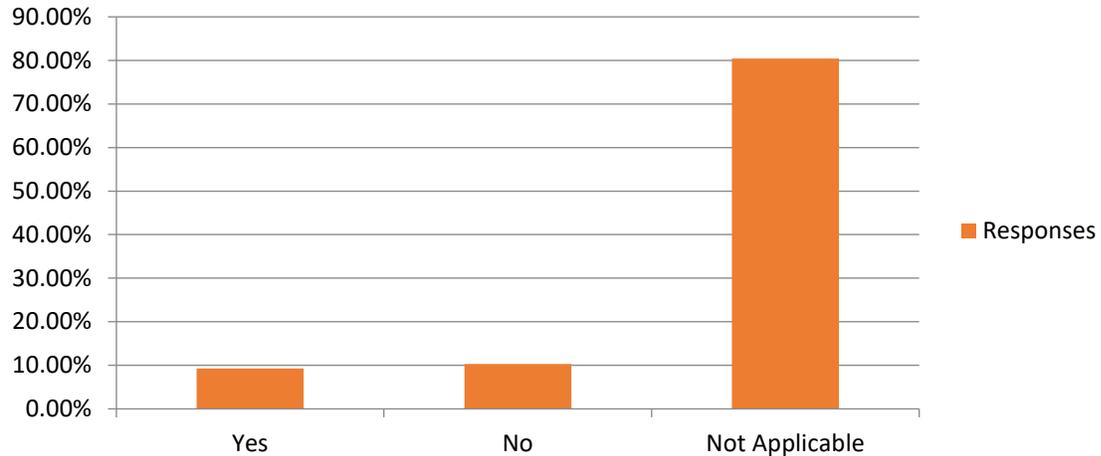


8. Is your home or business located in a designated floodplain or flood zone?



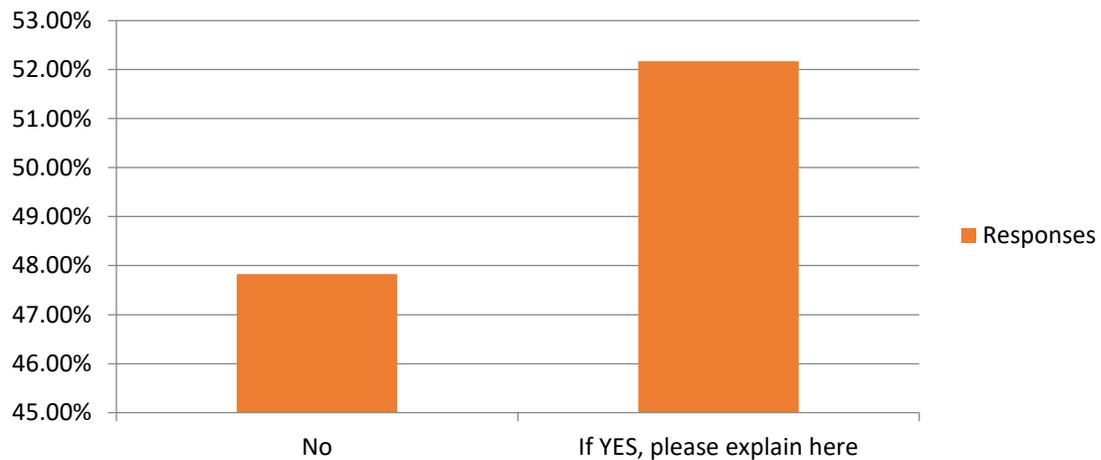
9. If you responded 'Yes' to the above question, do you currently have flood insurance?

If you responded 'Yes' to the above question, do you currently have flood insurance?



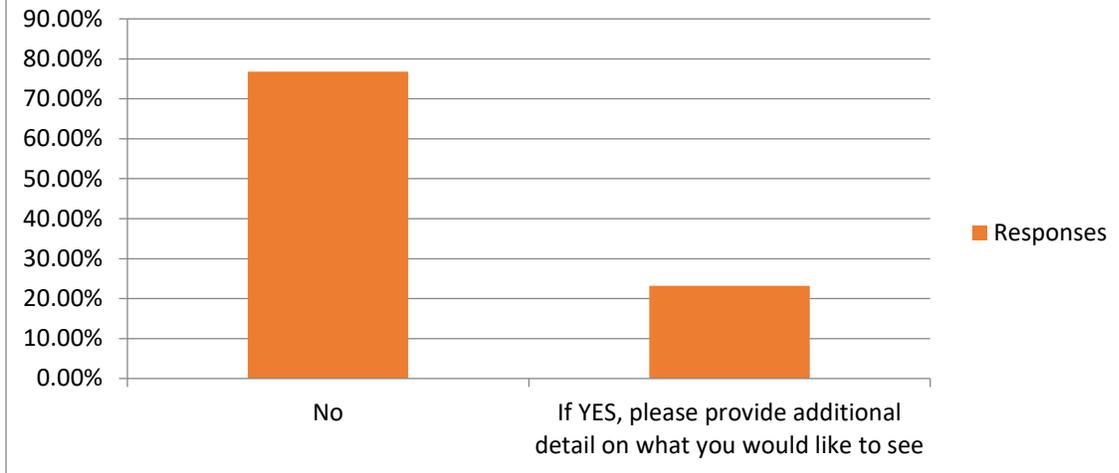
10. Have you taken actions to protect your home and/or business from impacts of hazards?

Have you taken actions to protect your home and/or business from impacts of hazards?



11. Do you have project ideas for how to protect the community from the impacts of hazards?

Do you have project ideas for how to protect the community from the impacts of hazards?



12. Are you interested in staying up to date with our progress? Provide your email address and we will provide you with updates and information about what you can do to help us!

-49 Answered

-66 Skipped

Appendix C: Snohomish County Hazard Mitigation Plan Annual Progress Report

[TBD]

Appendix D: Transfer of Development Rights and Purchase of Development Rights for Hazard Mitigation

Introduction

Identifying cost-effective tools to reduce life and safety risks to the resident population is a challenge facing county and municipal governments. Local governments lack the financial resources to purchase all at-risk properties and property owners often lack the resources to retrofit or replace existing at-risk structures. To address this challenge, this appendix identifies options for expanding Snohomish County's Transfer of Development Rights (TDR) and Purchase of Developments Rights (PDR) programs by incorporating high-risk hazard areas as TDR sending areas.

In this appendix, several examples of using TDR/PDR mechanisms to mitigate hazards are identified. The basic structure of how a program expansion could work in the County TDR/PDR program and the benefits and challenges the County might face during implementation are presented.

This appendix, however, does not provide a detailed explanation of TDR/PDR mechanisms, the historical development of TDR and PDR programs, challenges and best practices for mobilizing TDR market demand, nor the history of the Snohomish County TDR/PDR program. For information on these topics please refer to the following reports:

- Land Use Chapter of the *Snohomish County General Policy Plan*;
- Cascade Land Conservancy (also known as Forterra) 2011 report titled *Snohomish County: Purchase of Development Rights, Transfer of Development Rights, Strategic Opportunities for Conservation and Growth Management*;
- The 2013 report titled *Regional Transfer of Development Rights in Puget Sound, by a Regional Alliance of Puget Sound Counties, Cities, the Puget Sound Regional Council, Forterra and Department of Commerce*; and
- *Making TDR Work: The Case of the Seattle Metropolitan Area, Midterm Report (2011)*, by Prof. Chang-Hee Christine Bae and Matt Beal from the University of Washington.

TDR/PDR Programs and Hazard Mitigation

Across the United States there are examples of local governments using TDR/PDR programs as a means of mitigating the risks of natural hazards. A few of these are described below.

- In Santa Monica, California, the California Coastal Commission's TDR program requires that subdivision developments purchase development credits from sending areas identified with significant earthquake and landslide risks;
- The city of Corvallis, Oregon, enables the transfer of density (development rights) of a property for the preservation and restoration of natural resources and reduction of risk in natural hazard areas. This also includes provision of open space to avoid natural hazards;
- In Montgomery County, Pennsylvania, a study was conducted to identify the best means for addressing chronic flooding in the Fort Washington Office Park. New detention facilities upstream were found to be inadequate to significantly reduce flooding in much of the office park. The preferred and cost-effective approach to address the flooding was to establish a TDR program to

facilitate the transfer for development rights from frequently flooded areas in the office park to areas outside of the floodplain and still within the office park. Development and implementation of this proposal is still in process.

- Prior to the Florida legislature dismantling their growth management law in 2011, the State endorsed the use of TDR and PDR programs for hazard mitigation. Hillsborough County developed a TDR program to transfer development rights from coastal high-hazard areas to low-hazard areas. The program was designed to function both pre and post disaster. (Since the change in state growth management law, the county appears to have retained previously designated sending and receiving areas but has not identified any new areas.

In addition to local jurisdiction TDR programs, the U.S. Army Corps of Engineers recommended implementing a TDR program in Louisiana after hurricane Katrina to reduce future risk of storm-related flooding. The Federal Emergency Management Agency (FEMA) has acknowledged the value of TDR programs in integrating hazard mitigation with comprehensive planning.

Snohomish County TDR/Program Overview

Snohomish County's TDR and PDR programs are in the Land Use Chapter of the *Snohomish County General Policy Plan*. The county takes a two-tier approach with the TDR program: a county-wide policy and a separate overlay policy that continues the TDR pilot program developed with the City of Arlington. For the purposes of this study, Snohomish County is interested in the County-wide policies. The purpose of the TDR program is to use free market principles to permanently conserve specified natural resource lands. In addition, the County has developed a PDR program, which enables the county to purchase developments rights to permanently preserve natural resource lands.

Authorized sending areas for the county-wide program include parcels with farmland or forest land use designations. In addition, rural land holders may option into the program if their parcel(s) meet specific criteria. The County also has the authority to designate additional sending areas for the county-wide TDR program through inter-local agreement, development agreement, or code amendment. Receiving areas include cities, County-designated urban centers, and other areas that have or may be authorized to increase density. To create incentive for the purchase of TDR credits, the County requires development in receiving areas and the use of TDR credits to build to any authorized density greater than what was permitted under the comprehensive plan and development regulations as of November 10, 2012.

Allowable TDR credits for issue are defined in section LU 14.A.6 of the General Policy Plan. A conservation easement is placed on the land with the sale of the TDR credits by the property owner. To encourage preservation of farmland, greater development value is allocated to TDR credits purchased from farmland sending areas.

The Snohomish County program provides two mechanisms for transferring development credits to municipal governments: standard policies adopted by the local government, or inter-local agreements. Implementation of the county-wide program also enables Snohomish County to participate in a regional TDR agreement with King and Pierce counties. Under this agreement, TDR credits can be purchased in one county and used in another.

Options available in Snohomish County

The primary application of TDR for hazard mitigation is to restrict new development altogether or to reduce the allowed development density within hazardous areas. In expanding the use of TDRs to hazard mitigation, the county has several approaches to consider, policies that reduce risk prior to a disaster, and policies that address appropriate redevelopment post-disaster. The following three approaches build on the existing county-wide TDR and PDR policies.

Free Market Approach

With the Free Market Approach new sending areas are designated based on natural hazard risks and receiving areas would stay the same as under the existing County policy. The TDR market would set the price for credits and determine where and when development rights are transferred. PDRs could be used by the County to mitigate hazard in priority high-risk areas. A conservation easement would be implemented upon TDR sale from the sending area, the same as under existing policy. Under this approach, no additional restrictions are placed on the development of the property prior to sale of the development rights.

Benefits:

- Reduces hazard-related risk;
- Respects property rights;
- Leverages private sector resources to mitigate hazards;
- Lowers response and recovery costs;
- Moderately lowers mitigation costs for local governments;
- Builds on existing county program;
- Supports implementation of the Snohomish County Comprehensive Plan by concentrating future development in urban centers; and
- Helps maintain and restore ecosystem services.

Challenges:

- The TDR program relies on market to decide if and where to mitigate, which may not reflect County's priorities;
- The County must rely on the PDR program to target priority high-risk properties, which is a financial burden;
- Risk areas included in TDR/PDR programs need to be defined and identified; and
- Competing TDR program goals of resource land preservation and hazard mitigation.

Pre-Disaster Development Restriction

Under this approach, restrictions on type of new development allowed in specified hazard risk areas are added to mechanisms in place under the Free Market Approach. Risk compatible development would still be allowed. Once the new restrictions are put in place, TDR credits would be issued based on development potential that existed prior to the new restrictions. As non-risk compatible development would not be allowed, there would not be a need to issue a conservation easement.

Benefits:

- Reduces hazard related risk;
- Respects property rights;
- Leverages private sector resources to mitigate hazards;
- Lowers response and recovery costs;
- Significantly lowers mitigation costs for local governments;
- Builds on existing County program;
- Supports implementation of the Snohomish County Comprehensive Plan by concentrating future development in urban centers; and
- Helps maintain and restore ecosystem services.

Challenges:

- The County must develop and adopt development restrictions;
- Risk areas included in TDR/PDR programs need to be defined and identified; and
- Competing TDR program goals of resource land preservation and hazard mitigation.

Post-Disaster Recovery

Building on the previous approaches, this approach restricts post-disaster development to risk compatible uses. This may result in not replacing facilities and infrastructure on site in the disaster recovery process. Similar to the pre-disaster development restriction approach, TDR credits would be issued based on the development potential that existed prior to the new restrictions. As non-risk compatible development would not be allowed post-disaster, there would not be a need to issue a conservation easement.

Benefits:

- Reduces hazard related risk;
- Respects property rights;
- Leverages private sector resources to mitigate hazards;
- Lowers response and recovery costs;
- Lowers mitigation costs for local government;
- Builds on existing county program;
- Supports implementation of the Comprehensive Plan by concentrating future development in urban centers; and
- Helps maintain and restore ecosystem services.

Challenges:

- The County must develop and adopt post-disaster development restrictions;
- Risk areas included in TDR/PDR programs need to be defined and identified; and
- Competing TDR program goals of resource land preservation and hazard mitigation.

Conclusion

Snohomish County, like other local governments, faces the challenge of reducing hazard risk to residents and property, while minimizing the financial costs to the County. As demonstrated by other jurisdictions in the United States, TDR programs provide an effective tool to reduce development in high-risk hazard

areas and transfer development to lower-risk areas. Through expansion of the County's existing TDR program to include high-risk hazard areas as sending areas, the County could reduce risk of hazards; respect property rights; and lower County hazard mitigation, response, and recovery costs. To implement this proposed TDR program expansion, hazard sending areas would need to be defined and identified and the development value of the TDR credits would need to be determined.

Appendix E: Catalogs of Mitigation Alternatives

Catalogs of Mitigation Alternatives

The catalogs of mitigation alternatives list initiatives that could manipulate a hazard, reduce exposure to a hazard, reduce vulnerability to a hazard, or increase the ability to respond to or be prepared for a hazard. The alternatives are categorized by responsibility for implementation (i.e., who would implement the initiative: individuals, businesses, or government). These catalogs represent the comprehensive range of alternatives available for consideration by the planning partners.

The list was not exhaustive or site-specific. Its purpose was to provide each planning partner with a baseline of initiatives that were backed by a planning process, consistent with the goals and objectives of the planning area, and within the capabilities of the partnership. Each planning partner could add to the list of alternatives if an initiative they desired was not included. Generally, alternatives in the catalog not selected by a planning partner were rejected based on one of the following:

- The alternative was beyond the jurisdiction's financial capabilities;
- Their jurisdiction was not vulnerable to the hazard; or
- The alternative had already been implemented.

Mitigation Alternatives Catalog – Avalanche

No actions were reviewed for the avalanche hazard other than public education actions, since there is very little development exposed to this hazard within the planning area.

Mitigation Alternatives Catalog – Dam Failure

Table E-1 is the catalog of mitigation alternatives for the dam failure hazard.

Table E-1 Catalog of Risk Reduction Measures – Dam Failure		
Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
None	<ol style="list-style-type: none"> 1. Remove dams. 2. Remove levees. 3. Harden dams. 	<ol style="list-style-type: none"> 1. Remove dams. 2. Remove levees. 3. Harden dams.
Reduce Exposure		
Relocate out of dam failure inundation areas	Replace earthen dams with hardened structures	<ol style="list-style-type: none"> 1. Replace earthen dams with hardened structures. 2. Relocate critical facilities out of dam failure inundation areas. 3. Consider open space land use in designated dam failure inundation areas.
Reduce Vulnerability		
Elevate home to appropriate levels	Flood-proof facilities within dam failure inundation areas	<ol style="list-style-type: none"> 1. Adopt higher regulatory floodplain standards in mapped dam failure inundation areas. 2. Retrofit critical facilities within dam failure inundation areas.
Increase Preparation or Response Capability		
<ol style="list-style-type: none"> 1. Learn about risk reduction for the dam failure hazard. 2. Learn the evacuation routes for a dam failure event. 3. Self-educate on early warning systems and the dissemination of warnings. 	<ol style="list-style-type: none"> 1. Educate employees on the probable impacts of a dam failure. 2. Develop a Continuity of Operations Plan. 	<ol style="list-style-type: none"> 1. Map dam failure inundation areas. 2. Enhance emergency operations plan to include a dam failure component. 3. Institute monthly communications checks with dam operators. 4. Inform the public on risk reduction techniques 5. Adopt real-estate disclosure requirements for the re-sale of property located within dam failure inundation areas. 6. Consider the probable impacts of climate in assessing the risk associated with the dam failure hazard. 7. Establish early warning capability downstream of listed high-hazard dams. 8. Consider the residual risk associated with protection provided by dams in future land use decisions.

Mitigation Alternatives Catalog – Earthquake

Table E-2 is the catalog of mitigation alternatives for the earthquake hazard.

Table E-2		
Catalog of Risk Reduction Measures – Earthquake		
Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
None	None	None
Reduce Exposure		
Locate outside of hazard area (off soft soils).	Locate or relocate mission-critical functions outside hazard area where possible.	Locate critical facilities or functions outside hazard area where possible.
Reduce Vulnerability		
<ol style="list-style-type: none"> 1. Retrofit structure (anchor house structure to foundation). 2. Secure household items that can cause injury or damage (such as water heaters, bookcases, and other appliances). 3. Build to higher design. 	<ol style="list-style-type: none"> 1. Build redundancy for critical functions and facilities. 2. Retrofit critical buildings and areas housing mission-critical functions. 	<ol style="list-style-type: none"> 1. Harden infrastructure. 2. Provide redundancy for critical functions. 3. Adopt higher regulatory standards.
Increase Preparation or Response Capability		
<ol style="list-style-type: none"> 1. Practice “drop, cover, and hold.” 2. Develop household mitigation plan, such as creating a retrofit savings account, communication capability with outside, 72-hour self-sufficiency during an event. 	<ol style="list-style-type: none"> 1. Adopt higher standard for new construction; consider “performance-based design” when building new structures. 2. Keep cash reserves for reconstruction. 3. Inform your employees on the possible impacts of earthquakes and how to deal with them at your work facility. 4. Develop a Continuity of Operations Plan. 	<ol style="list-style-type: none"> 1. Provide better hazard maps. 2. Provide technical information and guidance. 3. Enact tools to help manage development in hazard areas (e.g., tax incentives, information). 4. Include retrofitting and replacement of critical system elements in the Capital Improvement Plan. 5. Develop strategy to take advantage of post-disaster opportunities. 6. Warehouse critical infrastructure components such as pipe, power line, and road repair materials. 7. Develop and adopt a Continuity of Operations Plan. 8. Initiate triggers guiding improvements (such as <50% substantial damage or improvements). 9. Further enhance seismic risk assessment to target high-hazard buildings for mitigation opportunities.

**Table E-2
Catalog of Risk Reduction Measures – Earthquake**

Personal Scale	Corporate Scale	Government Scale
<p>3. Keep cash reserves for reconstruction.</p> <p>4. Become informed on the hazard and risk reduction alternatives available.</p> <p>5. Develop a post-disaster action plan for your household.</p>		<p>10. Develop a post-disaster action plan that includes grant funding and debris removal components.</p>

Mitigation Alternatives Catalog – Flood

Table E-3 is the catalog of mitigation alternatives for the flood hazard.

Table E-3		
Catalog of Risk Reduction Measures – Flood		
Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
<ol style="list-style-type: none"> 1. Clear stormwater drains and culverts. 2. Institute low-impact development techniques on property. 	<ol style="list-style-type: none"> 1. Clear stormwater drains and culverts. 2. Institute low-impact development techniques on property. 	<ol style="list-style-type: none"> 1. Maintain drainage system. 2. Institute low-impact development techniques on property. 3. Dredging, levee construction, and providing regional retention areas. 4. Structural flood control, levees, channelization, or revetments. 5. Stormwater management regulations and master planning. 6. Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff.
Reduce Exposure		
<ol style="list-style-type: none"> 1. Locate outside of hazard area. 2. Elevate utilities above base flood elevation. 3. Institute low impact development techniques on property. 	<ol style="list-style-type: none"> 1. Locate business critical facilities or functions outside hazard area. 2. Institute low impact development techniques on property. 	<ol style="list-style-type: none"> 1. Locate or relocate critical facilities outside of hazard area. 2. Acquire or relocate identified repetitive loss properties. 3. Promote open space uses in identified high hazard areas via techniques such as: planned unit developments, easements, setbacks, greenways, sensitive area tracks. 4. Adopt land development criteria such as planned unit developments, density transfers, clustering. 5. Institute low-impact development techniques on property. 6. Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff.
Reduce Vulnerability		
<ol style="list-style-type: none"> 1. Retrofit structures (elevate structures above base flood elevation). 2. Elevate items within house above base flood elevation. 3. Build new homes above 	<ol style="list-style-type: none"> 1. Build redundancy for critical functions or retrofit critical buildings. 2. Provide floodproofing measures when new critical infrastructure must be located in floodplains. 	<ol style="list-style-type: none"> 1. Harden infrastructure, institute bridge replacement program. 2. Provide redundancy for critical functions and infrastructure. 3. Adopt appropriate regulatory standards, such as: increased freeboard standards, cumulative substantial improvement or damage, lower substantial damage threshold, compensatory storage, non-conversion deed restrictions. 4. Stormwater management regulations and master planning.

**Table E-3
Catalog of Risk Reduction Measures – Flood**

Personal Scale	Corporate Scale	Government Scale
<p>base flood elevation. 4. Flood-proof existing structures.</p>		<p>5. Adopt “no-adverse impact” floodplain management policies that strive to not increase the flood risk on downstream communities.</p>
Increase Preparation or Response Capability		
<p>1. Buy flood insurance. 2. Develop household mitigation plan, such as retrofit savings, communication capability with outside, 72-hour self-sufficiency during and after an event.</p>	<p>1. Keep cash reserves for reconstruction. 2. Support and implement hazard disclosure for the sale/re-sale of property in identified risk zones. 3. Solicit “cost-sharing” through partnerships with other stakeholders on projects with multiple benefits.</p>	<p>1. Produce better hazard maps. 2. Provide technical information and guidance. 3. Enact tools to help manage development in hazard areas (e.g., stronger controls, tax incentives, and information). 4. Incorporate retrofitting or replacement of critical system elements in capital improvement plan. 5. Develop strategy to take advantage of post-disaster opportunities. 6. Warehouse critical infrastructure components. 7. Develop and adopt a Continuity of Operations Plan. 8. Consider participation in the Community Rating System. 9. Maintain existing data and gather new data needed to define risks and vulnerability. 10. Train emergency responders. 11. Create a building and elevation inventory of structures in the floodplain. 12. Develop and implement a public information strategy. 13. Charge a hazard mitigation fee. 14. Integrate floodplain management policies into other planning mechanisms within the planning area. 15. Consider the probable impacts of climate change on the risk associated with the flood hazard. 16. Consider the residual risk associated with structural flood control in future land use decisions. 17. Enforce National Flood Insurance Program. 18. Adopt a Stormwater Management Master Plan.</p>

Mitigation Alternatives Catalog – Mass Earth Movement

Table E-4 is the catalog of mitigation alternatives for the mass earth movement hazard.

Table E-4		
Catalog of Risk Reduction Measures – Mass Earth Movement		
Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
1. Stabilize slope (dewater, armor toe). 2. Reduce weight on top of slope. 3. Minimize vegetation removal and the addition of impervious surfaces.	1. Stabilize slope (dewater, armor toe). 2. Reduce weight on top of slope.	1. Stabilize slope (dewater, armor toe). 2. Reduce weight on top of slope.
Reduce Exposure		
Locate structures outside of hazard area (off unstable land and away from slide-run out area).	Locate structures outside of hazard area (off unstable land and away from slide-run out area).	1. Acquire properties located in high-risk landslide areas. 2. Adopt land use policies that prohibit the placement of habitable structures in high-risk landslide areas.
Reduce Vulnerability		
Retrofit home.	1. Retrofit at-risk facilities.	1. Adopt higher regulatory standards for new development within unstable slope areas. 2. Armor/retrofit critical infrastructure against the impact of landslides.
Increase Preparation or Response Capability		
1. Institute warning system and develop evacuation plan. 2. Keep cash reserves for reconstruction. 3. Self-educate on risk reduction techniques for landslide hazards.	1. Institute warning system and develop evacuation plan. 2. Keep cash reserves for reconstruction. 3. Develop a Continuity of Operations Plan. 4. Educate employees on the potential exposure to landslide hazards and emergency response protocol.	1. Produce better hazard maps. 2. Provide technical information and guidance. 3. Enact tools to help manage development in hazard areas: better land controls, tax incentives, and information. 4. Develop strategy to take advantage of post-disaster opportunities. 5. Warehouse critical infrastructure components. 6. Develop and adopt a Continuity of Operations Plan. 7. Educate the public on the landslide hazard and appropriate risk reduction alternatives.

Mitigation Alternatives Catalog – Weather Events

Table E-5 is the catalog of mitigation alternatives for the weather events hazard.

Table E-5 Catalog of Risk Reduction Measures – Weather Events		
Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
None	None	None
Reduce Exposure		
None	None	None
Reduce Vulnerability		
<ol style="list-style-type: none"> 1. Insulate house. 2. Provide redundant heat and power. 3. Insulate structure. 4. Plant appropriate trees near home and power lines (“Right tree, right place” National Arbor Day Foundation Program). 	<ol style="list-style-type: none"> 1. Relocate critical infrastructure (such as power lines) underground. 2. Reinforce or relocate critical infrastructure such as power lines to meet performance expectations. 3. Install tree wire. 	<ol style="list-style-type: none"> 1. Harden infrastructure such as locating utilities underground. 2. Trim trees back from power lines. 3. Designate snow routes and strengthen critical road sections and bridges.
Increase Preparation or Response Capability		
<ol style="list-style-type: none"> 1. Trim or remove trees that could affect power lines. 2. Promote 72-hour self-sufficiency. 3. Obtain a National Oceanic and Atmospheric Administration (NOAA) weather radio. 4. Obtain an emergency generator. 	<ol style="list-style-type: none"> 1. Trim or remove trees that could affect power lines. 2. Create redundancy. 3. Equip facilities with a NOAA weather radio. 4. Equip vital facilities with emergency power sources. 	<ol style="list-style-type: none"> 1. Support programs such as “Tree Watch” that proactively manage problem areas through use of selective removal of hazardous trees, tree replacement, etc. 2. Establish and enforce building codes that require all roofs to withstand snow loads. 3. Increase communication alternatives. 4. Modify land use and environmental regulations to support vegetation management activities that improve reliability in utility corridors. 5. Modify landscape and other ordinances to encourage appropriate planting near overhead power, cable, and phone lines. 6. Provide NOAA weather radios to the public.

Mitigation Alternatives Catalog – Tsunami

Table E-6 is the catalog of mitigation alternatives for the tsunami hazard.

Table E-6		
Catalog of Risk Reduction Measures – Tsunami		
Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
None	None	Build wave abatement structures (e.g., the “Jacks” looking structure designed by the Japanese).
Reduce Exposure		
Locate outside of hazard area.	Locate structure or mission critical functions outside of hazard area whenever possible.	<ol style="list-style-type: none"> 1. Locate structure or functions outside of hazard area whenever possible. 2. Harden infrastructure for tsunami impacts. 3. Relocate identified critical facilities located in tsunami high hazard areas.
Reduce Vulnerability		
Apply personal property mitigation techniques to your home such as anchoring your foundation and foundation openings to allow flow through.	Mitigate personal property for the impacts of tsunami.	<ol style="list-style-type: none"> 1. Adopt higher regulatory standards that will provide higher levels of protection to structures built in a tsunami inundation area. 2. Utilize tsunami mapping once available, to guide development away from high risk areas through land use planning.
Increase Preparation or Response Capability		
<ol style="list-style-type: none"> 1. Develop and practice a household evacuation plan. 2. Support/participate in the Redwood Coast Tsunami Working Group. 3. Educate yourself on the risk exposure from the tsunami hazard and ways to minimize that risk. 	<ol style="list-style-type: none"> 1. Develop and practice a corporate evacuation plan. 2. Support/participate in the Redwood Coast Tsunami Working Group. 3. Educate employees on the risk exposure from the tsunami hazard and ways to minimize that risk. 	<ol style="list-style-type: none"> 1. Create a probabilistic tsunami map for the county. 2. Provide incentives to guide development away from hazard areas. 3. Develop a tsunami warning and response system. 4. Provide residents with tsunami inundation maps. 5. Join NOAA’s Tsunami Ready program. 6. Develop and communicate evacuation routes. 7. Enhance the public information program to include risk reduction options for the tsunami hazard.

Mitigation Alternatives Catalog – Volcano

Table E-7 is the catalog of mitigation alternatives for the volcano hazard.

Table E-7		
Catalog of Risk Reduction Measures – Volcano		
Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
None	None	Limited success has been experienced with lava flow diversion structures.
Reduce Exposure		
Relocate outside of hazard area, such as lahar zones.	Locate mission critical functions outside of hazard area, such as lahar zones whenever possible.	Locate critical facilities and functions outside of hazard area, such as lahar zones, whenever possible.
Reduce Vulnerability		
None	Protect corporate critical facilities and infrastructure from potential impacts of severe ash fall (air filtration capability).	<ol style="list-style-type: none"> 1. Protect critical facilities from potential problems associated with ash fall. 2. Build redundancy for critical facilities and functions.
Increase Preparation or Response Capability		
Develop and practice a household evacuation plan.	<ol style="list-style-type: none"> 1. Develop and practice a corporate evacuation plan. 2. Inform employees through corporate sponsored outreach. 3. Develop a cooperative. 	<ol style="list-style-type: none"> 1. Promote public outreach, awareness. 2. Tap into state volcano warning system to provide early warning to Snohomish County residents of potential ash fall problems.

Mitigation Alternatives Catalog – Wildland Fire

Table E-8 is the catalog of mitigation alternatives for the wildland fire hazard.

Table E-8		
Catalog of Risk Reduction Measures – Wildland Fire		
Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
Clear potential fuels on property such as dry overgrown underbrush and diseased trees.	Clear potential fuels on property such as dry underbrush and diseased trees.	<ol style="list-style-type: none"> 1. Clear potential fuels on property such as dry underbrush and diseased trees. 2. Implement best management practices on public lands.
Reduce Exposure		
<ol style="list-style-type: none"> 1. Create and maintain defensible space around structures. 2. Locate outside of hazard area. 3. Mow regularly. 	<ol style="list-style-type: none"> 1. Create and maintain defensible space around structures and infrastructure. 2. Locate outside of hazard area. 	<ol style="list-style-type: none"> 1. Create and maintain defensible space around structures and infrastructure. 2. Locate outside of hazard area. 3. Enhance building code to include use of fire-resistant materials in high hazard area.
Reduce Vulnerability		
<ol style="list-style-type: none"> 1. Create and maintain defensible space around structures and provide water on site. 2. Use fire-retardant building materials. 3. Create defensible spaces around home. 	<ol style="list-style-type: none"> 1. Create and maintain defensible space around structures and infrastructure and provide water on site. 2. Use fire-retardant building materials. 3. Use fire-resistant plantings in buffer areas of high wildland fire threat. 	<ol style="list-style-type: none"> 1. Create and maintain defensible space around structures and infrastructure. 2. Use fire-retardant building materials. 3. Use fire-resistant plantings in buffer areas of high wildland fire threat. 4. Consider higher regulatory standards (such as Class A roofing). 5. Establish biomass reclamation initiatives.
Increase Preparation or Response Capability		
<ol style="list-style-type: none"> 1. Employ Firewise techniques to safeguard home. 2. Identify alternative water supplies for firefighting. 3. Install/replace roofing material with noncombustible roofing materials. 	<ol style="list-style-type: none"> 1. Support Firewise community initiatives. 2. Create/establish stored water supplies to be utilized for firefighting. 	<ol style="list-style-type: none"> 1. More public outreach and education efforts, including an active Firewise program. 2. Possible weapons of mass destruction funds available to enhance fire capability in high risk areas. 3. Identify fire response and alternative evacuation routes. 4. Seek alternative water supplies. 5. Become a Firewise community. 6. Use academia to study impacts/solutions to wildland fire risk. 7. Establish/maintain mutual aid agreements between fire service agencies. 8. Create/implement fire plans. 9. Consider the probable impacts of climate change on the risk associated with the wildland fire hazard in future land use decisions.

Mitigation Alternatives Catalog – Hazardous Materials

Table E-9 is the catalog of mitigation alternatives for hazardous materials hazards.

Table E-9 Catalog of Risk Reduction Measures – Hazardous Materials		
Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
Practice safe transporting procedures (for example, do not transport hazardous materials (HAZMAT) unless trained and aware of the hazards).	<ol style="list-style-type: none"> 1. Promote a culture of awareness and safety to reduce risks of spills or releases. 2. Continuously seek out safer alternative products. 	<ol style="list-style-type: none"> 1. Promote a culture of awareness and safety to reduce risks of spills or releases. 2. Continuously seek out safer alternative products. 3. Have police and emergency responders work with appropriate regional, state, and federal agencies to share information, identify threats, and respond to potential incidents. 4. Provide information on hazardous waste disposal and/or drop off locations.
Reduce Exposure		
Relocate away from high-hazard areas.	Relocate critical or mission-essential facilities away from major highways and transportation corridors.	<ol style="list-style-type: none"> 1. Relocate critical or mission-essential facilities away from major highways and transportation corridors. 2. Harden critical infrastructure to the greatest extent possible. 3. Enforce safety laws and measures regarding HAZMAT.
Reduce Vulnerability		
Notify police or response personnel of suspicious activities.	Properly placard and label containers, update emergency plans, and coordinate response procedures with Snohomish County and local jurisdictions.	<ol style="list-style-type: none"> 1. Work proactively with HAZMAT facilities regarding placards and labeling of containers, emergency plans and coordination, standardized response procedures, and notification of the types of materials transported through Snohomish County on at least an annual basis. 2. Random inspections. 3. Routine hazard communication initiatives.
Increase Preparation or Response Capability		
Develop a family evacuation plan if living near a HAZMAT facility.	<ol style="list-style-type: none"> 1. Participate in jurisdictional/city, county, state, federal, and other efforts to practice response capabilities, gather relevant hazard 	<ol style="list-style-type: none"> 1. Participate in regional, state, and federal efforts to gather information at all levels and keep public safety officials briefed. 2. Continue all facets of emergency preparedness training and exercises for Police, Fire, Public Works, and

**Table E-9
Catalog of Risk Reduction Measures – Hazardous Materials**

Personal Scale	Corporate Scale	Government Scale
	<p>information, and monitor vulnerabilities.</p> <p>2. Develop a Business Continuity Plan.</p> <p>3. Review existing automatic/mutual aid agreements.</p>	<p>Manager/Public Information staff in order to respond quickly in the event of a HAZMAT incident.</p> <p>3. Review existing automatic/mutual aid agreements.</p> <p>4. Maintain a regional around-the-clock emergency services information hotline for the public.</p> <p>5. Coordinate with school districts to ensure emergency preparedness plans include HAZMAT incidents.</p>

Mitigation Alternatives Catalog – Cybersecurity Threats

Table E-10 is the catalog of mitigation alternatives for cybersecurity threats.

Table E-10 Catalog of Risk Reduction Measures – Cybersecurity Threats		
Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
Practice safe cyber procedures (i.e., not opening email attachments, clicking on unknown links, sharing private information).	<ol style="list-style-type: none"> 1. Promote a culture of diligence and awareness for various types of cyber threats and attacks. 2. Continuously educate employees on safe cyber practices and keep anti-virus software up to date. 	<ol style="list-style-type: none"> 1. Promote a culture of diligence and awareness for various types of cyber threats and attacks. 2. Continuously educate employees on safe cyber practices and keep anti-virus software up to date. 3. Have police and emergency responders work with appropriate regional, state, and federal agencies to share information, identify threats, and respond to potential incidents to reduce criminal activity attempts and other threats.
Reduce Exposure		
Reduce dependence on the Internet.	<ol style="list-style-type: none"> 1. Ensure protective systems are in place to recognize cyber threats and attacks. 2. Have backup systems. 	<ol style="list-style-type: none"> 1. Ensure protective systems are in place to recognize cyber threats and attacks. 2. Have backup systems. 3. Harden critical cyber infrastructure to the greatest extent possible.
Reduce Vulnerability		
Notify appropriate government officials regarding suspicious activities, attacks, or scams.	Maintain regular updates to systems for security patches.	Random training and testing of employees to ensure vigilance and awareness.
Increase Preparation or Response Capability		
Maintain awareness of various Internet/email scams, phishing techniques, etc.	<ol style="list-style-type: none"> 1. Obtain insurance for ransomware recovery. 2. Coordinate in information sharing initiatives with the local cities and County. 3. Develop a Business Continuity Plan. 4. Adopt Information Technology and telecommunications recovery plans. 	<ol style="list-style-type: none"> 1. Participate in regional, state, and federal efforts to gather information at all levels and keep public safety officials briefed at all times regarding any local threats. 2. Review existing automatic/mutual aid agreements. 3. Maintain a regional around-the-clock emergency services information hotline for the public. 4. Coordinate with school districts to ensure emergency preparedness plans include cybersecurity attacks. 5. Obtain insurance for ransomware recovery.

Mitigation Alternatives Catalog – Active Assailant

Table E-11 is the catalog of mitigation alternatives for active assailants.

Table E-11 Catalog of Risk Reduction Measures – Active Assailant		
Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
Practice vigilance and awareness.	<ol style="list-style-type: none"> Promote a culture of vigilance and awareness to recognize signs of potentially disturbed persons. Promote a “see something, say something” culture in all facets of life. 	<ol style="list-style-type: none"> Promote a culture of vigilance and awareness to recognize signs of potentially disturbed persons Promote a “see something, say something” culture in all facets of life. Have police and emergency responders work with appropriate regional, state, and federal agencies to share information, identify threats, and respond to potential incidents to reduce criminal activity attempts and other threats.
Reduce Exposure		
Relocate away from high-hazard areas when possible.	Control ingress and egress.	<ol style="list-style-type: none"> Control ingress and egress. Harden critical infrastructure to the greatest extent possible.
Reduce Vulnerability		
Notify police or response personnel of suspicious activities.	Promote a culture of awareness and vigilance.	Maintain visible police and emergency responder presence in sensitive and high-risk locations.
Increase Preparation or Response Capability		
Develop a family mitigation plan and an evacuation plan if living near a high-risk target.	<ol style="list-style-type: none"> Participate in jurisdictional/city, County, state, federal, and other efforts to practice response capabilities, gather relevant hazard information (such as on terrorism), and monitor vulnerabilities. Coordinate in information sharing initiatives with the local cities and County. Develop a Business Continuity Plan. Review existing automatic/mutual aid agreements. 	<ol style="list-style-type: none"> Participate in regional, state, and federal efforts to gather terrorism information at all levels and keep public safety officials briefed at all times regarding any local threats. Staff will then further develop response capabilities based on emerging threats. Continue all facets of emergency preparedness training and exercises for Police, Fire, Public Works, and Manager/Public Information staff in order to respond quickly in the event of an Active Assailant. Review existing automatic/mutual aid agreements. Maintain a regional around-the-clock emergency services information hotline for the public. Coordinate with school districts to ensure emergency preparedness plans include active assailant incidents.

Mitigation Alternatives Catalog – Aircraft Accidents

Table E-12 is the catalog of mitigation alternatives for aircraft accidents.

Table E-12 Catalog of Risk Reduction Measures – Aircraft Accidents		
Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
Always follow correct aircraft safety procedures, maintenance procedures, and regulations.	Promote a culture of health and safety to reduce risks of transportation accidents from travel fatigue or other concerns.	<ol style="list-style-type: none"> 1. Continuously review safety and operating procedures and regulations regarding aircraft. 2. Have police and emergency responders work with appropriate regional, state, and federal agencies to share information, identify threats, and respond to potential incidents to reduce criminal activity attempts and other threats.
Reduce Exposure		
Relocate away from high-hazard areas.	Find alternative ways of transportation.	Harden critical infrastructure to the greatest extent possible.
Reduce Vulnerability		
Notify police or response personnel of suspicious activities.	Maintain proper access controls at aircraft facilities.	<ol style="list-style-type: none"> 1. Maintain visible police and emergency responder presence in sensitive and high-risk locations. 2. Random inspections of aircraft as allowed by each company.
Increase Preparation or Response Capability		
Develop a family mitigation plan and an evacuation plan if living near a high-risk target or airport.	<ol style="list-style-type: none"> 1. Participate in jurisdictional/city, County, state, federal, and other efforts to practice response capabilities, gather relevant hazard information, and monitor vulnerabilities. 2. Coordinate information sharing initiatives with local cities and the County. 3. Review existing automatic/mutual aid agreements. 	<ol style="list-style-type: none"> 1. Participate in regional, state, and federal efforts to gather information at all levels and keep public safety officials briefed at all times regarding any local threats. Staff will then further develop response capabilities based on emerging threats. 2. Continue all facets of emergency preparedness training and exercises for Police, Fire, Public Works, and Manager/Public Information staff in order to respond quickly in the event of an aircraft accident. 3. Review existing automatic/mutual aid agreements. 4. Maintain a regional around-the-clock emergency services information hotline for the public.

Mitigation Alternatives Catalog – Epidemics/Pandemics

Table E-9 is the catalog of mitigation alternatives for epidemics/pandemics.

Table E-13 Catalog of Risk Reduction Measures – Epidemics/Pandemics		
Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
Practice safe traveling procedures and social distancing.	<ol style="list-style-type: none"> 1. Promote a culture of health and safety to reduce risks of transmission. 2. Continuously disinfect. 3. Promote the ability for employees to work remotely. 	<ol style="list-style-type: none"> 1. Promote a culture of health and safety to reduce risks of transmission. 2. Have police and emergency responders work with appropriate regional, state, and federal agencies to share information, identify threats, and respond to potential incidents to reduce spread of disease.
Reduce Exposure		
Relocate away from high-hazard areas (stay home and out of public/crowded places).	<ol style="list-style-type: none"> 1. Implement policies for working at home. 2. Delay non-emergency fieldwork and travel. 	<ol style="list-style-type: none"> 1. Implement stay at home orders. 2. Fund sanitation teams.
Reduce Vulnerability		
Notify medical or response personnel of potential diseases.	Promote regular doctor visits and use of sick leave.	Tighten vaccine rules.
Increase Preparation or Response Capability		
Develop a family response plan for times of financial hardship due to epidemics/pandemics and a plan if a family member gets sick.	<ol style="list-style-type: none"> 1. Participate in jurisdictional/city, County, state, federal, and other efforts to practice response capabilities, gather relevant hazard information, and monitor vulnerabilities. 2. Coordinate in information sharing initiatives with the local cities and County. 3. Develop a Business Continuity Plan. 4. Review existing automatic/mutual aid agreements. 	<ol style="list-style-type: none"> 1. Participate in regional, state, and federal efforts to gather terrorism information at all levels and keep public safety officials briefed at all times. 2. Continue all facets of emergency preparedness training and exercises for Police, Fire, Public Works, and Manager/Public Information staff in order to respond quickly in the event of a pandemic/epidemic. 3. Review existing automatic/mutual aid agreements. 4. Maintain a regional around-the-clock emergency services information hotline for the public. 5. Coordinate with school districts to ensure emergency preparedness plans include pandemics/epidemics.

Appendix F: Mitigation Strategy Evaluation and Mitigation Action Evaluation Forms

Every year, each jurisdiction will submit a Hazard Mitigation Strategy Evaluation Form. This provides the Planning Committee with all the information needed to compile a formal annual report on the progress of the plan. If any additional mitigation initiatives have been identified that were not previously addressed in the Snohomish County 2020 HMP, the jurisdiction will also complete a Mitigation Action Evaluation Form to attach to the Strategy Evaluation Form.



Snohomish County 2020 Hazard Mitigation Plan Progress

Hazard Mitigation Strategy Evaluation Form

Jurisdiction: _____

Prepared By: _____ Title: _____

For the 12-month period ending: _____ Date: _____

Instructions: Complete this form for each jurisdiction. Check the box beside Yes or No options. Complete descriptions for each question to which a Yes response applies, inserting additional lines as needed.

During the preceding 12 months:

1. Did the jurisdiction experience any hazard events resulting in losses?

No Yes – Describe (e.g., deaths, injuries, property damage, and indirect impacts such as loss of use, economic or environmental impacts, if a damage assessment was conducted, emergency or disaster declaration):

2. Have there been any observed impacts, physical changes, or new studies that would materially affect the hazards analysis?

No Yes – Describe:

3. Have any additional mitigation initiatives been identified, that were not previously addressed in the Hazard Mitigation Plan?

No Yes – For each new initiative, complete a Mitigation Action Evaluation Form.

4. Have any identified mitigation initiatives been completed and successful?

No Yes – Review:



Snohomish County 2020 Hazard Mitigation Plan Progress

5. Were there targeted strategies in the past year that did not get completed?

- No Yes – Discuss:

6. Do any mitigation strategies in the current plan need timeline amendments (such as changing a long-term project to short-term project due to funding)?

- No Yes – Describe:

7. Have there been any changes in potential or new funding options, including grant opportunities?

- No Yes – Describe:

8. Were there any other planning programs or initiatives that involved hazard mitigation? If so, what was their impact?

- No Yes – Describe:

9. Has public awareness of hazards improved?

- No Yes – Describe:



Snohomish County 2020 Hazard Mitigation Plan Progress

Mitigation Action Evaluation

Project ID:

Project Name:

Project Description:

Affected Jurisdiction(s):

Lead/Participating Agencies:

Status and Priority Level:

Actual Time to Complete/Anticipated Completion:

Actual Cost to Complete/Anticipated Cost:

Funding Source:

Anticipated Benefit vs. Cost – (For those projects with a measurable benefit in terms of future loss reduction, please quantify. For projects less easily quantified, please provide a qualitative assessment of the benefit in relation to the cost):

Other Comments:

Prepared By: _____ Date: _____

Appendix G: Planning Process and Public Outreach

Appendix H: FEMA Region 10 Local Hazard Mitigation Plan Review Tool

FEMA REGION 10 LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in [44 CFR §201.6](#) and offers States and FEMA Mitigation Planners an opportunity to provide feedback to participating jurisdictions.

1. The [Regulation Checklist](#) provides a summary of FEMA’s evaluation of whether the Plan has addressed all requirements.
2. The [Plan Assessment](#) identifies the plan’s strengths as well as documents areas for future improvement.
3. The [Multi-Jurisdiction Summary Sheet](#) is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference the [Local Mitigation Plan Review Guide](#) when completing this *Local Mitigation Plan Review Tool*.

Jurisdiction: Snohomish County, Washington	Title of Plan: Snohomish County Multi-Jurisdictional Hazard Mitigation Plan	Date of Plan: TBD
Local Point of Contact: John Holdsworth	Address: 720 80th St. S.W. Bldg A Everett, WA 98203	
Title: Program Manager - Planning		
Agency: Snohomish County Department of Emergency Management		
Phone Number: 425-388-5074	E-Mail: John.Holdsworth@snoco.org	

State Reviewer:	Title:	Date:
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FEMA Reviewer:	Title:	Date:
Date Received in FEMA Region 10		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1: MULTI-JURISDICTION SUMMARY SHEET (used only for multi-jurisdictional plans)

INSTRUCTIONS: The Multi-Jurisdiction Summary Spreadsheet is completed by listing each participating jurisdiction and which required Elements for each jurisdiction were ‘Met’ or ‘Not Met,’ and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it is used to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET (Add additional pages if necessary)										
#	Jurisdiction Name	Jurisdiction Type (city/borough/ district, etc.)	POC	Required Revisions / Comments	Requirements Met (Y/N)					
					A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require- ments
1	Snohomish County	County	John Holdsworth		Y	Y	Y	Y		
2	Alderwood Water & Wastewater	District	Amanda Meneses		Y	Y	Y	Y		
3	Arlington	City	James Trefry		Y	Y	N	N		
4	Brier	City	Jennifer Flathman		Y	Y	Y	Y		
5	Community Transit	District	Jacob Peltier		Y	Y	Y	Y		
6	Darrington	Town	Dan Rankin		Y	Y	N	N		
7	Edmonds	City	Craig Cottrell		Y	Y	Y	Y		

MULTI-JURISDICTION SUMMARY SHEET (Add additional pages if necessary)

#	Jurisdiction Name	Jurisdiction Type (city/borough/ district, etc.)	POC	Required Revisions / Comments	Requirements Met (Y/N)					
					A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require- ments
8	Fire District 26	District	Robert Thurston		Y	Y	Y	Y		
9	Fire District 5	District	Jim Fulcher		Y	Y	N	N		
10	French Slough Flood Control	District	Neil Wheeler		Y	Y	Y	Y		
11	Gold Bar	City	Denise Beaston		Y	Y	N	N		
12	Granite Falls	City	Charles White		Y	Y	N	N		
13	Highland Water	District	Susan Forbes		Y	Y	N	N		
14	Index	City	Kim Peterson		Y	Y	Y	Y		
15	Lake Stevens	City	Jeff Beazizo		Y	Y	Y	Y		
16	Lake Stevens Fire	District	Larry Huff		Y	N	N	N		
17	Lake Stevens Sewer	District	Caitlin Dwyer		Y	Y	Y	Y		

MULTI-JURISDICTION SUMMARY SHEET (Add additional pages if necessary)

#	Jurisdiction Name	Jurisdiction Type (city/borough/ district, etc.)	POC	Required Revisions / Comments	Requirements Met (Y/N)					
					A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require- ments
18	Lynnwood	City	Jared Bond		Y	Y	N	N		
19	Marshland Flood Control	District	Don Bailey		Y	Y	N	N		
20	Marysville	City	Diana Rose		Y	Y	N	N		
21	Mill Creek	City	Scott Eastman		Y	Y	Y	Y		
22	Monroe	City	Brad Feilberg		Y	Y	Y	Y		
23	Mountlake Terrace	City	Peter Dressel		Y	Y	N	N		
24	Mukilteo	City	Chris Alexander		Y	Y	Y	Y		
25	Mukilteo Water & Wastewater	District	Jim Voetberg		Y	Y	N	N		
26	North County Fire EMS	District	Mike Makela		Y	Y	N	N		
27	Olympic View Water and Sewer	District	Lynne Danielson		Y	Y	N	N		

MULTI-JURISDICTION SUMMARY SHEET (Add additional pages if necessary)

#	Jurisdiction Name	Jurisdiction Type (city/borough/ district, etc.)	POC	Required Revisions / Comments	Requirements Met (Y/N)					
					A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require- ments
28	Silver Lake Water and Sewer	District	Ron Berger		Y	Y	Y	Y		
29	Snohomish	City	Sharon Pettit		Y	Y	N	N		
30	Public Utility District #1	District	Jim Herrling		Y	Y	N	N		
31	Snohomish Health	District	Jeff Ketchel		Y	Y	Y	Y		
32	Snohomish School	District	Dave Sage		Y	Y	N	N		
33	South County Fire	District	Thad Hovis		Y	Y	N	N		
34	Stanwood Camano School	District	Liz Jamieson		Y	Y	Y	Y		
35	Stillaguamish Flood Control	District	Chuck Hazleton		Y	Y	Y	Y		
36	Sultan	City	Nate Morgan		Y	Y	N	Y		

SECTION 2: REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist is completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been ‘Met’ or ‘Not Met.’ The ‘Required Revisions’ summary at the bottom of each Element is completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions are explained for each plan sub-element that is ‘Not Met.’ Sub-elements are referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable.

1. REGULATION CHECKLIST	Location in Plan		
	(section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)			
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Volume 1 Section 2.3, 3.1, 3.3, 3.7 (Pages 6, 13, 16); Appendix G (Page 47)		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Volume 1 Section 3.2, 3.3, 3.4 (Pages 13, 14)		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Volume 1 Section 3.6, 3.7 (Table 3-1) (Pages 15, 16); Appendix G (Page 47)		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Volume 1 Section 3.5, 22.7 (Pages 14, 149)		
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Volume 1 Section 22.6 (Page 148)		
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Volume 1 Section 22.1, 22.5 (Pages 146, 148)		

1. REGULATION CHECKLIST

Location in Plan

Regulation (44 CFR 201.6 Local Mitigation Plans)

(section and/or
page number)

Met

**Not
Met**

ELEMENT A: REQUIRED REVISIONS

ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT

B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))

**Volume 1 Section
Chapters 6-18 (32,
36, 39, 44, 55, 78,
83, 95, 102, 111,
118, 125, 134)**

B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

**Volume 1 Section
Chapters 6-18,
Section 2.2: Past
Events and 2.3, 2.4,
2.5, 2.6, 4, and 5:
Probability of future
events (Pages 33, 37,
41, 46, 57, 79, 84,
96, 103, 112, 119,
126, 135)**

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan		
	(section and/or page number)	Met	Not Met
B3. Is there a description of each identified hazard’s impact on the community as well as an overall summary of the community’s vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Volume 1 Section Chapters 6-18 (Pages 35, 38, 42, 48, 60, 81, 86, 99, 105, 114, 120, 127, 137), Section 1, 2, 3 and Section 5: Exposure and Vulnerability		
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Volume II, Chapters 2-23, Section X.3.5 (Pages 12, 40, 53, 70, 83, 107, 120, 135, 153, 167, 200, 215, 234)		
<u>ELEMENT B: REQUIRED REVISIONS</u>			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction’s existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Volume II, Chapters 2-23, Section X.4: Capabilities Assessment (Pages 7, 37, 51, 68, 80, 105, 117, 132, 151, 164, 196, 210, 232, 245, 256, 266, 276, 286, 298, 308, 320, 337)		
C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Volume 1 Section 3.5 (Page 14); Volume II, Chapters 2-23, Section X.4.1.1 (Pages 12, 40, 53, 70, 83, 107, 120, 135, 153, 167, 200, 215, 234)		

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan		
	(section and/or page number)	Met	Not Met
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Volume 1 Section 1.5, 19.1 (Pages 3, 143)		
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Volume II, Chapters 2-23, Section 5.2: 2020 Strategies (Pages 27, 46, 61, 75, 94, 112, 127, 142, 160, 182, 207, 223, 242, 252, 262, 272, 282, 293, 304, 315, 327, 344)		
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Volume II, Chapter 1: Mitigation Action Prioritization (Page 4)		
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Volume 1 Section 22.7 (Page 149)		
<u>ELEMENT C: REQUIRED REVISIONS</u>			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan		
	(section and/or page number)	Met	Not Met
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Volume 1 Chapters 6-18, Section 6: Development Trends (Pages 35, 38, 42, 51, 69, 81, 91, 100, 108, 116, 123, 129, 139); Volume II, Chapters 2-23, Section 2: Jurisdiction Profile (Page 1, 34, 48, 63, 76, 101, 113, 128, 147, 161, 192, 209, 227, 243, 254, 264, 273, 284, 296, 306, 317, 335)		
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Volume II, Chapters 2-23, Section 5.1: Initiative Review and Status (Pages 20, 45, 58, 74, 87, 111, 125, 140, 157, 172, 204, 220, 239, 251, 261, 272, 281, 293, 304, 315, 327, 344)		
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Volume 1 Section 1.5, 2.3 (Table 2-1), 19.1 (Pages 3, 6, 143); Chapters 6-18; Volume II, Chapters 2-23, Sections 5.1 & 5.2 (Pages 20, 45, 58, 74, 87, 111, 125, 140, 157, 172, 204, 220, 239, 251, 261, 272, 281, 293, 304, 315, 327, 344)		

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan		
	(section and/or page number)	Met	Not Met
<u>ELEMENT D: REQUIRED REVISIONS</u>			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Volume 1 Section 21 (Page 146); Appendix J; Plan to be adopted following FEMA approval		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Appendix J; Plan to be adopted following FEMA approval		
<u>ELEMENT E: REQUIRED REVISIONS</u>			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			
<u>ELEMENT F: REQUIRED REVISIONS</u>			

SECTION 3: PLAN ASSESSMENT

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

Plan Strengths

Opportunities for Improvement

Appendix I: Community Rating System (CRS) Crosswalk

Appendix J: Plan Adoption Resolutions from Planning Partners

Appendix K: Hazards

Definitions of Hazard Ranking Factors

Table K-1 Hazard Ranking Definitions					
Rating	Severity	Magnitude	Frequency	Onset	Duration
1	No injuries or deaths expected. Minimal damage or impacts to natural systems.	Single or limited number of properties impacted.	Less than every 25 years	Greater than 30 days of warning	Only brief moments
2	Between 1 and 5 injuries or deaths. Minimal to moderate damage or impacts to natural systems.	Neighborhood or small community impacted.	10–25 years	5–30 days of warning	1–24 hours
3	Between 5 and 25 injuries or deaths. Moderate damage or impacts to natural systems.	City or town impacted.	5–10 years	1–5 days of warning	Days to weeks
4	Between 25 and 50 injuries or deaths. Extensive damage or impacts to natural systems.	Entire county impacted.	1–5 years	1–10 hours of warning	Weeks to months
5	Greater than 50 injuries or deaths. Catastrophic damage or impacts to natural systems.	State and/or region impacted.	Once per year	No warning	Months to years

Comprehensive List of Disaster Declarations for Snohomish County

Table K-2 FEMA Disaster Declarations				
Type of Incident	Date of incident	Event	Deaths and Injuries	Disaster Number
Flood	December 29, 1964	Heavy Rains, Flooding	–	185
Earthquake	April 29, 1965	6.5 to 6.7 Magnitude	6 deaths	196
Flood	December 1, 1975	Severe Storms, Flooding	–	492
Flood	December 10, 1977	Severe Storms, Mudslides, Flooding	–	545
Flood	December 31, 1979	Storms, High Tides, Mudslides, Flooding	–	612
Volcanic Eruption	May 21, 1980	Mount St. Helens Eruption	57 Deaths	623
Flood	December 15, 1986	Severe Storms, Flooding	–	784
Flood	November 26, 1990	Severe Storms, Flooding	–	883

**Table K-2
FEMA Disaster Declarations**

Type of Incident	Date of incident	Event	Deaths and Injuries	Disaster Number
Flood	March 8, 1991	Severe Storms, High Tides	–	896
Severe Storm	March 4, 1993	Severe Storms & High Wind	–	981
Severe Storm	January 3, 1996	Severe Storms, High Wind, Flooding	–	1079
Flood	February 9, 1996	High Winds, Severe Storms, Flooding	–	1100
Severe Storm	January 17, 1997	Severe Winter Storm, Landslides, Mudslides, Flooding	–	1159
Flood	April 2, 1997	Heavy Rains, Snow Melt, Flooding, Landslides, Mudslides	–	1172
Earthquake	February 28, 2001	6.8 Magnitude	400 injuries	1361
Severe Storm	November 7, 2003	Severe Storms, Flooding	–	1499
Severe Storm	May 17, 2006	Severe Storms, Landslides, Mudslides	–	1671
Severe Storm	December 12, 2006	Severe Storms, Flooding, Tidal Surge, Landslides, Mudslides	–	1641
Severe Storm	February 14, 2007	Severe Storms, Landslides, Mudslides, Flooding	–	1734
Severe Storm	December 8, 2007	Severe Winter Storm, Landslides, Mudslides	–	1682
Flood	January 7, 2009	Severe Winter Storm, Landslides, Mudslides, Flooding	–	1817
Severe Storm	March 2, 2009	Severe Winter Storm, Snow	–	1825
Severe Storm	March 5, 2012	Severe Winter Storm, Flooding, Landslides, Mudslides	–	4056
Landslide/Mudslide	March 24, 2014	Flooding, Mudslides	43 Deaths/12 Injuries	3370
Landslide/Mudslide	April 2, 2014	Flooding, Mudslides	–	4168
Severe Storm	October 15, 2015	Severe Windstorm	–	4242
Severe Storm	January 15, 2016	Severe Storms, Winds, Flooding, Landslides, Mudslides	–	4249
Severe Storm	March 4, 2019	Severe Winter Storms, Winds, Flooding, Landslides, Mudslides, Tornado	–	4418

Severe Weather Events Resulting in Deaths/Injuries or \$25,000 or More in Damages

Table K-3			
Severe Weather Events Resulting in Deaths/Injuries or \$25,000 or More in Damages			
Date	Type	Deaths or Injuries	Property Damage
November 24, 1970	Tornado (EF2)	-	\$25,000
October 26, 1971	Tornado (EF1)	-	\$25,000
September 15, 1996	Lightning	1 Death	\$0
April 10, 1997	Lightning	-	\$35,000
August 6, 1997	Lightning	1 Injury	\$0
March 8, 2006	Strong Wind	-	\$50,000
November 26, 2006	Heavy Snow	-	\$2.0 Million
December 14, 2006	High Wind	-	\$5.4 Million
January 5, 2007	Strong Wind	-	\$500,000
October 18, 2007	High Wind	-	\$750,000
December 3, 2007	Heavy Rain	-	\$10 Million
December 17, 2008	Heavy Snow	-	\$500,000
December 20, 2008	Heavy Snow	-	\$200,000
December 21, 2008	Heavy Snow	-	\$3.0 Million
March 20, 2009	Strong Wind	1 Death, 1 Injury	\$20,000
December 14, 2010	Thunderstorm Wind	-	\$30,000
November 22, 2011	Strong Wind	-	\$50,000
January 11, 2014	Strong Wind	-	\$100,000
October 25, 2014	Strong Wind	-	\$500,000
November 11, 2014	High Wind	-	\$4.0 Million
December 11, 2014	Strong Wind	-	\$500,000
August 29, 2015	High Wind	-	\$1.5 Million
September 20, 2015	Strong Wind	1 Death	\$0
November 17, 2015	Strong Wind	1 Death	\$5.0 Million
March 10, 2016	Strong Wind	-	\$1.0 Million
November 13, 2017	High Wind	1 Death, 1 Injury	\$3.5 Million

Source: NOAA Storm Events Database

Appendix L: References

- Andone, D., H. Kaur, and M. Holcombe. 2019. "There Could Have Been Three More Mass Shootings if These Men Weren't Stopped, Authorities Say." CNN. Accessed May 4, 2020. <https://www.cnn.com/2019/08/18/us/three-potential-attacks-foiled/index.html>.
- Balk, G. 2019. "Are Measles a Risk at Your Kid's School? Explore Vaccination-Exemption Data with Our New Tool." *Seattle Times*. Accessed May 4, 2020. <https://www.seattletimes.com/seattle-news/data/are-measles-a-risk-at-your-kids-school-explore-vaccination-exemption-data-with-our-new-tool/>.
- Bernhard, J. 2018. Grandmother foils alleged mass shooting plot at Washington school. Retrieved from <https://www.abc10.com/article/news/crime/grandmother-foils-alleged-mass-shooting-plot-at-washington-school/103-519167818>.
- Center for Strategic & International Studies (CSIS). 2018. *Economic Impact of Cybercrime*. Accessed May 4, 2020. https://www.mcafee.com/us/resources/reports/restricted/economic-impact-cybercrime.pdf?utm_source=Press&utm_campaign=bb9303ae70-EMAIL_CAMPAIGN_2018_02_21&utm_medium=email&utm_term=0_7623d157be-bb9303ae70-
- Centers for Disease Control and Prevention (CDC). 2019. "Measles Cases and Outbreaks." Accessed May 4, 2020. <https://www.cdc.gov/measles/cases-outbreaks.html>.
- Clark County Public Health. 2019. *Measles Investigation*. Accessed May 4, 2020. <https://www.clark.wa.gov/public-health/measles-investigation>
- Colorado Geological Survey. Not dated. "Debris Flows-Fans/Mudslides: A Definition." Accessed May 4, 2020. <http://coloradogeologicalsurvey.org/geologic-hazards/debris-flows-fans-mudslides/definition/>.
- Community Transit. 2020a. "About Us." Accessed online at: <https://www.communitytransit.org/about/about-us>. Accessed March 2020.
- Community Transit. 2020b. "Board of Directors & CEO." Accessed online at: <https://www.communitytransit.org/boardofdirectorsCEO>. Accessed March 2020
- Definitions: Centers for Disease Control and Prevention (CDC). 2012. "Epidemic Disease Occurrence." In *Principles of Epidemiology in Public Health Practice*, Third Edition. An introduction to Applied Epidemiology and Biostatistics (Section 11). Accessed May 4, 2020. <https://www.cdc.gov/csels/dsepd/ss1978/lesson1/section11.html>.
- Department of Homeland Security (DHS). Not dated (a). "Cybersecurity." Accessed May 4, 2020. <https://www.ready.gov/cybersecurity>.
- Department of Homeland Security (DHS). Not dated (b). "Severe Weather." *Ready*. Accessed May 4, 2020. <https://www.ready.gov/severe-weather>.
- Department of Homeland Security (DHS). 2008. "Active Shooter: How to Respond." Accessed May 4, 2020. https://www.dhs.gov/xlibrary/assets/active_shooter_booklet.pdf.
- Department of Homeland Security (DHS). 2017. "Active Shooter Recovery Guide." Retrieved from <https://www.dhs.gov/sites/default/files/publications/active-shooter-recovery-guide-08-08-2017-508.pdf> (page discontinued).
- Department of Homeland Security (DHS). 2018. "Cybersecurity Strategy." Accessed May 4, 2020. https://www.dhs.gov/sites/default/files/publications/DHS-Cybersecurity-Strategy_0.pdf.

- Doughton, Sandi. 2018. "Washington's Hidden Glacier Peak Volcano is Among the Most Dangerous." *Seattle Times*. Accessed May 4, 2020. <https://www.seattletimes.com/seattle-news/science/washingtons-hidden-glacier-peak-volcano-is-among-the-most-dangerous/#targetText=The%20USGS%20ranks%20Glacier%20Peak,of%20the%20area%2C%20Moran%20said>.
- Farley, G. 2016. "Why Snohomish Co. Utility Had Itself Hacked." *King5 News*. Accessed May 4, 2020. <https://www.king5.com/article/tech/why-snohomish-co-utility-had-itself-hacked/281-213970843>.
- Federal Bureau of Investigation (FBI). 2014. "Active Shooter Study: Quick Reference Guide." Accessed May 4, 2020. <https://www.fbi.gov/file-repository/as-study-quick-reference-guide-updated1.pdf/view>.
- Federal Bureau of Investigation (FBI). 2019a. "Quick Look: 277 Active Shooter Incidents in the United States From 2000 to 2018." Office of Partner Engagement. Accessed May 4, 2020. <https://www.fbi.gov/about/partnerships/office-of-partner-engagement/active-shooter-incidents-graphics>.
- Federal Bureau of Investigation (FBI). 2019b. "Active Shooter Incidents in the United States from 2000-2018." Accessed May 4, 2020. <https://www.fbi.gov/file-repository/active-shooter-incidents-2000-2018.pdf/view>.
- Federal Bureau of Investigation (FBI). 2019c. *2018 Internet Crime Report*. Accessed May 4, 2020. https://pdf.ic3.gov/2018_IC3Report.pdf.
- Federal Emergency Management Agency (FEMA). 2019a. Hazard Mitigation Planning. Retrieved from <https://www.fema.gov/hazard-mitigation-planning>.
- Federal Emergency Management Agency (FEMA). 2019b. "Cybersecurity." Accessed May 4, 2020. <https://www.fema.gov/cybersecurity>.
- Federal Emergency Management Agency (FEMA). 2019c. "Data Visualization: Disaster Declarations for States and Counties." Accessed May 4, 2020. <https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties>.
- Gibson, T. 2019. "Understanding the Difference: Active Shooter vs. Active Assailant in K-12 Schools." Rave Mobile Safety. Accessed May 4, 2020. <https://www.ravemobilesafety.com/blog/understanding-the-difference-active-shooter-vs-active-assailant-in-k-12-schools>.
- Hozan, E. 2019. "Washington Stat's Northshore School District Cyber Attack." Secplicity. Accessed May 4, 2020. <https://www.secplicity.org/2019/09/25/washington-states-northshore-school-district-cyber-attack/>.
- Institute of Medicine (US) Forum on Microbial Threats. 2008. *Global Climate Change and Extreme Weather Events: Understanding the Contributions to Infectious Disease Emergence: Workshop Summary*. Washington, D.C.: national Academies Press. <https://www.ncbi.nlm.nih.gov/books/NBK45750/>.
- Insurance Information Institute. 2019. "Facts + Statistics: Identity Theft and Cybercrime." Accessed May 4, 2020. <https://www.iii.org/fact-statistic/facts-statistics-identity-theft-and-cybercrime##targetText=About%2051%2C000%20people%20were%20victims,of%20all%20losses%20in%202018>.
- Kiernan, K. 2019. "How Much of a Threat do Drones Pose to Air Travel? Here's What You Should Know." *Forbes*. Accessed May 4, 2020. <https://www.forbes.com/sites/kristykiernan/2019/02/21/drones-threat-airplanes-airports/#f25cb4c30c6b>.

Kiger, P. Not dated. "Five Reasons Commercial Airplanes Crash." *How Stuff Works*. Accessed May 4, 2020. <https://science.howstuffworks.com/transport/flight/modern/reasons-commercial-airplanes-crash.htm>.

KOMO Staff. 2016. "Thousands of Northshore School District Students Gmail Accounts Spammed." *KOMONEWS*. Accessed May 4, 2020. <https://komonews.com/news/local/thousands-of-northshore-sd-student-gmail-accounts-hacked>.

Lake Stevens Sewer District. 2016. *Sanitary Sewer Comprehensive Plan*. Accessed May 4, 2020. https://s3-us-west-2.amazonaws.com/lkstevens/d22411/LSSD_2016_CSP_Ch1to5.pdf

Meriam-Webster Dictionary. Not Dated. S.v. "aircraft."

National Geographic. Not dated. "Landslide." Accessed May 4, 2020. <https://www.nationalgeographic.org/encyclopedia/landslide/>.

National Oceanic and Atmospheric Administration (NOAA). 2009. *Pacific Tsunami Warning Center*. National Weather Service. Retrieved from <https://ptwc.weather.gov/faq.php> (page discontinued).

National Oceanic and Atmospheric Administration (NOAA). 2019a. "What Is a Tsunami?" National Ocean Service. Accessed May 4, 2020. <https://oceanservice.noaa.gov/facts/tsunami.html>.

National Oceanic and Atmospheric Administration (NOAA). 2019b. "Storm Events Database." Accessed May 4, 2020. <https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=718096>.

National Oceanic and Atmospheric Administration (NOAA). Not dated (a). "Tsunami Dangers." National Weather Services. Accessed May 4, 2020. https://www.weather.gov/jetstream/tsu_dangers.

National Oceanic and Atmospheric Administration (NOAA). Not dated (b). "Tsunami Frequently Asked Questions." National Weather Service. Accessed on May 4, 2020. <https://www.tsunami.gov/?page=tsunamiFAQ#targetText=The%20amount%20of%20movement%20of,cause%20landslides%20that%20generate%20tsunamis>.

National Transportation Safety Board. 2019. "Aviation Statistics." Accessed May 4, 2020. https://www.nts.gov/investigations/data/Documents/AviationAccidentStatistics_1999-2018_20191101.xlsx.

Pacific Northwest Seismic Network (PNSN). 2019a. "Cascadia Subduction Zone." Accessed May 4, 2020. <https://pnsn.org/outreach/earthquakesources/csz>.

Pacific Northwest Seismic Network (PNSN). 2019b. "PNW Earthquake Sources Overview." Accessed May 4, 2020. <https://pnsn.org/outreach/earthquakesources>.

Pacific Northwest Seismic Network (PNSN). 2019c. "PNSN Recent Events." Accessed May 4, 2020. <https://pnsn.org/earthquakes/recent>.

Paine Field Snohomish County Airport. 2019. "Questions, Answers About Commercial Air Service at Paine Field." Accessed May 4, 2020. <https://www.paineairport.com/218/Commercial-Air-Service-FAQs>.

Pipeline and Hazardous Materials Safety Administration. 2019. *Incident Statistics*. Accessed May 4, 2020. <https://www.phmsa.dot.gov/hazmat-program-management-data-and-statistics/data-operations/incident-statistics>.

Plane Crash Map. 2019. Accessed May 4, 2020. <https://planecrashmap.com/list/wa/>.

Puget Sound Partnership. 2020. "Watershed Profile: Salmon and the Stillaguamish River." Shared Strategy for Puget Sound. Accessed online at: <https://www.psp.wa.gov/shared-salmon-strategy/watersheds/watershed-stillaguamish.htm>.

- Schuster, R. L. and L.M. Highland. 2001. *Socioeconomic and Environmental Impacts of Landslides in the Western Hemisphere*. United States Geological Survey. Accessed May 4, 2020. <https://pubs.usgs.gov/of/2001/ofr-01-0276/>.
- Schwarzen, C. 2005. "Tsunami Here? Scientists Say It Could Happen" *Seattle Times*. Accessed May 4, 2020. <http://community.seattletimes.nwsourc.com/archive/?date=20050316&slug=tsunami16n>.
- Seattle Police Department. Not dated. Extreme Risk Protection Orders. Accessed May 4, 2020. <https://www.seattle.gov/police/need-help/erpo>.
- Silver, J., A. Simons, and S. Craun. (2018). A Study of the Pre-Attack Behaviors of Active Shooters in the United States Between 2000 – 2013. Federal Bureau of Investigation, U.S. Department of Justice. Accessed May 4, 2020. <https://www.fbi.gov/file-repository/pre-attack-behaviors-of-active-shooters-in-us-2000-2013.pdf>.
- Skagit Breaking Staff. 2019. "Pilot Dies After Plane Crashes into Marysville Field." *Skagit Breaking*. Accessed May 4, 2020. <https://www.skagitbreaking.com/2019/08/16/pilot-dies-after-plane-crashes-into-marysville-field/>.
- Snohomish County Public and Private Airports, Washington. Not dated. Tollfreeairline.com. Accessed May 4, 2020. <http://www.tollfreeairline.com/washington/snohomish.htm>.
- Snohomish County. Not dated. "Community Wildfire Protection Plan." Accessed May 4, 2020. <https://snohomishcountywa.gov/4113/Community-Wildfire-Protection-Plan>.
- Snohomish County. 2017. *Snohomish County Tomorrow 2016 Growth Monitoring Report*. Prepared for Snohomish County Tomorrow Steering Committee Review on March 22, 2017. Accessed online at: https://snohomishcountywa.gov/DocumentCenter/View/44885/GMR_2016_complete_final_reduce_dsize_Apr-12-2017updt?bidId=
- Stanwood-Camano School District (SCSD). 2019. 2019-2020 Budget Handbook for our Community. http://stanwood.ss19.sharpschool.com/UserFiles/Servers/Server_588437/File/departement/Fiscal%20Services/Budget%20Handbook%202019-20-FINAL.pdf. Accessed March 2020.
- Stanwood-Camano School District (SCSD). 2020. School Board. <http://stanwood.ss19.sharpschool.com/cms/One.aspx?portalId=588521&pageId=959695>. Accessed March 2020.
- State of Washington. 2019. *State of Washington 2019 Population Trends*, Office Financial Management, Forecasting and Research Division. Accessed online at: https://www.ofm.wa.gov/sites/default/files/public/dataresearch/pop/april1/ofm_april1_poptrends.pdf.
- State of Washington. 2017. *Growth Management Act population projections for counties: 2010 to 2040*, Office of Financial Management. Accessed online at: <https://ofm.wa.gov/washington-data-research/population-demographics/population-forecasts-and-projections/growth-management-act-county-projections/growth-management-act-population-projections-counties-2010-2040-0>
- Toregas, C. and Santos, M. 2019. "Cyber Security and Its Cascading Effect on Societal Systems." *Global Assessment Report on Disaster Risk Reduction*. United Nations Office for Disaster Risk Reduction (UNDRR). Accessed May 4, 2020. <https://www.unisdr.org/we/inform/publications/66504>.
- United States Census Bureau. Not dated. QuickFacts Snohomish County, Washington. Accessed online at: <https://www.census.gov/quickfacts/snohomishcountywashington>
- United States Environmental Protection Agency (EPA). 2019. Emergency Planning and Community Right-to-Know Act (EPCRA). Accessed May 4, 2020.

<https://www.epa.gov/epcra#targetText=The%20Emergency%20Planning%20and%20Community,%2C%20state%2C%20and%20local%20governments.>

United States Geological Survey (USGS). Not dated (a). "The Severity of an Earthquake." Accessed May 4, 2020. <https://pubs.usgs.gov/gip/earthq4/severitygip.html>.

United States Geological Survey (USGS). Not dated (b). "What Is a Landslide and What Causes One?" Accessed on May 4, 2020. https://www.usgs.gov/faqs/what-a-landslide-and-what-causes-one?qt-news_science_products=0#qt-news_science_products.

United States Government Accountability Office. 2005. *Critical Infrastructure Protection: Department of Homeland Security Faces Challenges in Fulfilling Cybersecurity Responsibilities*. Accessed May 4, 2020. <https://www.gao.gov/new.items/d05434.pdf>.

University of Washington. 2015a. *Snohomish County Hazard Mitigation Plan Volume 1: Risk Assessment*. Accessed May 4, 2020. <https://snohomishcountywa.gov/DocumentCenter/View/23981/HMP-Volume-1-Sept-2015-Final?bidId=>.

University of Washington. 2015b. *Snohomish County Hazard Mitigation Plan Summary*. Snohomish County Emergency Management. Accessed May 4, 2020. <https://snohomishcountywa.gov/DocumentCenter/View/37255/HMP-Summary-Sept-2015-Final?bidId=>

U.S. Department of Transportation (USDOT). Not dated. Accessed November 19, 2019. https://portal.phmsa.dot.gov/analyticsSOAP/saw.dll?Dashboard&NQUser=PDM_WEB_USER&NQPassword=Public_Web_User1&PortalPath=/shared/Public%20Website%20Pages/_portal/Hazmat%20Incident%20Report%20Search

Washington Association of Sheriffs and Police Chiefs. 2018. "Washington Mass Shootings Work Group: Findings and Recommendations." Accessed May 4, 2020. [https://www.waspc.org/assets/docs/Mass%20Shootings%20Work%20Group%20Report%20\(Compressed%20File\).pdf](https://www.waspc.org/assets/docs/Mass%20Shootings%20Work%20Group%20Report%20(Compressed%20File).pdf).

Washington Department of Ecology. 2019a. *Inventory of Dams Report*. Accessed May 4, 2020. <https://fortress.wa.gov/ecy/publications/documents/94016.pdf>.

Washington Department of Ecology. 2019b. "Active and Past Spill Incidents," Accessed May 4, 2020. <https://ecology.wa.gov/Spills-Cleanup/Spills/Spill-preparedness-response/Responding-to-spill-incidents/Spill-incidents>.

Washington Department of Natural Resources (DNR). 2013. "Understanding Earthquake Hazards in Washington State: Modeling a Magnitude 7.4 Earthquake on the Southern Whidbey Island Fault Zone." Accessed May 4, 2020. https://www.dnr.wa.gov/Publications/ger_seismic_scenario_swif.pdf.

Washington Department of Natural Resource (DNR). 2019. "DNR GIS Open Data." Accessed May 4, 2020. <https://www.dnr.wa.gov/opendata>.

Washington Emergency Management Division. 2018. *Washington State Enhanced Hazard Mitigation Plan: Risk and Vulnerability Assessment*. Retrieved from <https://mil.wa.gov/asset/5ba4211059264>.

Washington Military Department. 2015. *Washington State Threat Mitigation Plan*. Accessed May 4, 2020. <https://mil.wa.gov/asset/5ba4217e9c3ad>.

Washington State Department of Health. 2010. "2009 H1N1 Influenza in Washington State: A Summary of the First Year-April 2009-May 2010." Accessed May 4, 2020. <https://www.doh.wa.gov/Portals/1/Documents/5100/2009-H1N1-PandemicSummaryReport.pdf>.

- Washington State Department of Health. 2010. "2009 H1N1 Influenza in Washington State: A Summary of the First Year-April 2009-May 2010." Accessed May 4, 2020. <https://www.doh.wa.gov/Portals/1/Documents/5100/2009-H1N1-PandemicSummaryReport.pdf>.
- Washington State Department of Natural Resources. Not dated. "Tsunamis." *Geological Hazards*. Accessed May 4, 2020. <https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/Tsunamis#historical-tsunamis-worldwide>.
- Washington State Department of Natural Resources. 2013. "Understanding Earthquake Hazards in Washington State: Modeling a Magnitude 7.4 Earthquake on the Southern Whidbey Island Fault Zone." Accessed May 4, 2020. https://www.dnr.wa.gov/Publications/ger_seismic_scenario_swif.pdf.
- Washington State Military Department. 2012. *Washington State Hazard Mitigation Plan – Hazard Profile – Volcano*. Accessed May 4, 2020. <https://mil.wa.gov/asset/5ba42001acec3>.
- World Health Organization (WHO). Not dated. "Volcanic Eruptions - Natural Disaster Profile - Technical Hazard Sheet." *Humanitarian Health Action*. Accessed May 4, 2020. <https://www.who.int/hac/techguidance/ems/volcanos/en/>.
- World Health Organization (WHO). 2018. *Managing Epidemics: Key Facts About Major Deadly Diseases*. Accessed May 4, 2020. <https://www.who.int/emergencies/diseases/managing-epidemics-interactive.pdf>.
- World Meteorological Organization. 2004. *A Definition of Severe Weather*. Accessed May 4, 2020. [https://www.wmo.int/pages/prog/www/DPS/Meetings/Wshop-SEEF_Toulouse2004/Doc3-1\(1\).doc](https://www.wmo.int/pages/prog/www/DPS/Meetings/Wshop-SEEF_Toulouse2004/Doc3-1(1).doc).
- Wright, J. M. 2007. *Floodplain Management: Principles and Current Practices*. Accessed May 4, 2020. <https://training.fema.gov/hiedu/aemrc/courses/coursetreat/fm.aspx>.