

2022

Multi-Hazard Mitigation Plan

Okanogan County, Washington



Prepared By:
Northwest Management, Inc.

Okanogan County
Emergency Management
3/21/2022

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FOREWORD

Okanogan County Department of Emergency Management is dedicated to the protection of life, property, economic, environmental, and historic and cultural resources throughout the county. Seeking to inform and educate the public and reduce the vulnerability of citizens and infrastructure in Okanogan County through comprehensive disaster planning and mitigation.

Hazard mitigation is sustained action to reduce or eliminate the long-term risk to human life and property from hazards. Multi-hazard mitigation planning is a process used by state, tribal, and local governments to engage stakeholders, identify hazards and vulnerabilities, develop a long-term strategy to reduce risk and future losses, and implement the plan, taking advantage of a wide range of resources. A state mitigation plan demonstrates commitment to reduce risks from natural hazards and serves as a guide for decision makers for reducing the effects of natural hazards as resources are committed”¹

The **Okanogan County, Washington Multi - Hazard Mitigation Plan** was updated in 2020-2022 by the Okanogan County MHMP planning committee in cooperation with Northwest Management, Inc. of Moscow, Idaho.

This Plan satisfies the requirements for a local multi-hazard mitigation plan and a flood mitigation plan under 44 CFR Part 201.6 and 79.6.

¹ Federal Emergency Management Agency. “Local Multi-Hazard Mitigation Planning Guidance.” July 1, 2008

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APPROVAL LETTER FROM FEMA

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ADOPTION RESOLUTIONS

This heading is a place holder for the adoption resolutions that will be signed by each jurisdiction once the plan is approved by FEMA.

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CHAPTER 1: PLAN OVERVIEW

IN THIS SECTION:

- Planning Participants
- Phase 1 Hazard Assessment
- Goals and Guiding Principals
- Integration with Other Planning Mechanisms

CHAPTER 1 – PLAN OVERVIEW

OVERVIEW OF THIS PLAN AND ITS DEVELOPMENT

This regional Multi-Hazard Mitigation Plan is the result of analyses, professional cooperation and collaboration, assessments of hazard risks and other factors considered with the intent to reduce the potential for hazards to threaten people, structures, infrastructure, and unique ecosystems in Okanogan County, Washington.

In September of 2019, Okanogan County Emergency Management solicited competitive bids from companies to provide the service of leading the process to update the Okanogan County, Washington Multi-Hazard Mitigation Plan. The update was to include an in-depth risk assessment for natural hazards in Okanogan County and the development of a list of mitigation projects aimed at protecting county residents, property, natural resources, infrastructure, and the local economy from the impacts of the following hazards: **Flood (and Dam Failure), Earthquake, Landslides, Severe Weather, Wildland Fire, Volcano, Hazardous Materials, Pandemic, and Terrorism & Civil Unrest**. Northwest Management, Inc. (NMI) was selected to provide this service to the County. NMI is a consulting firm located in Moscow, Idaho.

The planning team responsible for implementing this project was led by the County Emergency Management Office with assistance from Northwest Management, Inc. Agencies and organizations that participated in the planning process included:

- Okanogan County Commissioners
- Okanogan County Departments
- City of Omak
- City of Okanogan
- City of Oroville
- City of Tonasket
- City of Brewster
- City of Pateros
- Town of Conconully
- Town of Nespelam
- Town of Elmer City
- Town of Coulee Dam
- Town of Riverside
- Town of Twisp
- Town of Winthrop
- Okanogan County Fire Districts
- City of Omak Fire Department
- City of Okanogan Fire Department
- Town of Conconully Fire Department
- Town of Coulee Dam Fire Department
- Washington Department of Natural Resources
- Confederated Tribes of the Colville Reservation
- Colville Agency, Bureau of Indian Affairs
- Okanogan County Public Utilities District
- Okanogan County Public Health
- Okanogan Communities Development Council
- Washington Military Department, Emergency Management Division
- Okanogan Conservation District
- USDA Forest Service
- Okanogan County Sheriff's Department and Emergency Management
- American Red Cross
- Northwest Management, Inc.

GUIDING PRINCIPLES

Effective November 1, 2004, a Multi-Hazard Mitigation Plan approved by the Federal Emergency Management Agency (FEMA) is required for Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation Program (PDM) eligibility. The HMGP and PDM program provide funding, through state emergency management agencies, to support local mitigation planning and projects to reduce potential disaster damages.

The new local Multi-Hazard Mitigation Plan requirements for HMGP and PDM eligibility are based on the Disaster Mitigation Act of 2000, which amended the Stafford Disaster Relief Act to promote an integrated, cost effective approach to mitigation. Local Multi - Hazard Mitigation Plans must meet the minimum requirements of the Stafford Act-Section 322, as outlined in the criteria contained in 44 CFR Part 201. The plan criteria cover the planning process, risk assessment, mitigation strategy, plan maintenance, and adoption requirements.

In order to be eligible for project funds under the Flood Mitigation Assistance (FMA) program, communities are required under 44 CFR Part 79.6(d)(1) to have a mitigation plan that addresses flood hazards. On October 31st, 2007, FEMA published amendments to the 44 CFR Part 201 at 72 Federal Reg. 61720 to incorporated mitigation planning requirements for the FMA program (44 CFR Part 201.6). The revised Local Mitigation Plan Review Crosswalk (July 2008) used by FEMA to evaluate local hazard mitigation plans is consistent with the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by Section 322 of the Disaster Mitigation Act of 2000, the National Flood Insurance Act of 1968, as amended by the National Flood Insurance Reform Act of 2004 and 44 Code of Federal Regulations (CFR) Part 201 – Mitigation Planning, inclusive of all amendments through October 31, 2007 was used as the official guide for development of a FEMA-compatible Okanogan County, Washington Multi-Hazard Mitigation Plan².

FEMA will only review a local Multi-Hazard Mitigation Plan submitted through the appropriate State Hazard Mitigation Officer (SHMO). Draft versions of local Multi - Hazard Mitigation Plans will not be reviewed by FEMA. FEMA will review the final version of a plan prior to local adoption to determine if the plan meets the criteria, but FEMA will be unable to approve it prior to adoption.

The SHMO in Washington is:

Tim Cook
Washington Military Department
Emergency Management Division
Building 20, M/S: TA-20
Camp Murray, WA 98430-5122

² Federal Emergency Management Agency. "Local Multi-Hazard Mitigation Planning Guidance." July 1, 2008.

A FEMA designed plan will be evaluated on its adherence to a variety of criteria.

- Adoption by the Local Governing Body
- Multi-jurisdictional Plan Adoption
- Multi-jurisdictional Planning Participation
- Documentation of Planning Process
- Identifying Hazards
- Profiling Hazard Events
- Assessing Vulnerability: Identifying Assets
- Assessing Vulnerability: Estimating Potential Losses
- Assessing Vulnerability: Analyzing Development Trends
- Multi-jurisdictional Risk Assessment
- Local Hazard Mitigation Goals
- Identification and Analysis of Mitigation Measures
- Implementation of Mitigation Measures
- Multi-jurisdictional Mitigation Strategy
- Monitoring, Evaluating, and Updating the Plan
- Implementation Through Existing Programs
- Continued Public Involvement

UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE (GAO)

Since 1984, wildland fires have burned an average of more than 850 homes each year in the United States and, because more people are moving into fire-prone areas bordering wildlands, the number of homes at risk is likely to grow. The primary responsibility for ensuring that preventative steps are taken to protect homes lies with homeowners. Although losses from fires made up only 2.2 percent of all insured catastrophic losses from 1991 to 2010, fires can result in billions of dollars in damages.

GAO was asked to assess, among other issues, (1) measures that can help protect structures from wildland fires, (2) factors affecting use of protective measures, and (3) the role technology plays in improving firefighting agencies' ability to communicate during wildland fires.

The GAO supports that the two most effective measures for protecting structures from wildland fires are: (1) creating and maintaining a buffer, called defensible space, from 30 to 100 feet wide around a structure, where flammable vegetation and other objects are reduced; and (2) using fire-resistant roofs and vents. In addition to roofs and vents, other technologies – such as fire-resistant windows and building materials,

surface treatments, sprinklers, and geographic information systems mapping – can help in protecting structures and communities, but they play a secondary role³.

Although protective measures are available, many property owners have not adopted them because of the time or expense involved, competing concerns such as aesthetics or privacy, misperceptions about wildland fire risks, and lack of awareness of their shared responsibility for fire protection. Federal, state, and local governments, as well as other organizations, are attempting to increase property owners' use of protective measures through education, direct monetary assistance, and laws requiring such measures. In addition, some insurance companies have begun to direct property owners in high risk areas to take protective steps.

STATE AND FEDERAL CWPP GUIDELINES

The Community Wildfire Protection Plan information included in this document is compatible with FEMA requirements for a Hazard Mitigation Plan, while also adhering to the guidelines proposed in the National Fire Plan, and the Healthy Forests Restoration Act (2003). The Community Wildfire Protection Plan has been prepared in compliance with:

- Healthy Forests Restoration Act (2003).
- The Federal Land Assistance, Management and Enhancement (FLAME) Act (2009).
- The National Fire Plan: A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan (December 2006).
- National Cohesive Wildland Fire Management Strategy (March 2011). The Cohesive Strategy is a collaborative process with active involvement of all levels of government and non-governmental organizations, as well as the public, to seek national, all-lands solutions to wildland fire management issues.
- The Federal Emergency Management Agency's Region 10 guidelines for a Local Hazard Mitigation Plan as defined in 44 CFR parts 201 and 206, and as related to a fire mitigation plan chapter of a Multi-Hazard Mitigation Plan.
- National Association of State Foresters – guidance on identification and prioritizing of treatments between communities (2003).

³ Technology Assessment: Protecting Structures and Improving Communications during Wildland Fires. United States Government Accountability Office. April 2005.

<https://www.govinfo.gov/content/pkg/GAOREPORTS-GAO-05-380/pdf/GAOREPORTS-GAO-05-380.pdf>

PLANNING PHILOSOPHY AND GOALS

OKANOGAN COUNTY PLANNING PHILOSOPHY

This effort will utilize the best and most appropriate science from all partners and the integration of local and regional knowledge about man-made and natural hazards. This effort will strive to meet the needs of all local people and the regional economy, while considering the significance of this region to the rest of Washington and the Inland West.

MISSION STATEMENT

To make residents, communities, state agencies, local governments, non-profits, and businesses less vulnerable to the effects of hazards through the effective administration of hazard mitigation grant programs, hazard risk assessments, wise and efficient infrastructure hardening, and a coordinated approach to mitigation policy through federal, state, regional, and local planning efforts. Our combined priorities will be the protection of people, structures, infrastructure, and unique ecosystems that contribute to our way of life and the sustainability of the local and regional economy.

VISION STATEMENT

Promote a countywide hazard mitigation ethic through leadership, professionalism, and excellence, leading the way to a safe, sustainable Okanogan County.

JURISDICTIONAL PLANNING AND MITIGATION GOALS

Each participating jurisdiction assisted in developing Okanogan County's Mission, Vision, and Goal Statements with each jurisdiction's respective interests in mind. Therefore, it was determined that these statements suited the needs of each jurisdiction. This paragraph serves as each jurisdiction's acceptance of the county's Mission, Vision, and Goal Statements.

For the 2022 plan update, the planning team reviewed and adjusted these goal statements to properly align with the needs and vision of the county in 2022. Each adopting jurisdiction then had the opportunity to review the goal statements and accept them and/or add goals of their own. The following goal statements are both the goals of Okanogan County and of each adopting jurisdiction.

OKANOGAN COUNTY

Planning Goals:

1. This planning process will involve planning for the hazards of Flood, Earthquake, Landslides, Severe Weather, Wildland Fire, Terrorism & Civil Unrest, Dam Failure, Hazardous Materials, and Volcano.
2. Prioritize the protection of people, structures, infrastructure, and unique ecosystems that contribute to our way of life and the sustainability of the local and regional economy in all current and future planning efforts.

3. Additional hazards will be added to this plan as pre-mitigation planning is completed in the future.
4. Establish mitigation priorities and develop mitigation strategies in Okanogan County.
5. Develop and implement planning mechanisms and strategies that include considerations for the protection of animals (including pets, livestock, and other animals) in order to prepare businesses, residents, and other people to care for their animals during disaster events.
6. Meet or exceed the requirements of a FEMA All Hazard Mitigation Plan while creating a plan that is usable and workable for future planning and mitigation purposes.

Mitigation Goals:

7. Educate communities and organizations/agencies about the unique challenges of natural hazard preparedness in the county and encourage and support people to take actions toward readiness and hazard mitigation.
8. Strategically locate and plan infrastructure projects that take into consideration the impacts of natural hazards.
9. Identify and implement an integrated schedule of treatments targeted at reducing losses of all kinds that may be sustained by Okanogan County and the region.

PLANNING MECHANISMS AND CAPABILITIES

During the development of this Multi-Hazard Mitigation Plan, existing planning and management documents, programs, and policies were reviewed in order to avoid conflicting goals and objectives and to identify those that would enhance the hazard mitigation objectives outlined in this document. For a more exhaustive list of jurisdictional capabilities refer to Appendix 4; each adopting jurisdiction filled out a Capability Assessment form (an adaptation of FEMA worksheet 4.1) in order to provide a more complete picture of the resources that are already available for the purposes of natural hazard planning and mitigation. ***It should also be noted that all adopting jurisdictions have the ability and access to resources that are necessary to expand upon and improve existing policies and programs as needed.***

Okanogan County Local Hazard Mitigation Plan – 2013

In the 2013 Draft of the Local Hazard Mitigation Plan, the Task Force was developing ways to raise the community awareness of the natural hazards that threaten the public health and safety, the economic vitality of businesses, and the operational capability of important facilities and institutions. The draft plan identified the hazards threatening Okanogan County and provided an assessment of the risks posed. It also detailed the specific vulnerabilities of Okanogan County and many of the facilities that are important to the community's daily life. The plan included proposals to avoid or minimize those vulnerabilities. This information assisted individuals in understanding how the community could become safer from the impacts of future disasters. The work done and community supported garnered during the 2012-13 planning process has been incorporated in this Multi-Hazard Mitigation Plan.

Okanogon County Comprehensive Plan 2014 Update

The Okanogon County Comprehensive Plan (Plan) is a 20-year guide for the future of Okanogon County. The Plan provides a framework to support growth, development, and public decision-making in the County. It provides the vision of how residents want the County to grow and evolve over time. It establishes the goals, policies, priorities, and actions that the County will pursue to allow maintenance and enhancement of the quality of life, preservation of the rural character, sustainability of agricultural and natural resource industries, provision of recreational opportunities for residents and visitors, and protection of environmentally sensitive areas.

A comprehensive plan is a document that can benefit private property owners, local businesses, and cities and towns in the County, County staff, state and federal agencies, Tribes, community organizations and other interested parties. It is an effective management tool for elected officials, empowers community members to help define the future vision and character of the County, guide development patterns of the County, and provide predictability to property owners regarding the future use and enjoyment of their land.

The Okanogon County Comprehensive Plan was adopted in 1964 and the most recent updates and revisions occurred in 2014. The Okanogon County Multi-Hazard Mitigation Plan will be incorporated as a tool for decision makers to further their knowledge of specific hazard risk areas in order to make more informed decisions on how development should occur in those areas. Although land use designations are expected to be revised, specific recommendations regarding the vulnerability or potential dollar losses of future buildings, infrastructure, and critical facilities is not possible at this time.

Okanogon County Hazard Identification and Vulnerability Assessment 2004

The Hazard Identification and Vulnerability Assessment (HIVA) dated February 2004, describes natural and technological (human-made) hazards, which can potentially impact the people, economy, environment, and property of Okanogon County. It serves as a basis for county-level emergency management programs. It is the foundation of effective emergency management and identifies the hazards that organizations must mitigate against, prepare for, respond to, and recover from in order to minimize the effects of disasters and emergencies. The HIVA is not a detailed study, but rather a general overview of hazards that can cause emergencies and disasters. The Okanogon County All Hazards Mitigation Plan is a much more comprehensive approach, is more detailed, and provides specific plans to approach the county's problem areas.

Okanogon County Comprehensive Emergency Management Plan (CEMP) 2017 Update

The Comprehensive Emergency Management Plan (CEMP) dated July 2017, considers the emergencies and disasters likely to occur, as described in the Okanogon County Hazard Identification and Vulnerability Assessment, and describes functions and activities necessary to implement the four phases of Emergency Management – mitigation, preparedness, response and recovery. The plan utilizes Emergency Support Functions, which identify primary and support agencies responsibilities/activities that county and local jurisdictions may need in order to implement all-hazard mitigation. It provides policies, information,

recommendations and guidance to assist responsible officials making operational decisions. This plan is more the “who, what, when, where and why” activities in the event of an emergency. Emergency Support Functions (ESFs) = Transportation; Emergency Communications; Public Works & Engineering; Fire Protection; Information Analysis & Planning; Mass Care; Resource Management; Health & Medical Services; Search & Rescue; Hazardous Materials; Food & Water; Energy & Utilities; Military Support; Recovery & Restoration; Law Enforcement; and Damage Assessment. This plan does not conflict in any way with the All Hazards Mitigation Plan. CEMP updates will include support of initiatives and action items outlined in the Okanogan County All Hazards Mitigation Plan.

Okanogan County Emergency Response Plan– HazMat Plan

The purpose of the Hazardous Materials Emergency Response Plan is to establish common guidelines for responding to hazardous materials incidents anywhere within Okanogan County and to protect life, property and the environment from risks associated with the discharge, release, or misuse of hazardous materials. The HazMat Plan is an operational plan as well as a reference document. It may be used for pre-emergency planning and recovery as well as emergency response. The plan is different from the county CEMP in that it is focused on the multi-jurisdictional response to a hazardous materials spill with the Washington State Patrol as the lead agency. This plan endeavors to include contingencies for all these types of hazardous events, except *oil spills*. This plan does not conflict in any way with the Multi-Hazard Mitigation Plan.

Critical Area Ordinance 2013 Update

This ordinance identifies protected and hazardous areas. Protected areas are fish and wildlife habitat conservation areas, aquifer recharge areas, and wetlands. Hazardous areas are frequently flooded areas, geologically hazardous areas, erosion hazard areas, landslide hazard areas, mine hazard areas, seismic hazard areas, and volcanic hazard areas.

Okanogan County Zoning Ordinance

This ordinance does not identify hazard areas in great detail although there are a few zoning districts in the Methow Valley that prohibit new residences within the floodplain. These zones are the “Methow Review District”, the “Rural Residential District”, and the “Low Density Residential District”.

Open Space Timber/Open Space Open Space Plans

The Open Space Timber (OST) and Open Space Open Space (OSOS) Plans could be affected by some fuel reduction practices. The effects are more beneficial than hazardous, if handled appropriately. OST requires the sustenance of healthy commercial-grade timber. Fuels reduction has been shown to increase timber health. OSOS requires the sustenance of priority resources, other than timber. Landowners must ensure that fire-safety practices do not damage priority resources that keep them in the program in which they receive a property tax reduction.

Master Program for Okanogan County Shoreline Management 2018

The Master Program for Shoreline Management outlines allowed/prohibited uses within specific shoreline zoning designations. All shoreline designations allow forest practices within shoreline areas. Non-forestry related mitigation actions would be looked at individually, hopefully either allowed or allowed by permit. Most of the identified action items would have no effect on the shoreline areas such as road signs, evacuation plan, public education, fire-safe building materials etc. The shoreline ordinance revision came into effect June 26, 2018 and the revised shoreline plan acknowledges and supports the Okanogan County Multi-Hazard Mitigation Plan.

Washington State Wildland Fire Protection 10-Year Strategic Plan 2019

The Strategic Plan, developed by the Washington DNR, was designed to help natural resource, forest management, and wildland fire professionals prepare for and manage escalating wildfire risk in Washington State. The plan lays out 40 different strategies to accomplish four key goals related to resilient landscapes, prepared, and adapted communities, safe and effective response, and Washington State's preparedness, response, and recovery systems. The plan reflects the input of nearly 1,000 Washingtonians, including experts from the U.S. Forest Service, Washington State Fire Marshal's Office, and local fire agencies. The plan applies to all wildfire response agencies, as well as local emergency responders, forest health experts, and community members.

Burned Area Emergency Response Plans⁴

BAER stands for Burned Area Emergency Response. Wildfires can cause complex problems, from severe loss of vegetation and soil erosion, to a decrease in water quality and possible flash flooding. The Burned Area Emergency Response Program addresses post-fire emergency stabilization of these and other post wildfire problems, in order to protect public safety and prevent further degradation of the landscape and to mitigate post-fire damages to cultural resources.

The BAER program is designed to address emergency stabilization issues related to wildland fire. The program is utilized by all federal land management agencies. The BAER teams perform emergency Stabilization actions within one year of wildfire containment. These actions are intended to stabilize and prevent unacceptable degradation to natural and cultural resources, minimize threats to life or property resulting from the effects of a fire, or to repair, replace, or construct physical improvements necessary to prevent degradation of land or resources.

Recently, the Okanogan-Wenatchee National Forest assembled a Burned Area Emergency Response (BAER) assessment team to analyze post-fire condition of burned watersheds and to plan emergency stabilization treatments for Central Washington wildfires. The team has conducted field surveys and analyzed satellite imagery to develop burned area assessments. Completed BAER reports for past fires

⁴ Burned Area Emergency Response (BAER). National Interagency Fire Center. Available online at <https://www.nifc.gov/BAER/>.

(2012-2018) are available through the Central Washington Fire Recovery website for major wildfires that affected Okanogan County⁵.

INCORPORATION OF OTHER PLANNING MECHANISMS

OKANOGAN COUNTY

Okanogan County recently updated the Comprehensive Plan (2018) and the Shoreline Master Program (2018). The 2014 MHMP was not incorporated into either document, but the 2022 MHMP will be when they are next updated. Okanogan County is currently working with FEMA to update flood maps which will be added to the plan once they are complete. Although there are no other County planning mechanisms that are currently being updated the Planning Team will review the Hazard Mitigation Plan, and incorporate it into other planning mechanisms where appropriate, as a part of future update procedures.

OKANOGAN CONSERVATION DISTRICT

The Okanogan Conservation District will incorporate this Plan into both the annual and five-year plans (2017-2022). Considering the budgetary needs for conservation work described in the five-year plan, the CD will also look for opportunities to add additional projects to the Hazard Mitigation Plan.

CITIES AND TOWNS

The adopting cities and towns will utilize the information within this plan update when creating or updating other plans. Many of the adopting jurisdictions have different planning mechanisms that complement the Hazard Mitigation Plan; the information provided in this plan is based on the best available science and technology at the time of the update and will be referenced and utilized, where appropriate, to update all additional pertinent City plans, Ordinances, Policies, Regulations, etc. scheduled for update within five years from adoption of this MHMP.

FIRE DEPARTMENTS AND DISTRICTS

The County Fire Departments and Districts will utilize the information within this plan update when creating or updating other plans. However, most wildland fire entities will use the Okanogan Community Wildfire Protection Plan as their primary hazard planning tool. It is anticipated that the CWPP will be updated shortly after the 2022 MHMP is approved and adopted so it is unlikely that the fire departments and districts will need to integrate the 2022 MHMP into any other planning mechanisms.

NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE

Effective October 1, 2008, the Federal Emergency Management Agency (FEMA) will require jurisdictions that participate in the National Flood Insurance Program (NFIP) to link their mitigation strategy with continued compliance with the National Flood Insurance Program.

⁵ Burned Area Emergency Response websites for past large fires on the Okanogan-Wenatchee National Forest. Central Washington Fire Recovery. Available online at: <http://www.centralwashingtonfirerecovery.info/>.

Okanogan County, WA Natural Hazard Mitigation Plan 2022

At the time of this update, Okanogan County and the other adopting jurisdictions that are participating in the NFIP are in good standing (Table 1). As of December 31, 2019, Okanogan County had 208 policies in force with just over \$51 million in total insurance in-force; policy statistics were available for each participating jurisdiction except for Winthrop (the towns of Coulee Dam, Elmer City, and Nespelem are not currently participating in the NFIP). At the time of this update, none of the adopting jurisdictions participate in the Community Rating System and, according to FEMA, none are listed as future participating communities (those that become eligible as of October 1, 2021)⁶. According to data provided by the State of Washington, there were five repetitive loss properties and zero severe repetitive loss properties in Okanogan County as of September 25, 2021 (Table 2).

Table 1) NFIP Policy Statistics as of 12/31/2019 for communities in Okanogan County, WA. Policy statistics were unavailable for Winthrop and Coulee Dam, Elmer City, and Nespelem do not currently participate in NFIP. None of the listed communities participate in the Community Rating System (CRS).

Community Name	Community Number	Policies In-Force	Insurance In-Force	Written Premium In-Force	FIRM Effective Date	CRS Ranking
Okanogan County	530117	208	\$51,054,100	\$158,427	January 2, 2003	N/A
Brewster	530275	2	\$700,000	\$890	August 9, 1999	N/A
Conconully	530118	17	\$2,997,800	\$17,934	January 2, 2003	N/A
Coulee Dam	N/A	N/A	N/A	N/A	N/A	N/A
Elmer City	N/A	N/A	N/A	N/A	N/A	N/A
Nespelem	N/A	N/A	N/A	N/A	N/A	N/A
Okanogan	530119	38	\$5,868,800	\$64,967	August 2, 1995	N/A
Omak	530120	5	\$1,328,000	\$6,180	November 16, 1982	N/A
Oroville	530121	7	\$1,049,100	\$8,659	November 16, 1982	N/A
Riverside	530122	8	\$1,039,300	\$12,647	January 5, 1982	N/A
Tonasket	530123	8	\$863,000	\$10,522	January 5, 1978	N/A
Twisp	530124	7	\$1,458,500	\$3,606	July 18, 1977	N/A
Winthrop	530125				November 2, 1977	N/A

⁶ National Flood Insurance Program: Community Rating System. FEMA. Accessed August 5, 2021. Available online at: <https://www.fema.gov/floodplain-management/community-rating-system>

Table 2) NFIP Repetitive Loss and Severe Repetitive Loss statistics as of 9/25/2021 for communities in Okanogan County, WA.

No.	Community Name	Address City	Occupancy Type	Count of Dates of Loss	Mitigated	NFIP Insured
1	Omak, City of	Omak	Other-Nonres	3	No	No
2	Okanogan, City of	Okanogan	Single Family	4	No	No
3	Okanogan County	Oroville	Single Family	2	No	Yes
4	Okanogan County	Mazama	Single Family	2	No	Yes
5	Okanogan County	Mazama	Single Family	2	No	Yes

PROGRAM ADMINISTRATION AND PARTICIPATION

Participation in the National Flood Insurance Program (NFIP) and subsequent adoption of the Uniform Building Codes, or more stringent local building codes, provide basic guidelines to communities on how to regulate development. When a county participates in the NFIP it enables property owners in the county to insure against flood losses. By employing wise floodplain management, a participating county can protect its citizens against much of the devastating financial loss resulting from flood disasters. Careful local management of development in the floodplains results in construction practices that can reduce flood losses and the high costs associated with flood disasters to all levels of government.

The jurisdictions participating in NFIP will continue their participation by regularly reviewing their floodplain ordinances and updating them when necessary. It is through the ordinances that each participating jurisdiction recognizes the flood zones identified by FEMA FIRM maps and through the requirements of the ordinances that the NFIP is administered. If available, the municipal codes for Okanogan County and adopting cities and towns can be accessed using the links that are included in Table 3. If a jurisdiction has a floodplain ordinance, it can be found by searching the municipal codes online.

The towns of Coulee Dam, Elmer City, and Nespelem do not participate in the NFIP because they are not in proximity to any flood zones, according to the current FIRM maps. However, the FIRM maps are currently being updated so the participation of all three towns should be evaluated again once the final map updates are released. It is anticipated that the updated maps will be completed by the winter of 2023/2024. For more information about the FIRM map update, refer to the last sub-heading in this section (Risk Map Update).

Table 3) Floodplain ordinance information for each adopting jurisdiction. If available, the floodplain ordinances for each adopting jurisdiction, if applicable, can be found using the provided link.

Community Name	Floodplain Ordinance?	Link to Municipal Codes:
Okanogan County	YES	https://www.codepublishing.com/WA/OkanoganCounty
Brewster	YES	https://www.codepublishing.com/WA/Brewster
Conconully	YES	N/A
Coulee Dam	NO	https://www.codepublishing.com/WA/CouleeDam/
Elmer City	NO	N/A

Nespelem	NO	N/A
Okanogan	YES	https://www.codepublishing.com/WA/Okanogan/
Omak	YES	https://www.codepublishing.com/WA/Omak/
Oroville	YES	https://library.municode.com/wa/oroville/codes/code_of_ordinances
Riverside	YES	N/A
Tonasket	YES	https://www.codepublishing.com/WA/Tonasket/
Twisp	YES	https://www.codepublishing.com/WA/Twisp/
Winthrop	YES	https://www.codepublishing.com/WA/Winthrop/

EXPANDING PARTICIPATION IN NFIP

An important part of being an NFIP community is the availability of flood insurance for those homes and business within designated flood plains, or in areas that are subject to flooding, but that are not designated as Special Flood Hazard Areas.

If, at any point, participation in the NFIP by private property owners and businesses in Okanogan County appears to be low, assessing the following points could help to address the issue:

- A lack of knowledge about the existence of the availability of flood insurance.
- Home and business owners unaware of their vulnerability to flood events.
- Current cost of insurance is prohibitive.

The first two reasons can be addressed through public education. The third could be addressed by all communities in the county taking advantage of the Community Rating System (CRS).

To encourage communities to go beyond the minimum requirements and further prevent and protect against flood damage, the NFIP established the Community Rating System (CRS). To qualify for CRS, communities can do things like make building codes more rigorous, maintain drainage systems, and inform residents of flood risk.

In exchange for becoming more flood-ready, the CRS community's residents are offered discounted premium rates. Based on your community's CRS ratings, you can qualify for up to a 45% discount of your annual flood insurance premium.

Of the Okanogan County communities that participate in the NFIP, no community has earned a discount on their flood insurance rates through the Community Rating System (CRS).

Participation is relatively simple, and with the planning work already in place within the county little to no additional work would have to be done to start receiving discounted insurance rates. For additional information go to <https://www.fema.gov/national-flood-insurance-program-community-rating-system>

Okanogan County adopted the International Building Code. Continued review and enforcement will ensure that Payette County remains in good standing with the NFIP and could enable additional discounts under CRS.

RISK MAP UPDATE

The State of Washington identified Okanogan County as a priority for FEMA's Risk MAP program. The State determines its priorities based on population at risk to hazards, recent events, and community interest. In 2015 FEMA, State, and Local stakeholders participated in a Risk MAP Discovery Meeting and Scoping Meeting, where community concerns were identified. These concerns were captured in the Risk MAP Discovery Report and delivered to the communities in the watershed. After the Discovery and Scoping Meetings, community concerns were researched and analyzed, in order to develop a scope of work that includes multi-hazard risk assessment products and updates to the communities' regulatory flood maps based on community-identified resilience needs. The Okanogan County Risk Mapping, Assessment, and Planning (Risk MAP) Project Team and the Strategic Alliance for Risk Reduction (STARR II), a contractor for FEMA, are leading the update process.

The Draft Maps for Okanogan County were released in November 2020. Although they were reviewed, the draft maps were not incorporated into the 2022 Okanogan County HMP update. The final versions of the maps are expected to be released in the Winter of 2023/2024 so they, along with GIS data, will be available for flood hazard analysis for the next update of the Okanogan County HMP.

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CHAPTER 2: PLANNING PROCESS

IN THIS SECTION:

- Description of the Planning Process
- The Planning Team
- Planning Committee Meetings
- Public Involvement

CHAPTER 2 - PLANNING PROCESS

DOCUMENTING THE PLANNING PROCESS

Documentation of the planning process, including public involvement, is required to meet FEMA’s DMA 2000 (44CFR§201.6(b) and §201.6(c)(1)) for an updated local mitigation plan. This section includes a description of the planning process used to produce this plan, including how it was prepared, who was involved in the process, and how all the involved agencies participated.

PARTICIPATION IN THE PLANNING PROCESS

The Okanogan County Multi-Hazard Mitigation Plan update was developed through a collaborative process involving all organizations and agencies detailed in Chapter 1 of this document. The planning effort began by organizing and convening a countywide planning committee. A press release soliciting interested organizations, professionals, and members of the public, from both inside and outside of the county, was published two weeks before the first meeting was held (Figure 1).

Okanogan County and Cities Kick Off Project to Update Hazard Mitigation Plan

OKANOGAN, WASH – Okanogan County is beginning the process of updating its Multi-Hazard Mitigation Plan. The plan examines the risks posed by the natural hazards that affect Okanogan County, and its communities, and develops strategies to reduce the impacts from those hazards.

The Federal Emergency Management Agency (FEMA) requires counties to update this plan every five years to remain eligible for federal funding for hazard mitigation projects. All cities/towns in Okanogan County, two Fire Districts, Okanogan Conservation District are currently recognized as adopting jurisdictions in the plan, along with the county itself.

This project is funded through grants from FEMA and the initial “kickoff” meeting will be held October 30, 2019 at 1:30 PM in the Commissioners Hearing room at the Virginia Granger Admin Building in Okanogan.

A planning team will work with Emergency Management throughout the update process. The team will consist of representatives from local agencies, organizations, governments, and groups. Northwest Management, Inc. has been retained by Okanogan County to provide risk assessments, hazard mapping, field inspections, interviews, and to collaborate with the planning team to update the plan.

Community input will also play a key role in the 2020 plan update. Public meetings, reviews of the plan, and a public comment period will be announced in the future. The current version of the plan (titled the *Okanogan County Multi-Hazard Mitigation Plan*) can be accessed and viewed on the Okanogan County Emergency Management website. The update project is expected to be completed by October 15, 2020.

Figure 1) Press release advertising the 2022 Okanogan County Multi-Hazard Mitigation Plan Update.

The Okanogan County Emergency Management Director, Maurice Goodall, led the planning team efforts alongside the Northwest Management, Inc. team. Mr. Goodall began recruiting planning team members in 2019 by sending out a project invitation letter to a wide variety of resource professionals, including county and city elected officials and staff, fire protection districts, law enforcement, hospital and school district representatives, public health districts, local interest groups, and others. The original invitation to participate in the Multi-Hazard Mitigation Plan planning process was sent to numerous individuals representing different interests; the individuals listed in Table 4 are those who were invited to participate in the planning process. Individuals were considered participants if they attended at least one meeting. Some of the fire chiefs received an N/A (non-applicable) in the participation column as the fire districts and fire departments are yet to adopt the plan.

Table 4) Individuals who participated in the 2022 update of the Okanogan County Hazard Mitigation Plan.

Name	Organization	Title	Par.
Aaron Dickinson	Okanogan County Fire District 7	Assistant Chief	Y
Alice Atwood	City of Tonasket	Clerk/Treasurer	Y
Andy Gasho	Okanogan County Fire District 4	Fire Chief	N/A
Art Smyth	City of Brewster	Mayor	N
Bo Phillipy	Regency Omak	Administrator	Y
Bob Poch	Coulee Dam	Mayor	N
Brian Pyper	Okanogan County Public Health	RN	Y
Brian Warnecke	Coulee Dam Volunteer Fire Dept.	Fire Chief	N/A
Bruce Rawley	Oroville Fire Department	City of Oroville	N
Carlene Anders	Okanogan County LTRG	Mayor of Pateros	Y
Charlie Atkinson	Pleasant Valley Water Users Assoc.	Agent	Y
Chris Branch	Okanogan County	Commissioner	Y
Chuck Johnson	Washington DNR	Landowner Assistance Forester	Y
Cindy Gagne	City of Omak	Mayor	N
Cody Accord	Okanogan County Fire District 6	Fire Chief	Y
Craig Atwood	City of Okanogan	Clerk/Treasurer	Y
Craig Nelson	Okanogan Conservation District	Executive Director	Y
Darcy Epperson	Town of Nespelem	Mayor	N
Darryl Peery	Okanogan County Fire District 10	Fire Chief	N/A
David Gottula	OC Electric Co-Op	General Manager	Y
David Finch	Okanogan County Fire District 2	Town of Elmer City	N
Del Ostenberg	Colville Tribes	EMS/Fire and Rescue Nespelem	Y
Dennis Brown	City of Tonasket	Mayor	N
Donald Becker	WSDOT	Twisp Maintenance Supervisor	Y
Doug Ralston	Pleasant Valley Water Users Assoc.	Officer	Y
Dylan Gamble	Okanogan County Fire District 15	Fire Chief	N/A
Ed Townsend	Okanogan County Fire District 8	Fire Chief	N/A
Everett Hope	ARES Okanogan County Ec.	Resident	Y

Gary Benton	Town of Elmer City	Clerk/Treasurer	Y
Gene Jones	Okanogan County Fire District 16	Fire Chief	N/A
Greg Townsend	Chelan Fruit	Manager	Y
Jake Hardt	Washington DNR	Landowner Assistance Forester	Y
Jason Hubbard	Town of Riverside	Mayor	N
Jesse Tillman	Town of Elmer City	Mayor	N
Joe Kitzman	Okanogan County Fire District 15	Fire Chief	N/A
John K. Culp	City of Okanogan	Mayor	Y
John Neal	City of Oroville	Mayor	N
John Slater	Chelan Fruit	Refrigeration Manager	Y
Jord L. Wilson	City of Pateros	City Administrator	Y
Jose Gonzalez	Charter	Resident	Y
Jim Nanamkin	Colville Tribes Emergency Management	Public Safety Coordinator	Y
Justin Osborne	Okanogan County Fire District 7	Fire Chief	Y
Kathleen Johnson	USFS – Tonasket	District Ranger	Y
Kathryn Heim	Fire Adapted Methow Valley	Program Director	Y
Keith Zweigle	Okanogan County Fire District 15	Fire Chief	N/A
Kevin Bowling	Omak/Okanogan Fire	Fire Chief	Y
Kim Jacobs	North Valley Hospital District	Safety & Disaster Officer	Y
Kirsten Cook	Okanogan Conservation District	Community Outreach Director	Y
Lee Webster	City of Brewster	Public Works Director	Y
Lex Lindquist	Washington State Patrol	Sergeant	Y
Maggie Dungan	Aero Methow Rescue Service	Paramedic	Y
Maurice Goodall	Okanogan County	Emergency Management Director	Y
Matt Rawson	Okanogan County Fire District 3	Fire Chief	N/A
Mike Worden	OCSO Dispatch	Chief Deputy Spec Ops / Comms	Y
Nancy Farr	Fire Adapted Winthrop	Founder and Director	Y
Phil Dart	Okanogan County Fire District 11	Fire Chief	N/A
Randy Kilmer	Town of Twisp	Clerk/Treasurer	Y
Rick Balam	Okanogan County Sheriff SAR	SAR Coordinator	Y
Richie Gorr	Colville Tribes Emergency Management	EMS Fire/EMT	Y
Robert Seyler	Colville Tribes Emergency Management	EMS Fire/EMT	Y
Rocklynn Culp	Town of Winthrop	Town Planner	Y
Ron Garrow	American Red Cross	Mass Care Lead	Y
Ron Wonch	Washington DNR	Forester	Y
Rusty Stamps	Okanogan County Fire District 6	Assistant Chief	Y
Ryan Moses	Honeybear Growers	Resident	Y
Sally Ranzau	Town of Winthrop	Mayor	N

Sam Martin	Town of Conconully	Mayor	N
Sharma Dickinson	Town of Riverside	Clerk/Treasurer	Y
Sheila Corson	Okanogan County Public Utility District	Public Relations Coordinator	Y
Soo, Ing-Moody	Town of Twisp	Mayor	N
Stefani Bowden	Town of Coulee Dam	Clerk/Treasurer	Y
Sterlene Sena	Omak Library	Librarian	Y
Steve Thompson	City of Oroville	City Superintendent	Y
Sunshine Arkell	Washington DNR	SF-Engine Leader	Y
Tami Cochran	Town of Conconully	Clerk/Treasurer	Y
Tim Tugaw	Okanogan County Fire District 6	Division Chief	N/A
Tina Delap	Okanogan County	Emergency Management Assistant	Y
Trisha Davis-Stacy	Town of Nespelem	Clerk/Treasurer	Y
William Vallance	Okanogan County Fire District 15	Fire Chief	N/A
Zac Claussen	Okanogan County Fire District 9	Fire Chief	Y
Brad Tucker	Northwest Management Inc.	Dept. Manager	Y
Eric Nelson	Northwest Management Inc.	Planner/Lead Author	Y
Adam Herrenbruck	Northwest Management Inc.	Planner/Co Author	Y

Due to the large number of adopting jurisdictions and respective representatives, the planning partners were divided into two groups: The Planning Team and Stakeholders. Depending on which group they were assigned to, members of each group were involved in the planning process in different ways. Descriptions of Planning Team and Stakeholder involvement and the planning partners assigned to each group are detailed below.

It should be noted that even though the individuals listed in Table 4 were invited it does not necessarily mean that they were able to participate in the planning process. In some cases, if an individual could not participate a substitution was made so that entity was still be represented in the planning process. Additionally, a few participants served on as dual representatives of more than one jurisdiction. Members of the Planning Team and Stakeholder groups are listed below in Table 5 and Table 7, respectively. A record of sign-in sheets is included in the Chapter 7 Appendices.

THE PLANNING TEAM

The Planning Team was largely composed of representatives of the county or individuals interested in planning at the county level. Therefore, the Planning Team was largely tasked with providing input on the overall planning process (e.g. scheduling of planning efforts, public outreach, planning partner recruitment) and for reviewing and providing feedback on all chapters in the Hazard Mitigation Plan with a focus on the Okanogan County risk assessment and mitigation action items. The review of city, town, fire department, fire district, and conservation district profiles and risk assessments were delegated to planning partners in the Stakeholder group. Members of the Planning Team are listed in Table 5; all individuals listed in the table attended at least one Planning Team meeting (the Planning Team meetings

are described later on in this section). As stated previously, it was possible for some individuals to be members of both groups.

Table 5) Personnel who participated in the 2022 update of the Okanogan County Hazard Mitigation Plan as a member of the Planning Team. Asterisks indicate that individual served as a member of both the Planning Team and the Stakeholder group.

Name	Organization	Title
Carlene Anders	Okanogan County LTRG	Mayor of Pateros
Chris Branch	Okanogan County	Commissioner
Everett Hope*	ARES Okanogan County Ec.	Resident
Jon Culp	City of Okanogan	Mayor
Jord L. Wilson*	City of Pateros	City Administrator
Kathleen Johnson	USFS – Tonasket	District Ranger
Kathryn Heim*	Fire Adapted Methow Valley	Program Director
Kevin Bowling*	Omak/Okanogan Fire	Fire Chief
Kim Jacobs	North Valley Hospital District	Safety & Disaster Officer
Kirsten Cook*	Okanogan Conservation District	Community Outreach Director
Maggie Dungan	Aero Methow Rescue Service	Paramedic
Maurice Goodall	Okanogan County	Emergency Management Director
Nancy Farr	Fire Adapted Winthrop	Founder and Director
Robert Seyler	Colville Tribes Emergency Management	EMS Fire/EMT
Rocklynn Culp*	Town of Winthrop	Town Planner
Ron Wonch	Washington DNR	Forester
Rusty Stamps	Okanogan County Fire District 6	Assistant Chief
Sheila Corson	Okanogan County Public Utility District	Public Relations Coordinator
Brad Tucker	Northwest Management Inc.	Dept. Manager
Eric Nelson	Northwest Management Inc.	Planner/Lead Author
Adam Herrenbruck	Northwest Management Inc.	Planner/Co Author

STAKEHOLDERS

The Stakeholder group was largely composed of individuals representing cities, towns, fire departments, fire districts, natural resource groups, and other interest groups; most Stakeholders were representatives of adopting jurisdictions. Because of the scope of the Hazard Mitigation Plan update and the number of individuals involved, members of the Stakeholder group were not formally invited to participate in the Planning Team meetings (they were welcome to participate if they asked to be involved). As most were representatives of adopting jurisdictions, Stakeholders were largely responsible for documents and information that concerned their respective jurisdictions. Each adopting jurisdiction was asked to provide information to Northwest Management Inc. as well as review their community profiles, risk assessments, and mitigation action items. As Stakeholders were not formally invited to participate in Planning Team meetings, communication mostly took place through email and over the phone. Information requests and reminders were commonly sent to the Stakeholder email group while one-on-one phone calls were held with Stakeholders/adopting jurisdictions to address comments and questions about the planning process. Table 6 lists all Stakeholders that participated in the plan update. As stated previously, it was possible for some individuals to be members of both the Stakeholder group and the Planning Team.

Section 2 – Planning Process

Table 6) Personnel who participated in the 2022 update of the Okanogan County Hazard Mitigation Plan as a member of the Stakeholder group. Asterisks indicate that individual served as a member of both the Stakeholder group and the Planning Team.

Name	Organization	Title
Alice Atwood	City of Tonasket	Clerk/Treasurer
Craig Atwood	City of Okanogan	Clerk/Treasurer
Craig Nelson	Okanogan Conservation District	Executive Director
Everett Hope*	ARES Okanogan County Ec.	Resident
Gary Benton	Town of Elmer City	Clerk/Treasurer
Jord L. Wilson*	City of Pateros	City Administrator
Kathryn Heim*	Fire Adapted Methow Valley	Program Director
Kevin Bowling*	Omak/Okanogan Fire	Fire Chief
Kirsten Cook*	Okanogan Conservation District	Community Outreach Director
Lee Webster	City of Brewster	Public Works Director
Randy Kilmer	Town of Twisp	Clerk/Treasurer
Rocklynn Culp*	Town of Winthrop	Town Planner
Sharma Dickinson	Town of Riverside	Clerk/Treasurer
Stefani Bowden	Town of Coulee Dam	Clerk/Treasurer
Steve Thompson	City of Oroville	City Superintendent
Tami Cochran	Town of Conconully	Clerk/Treasurer
Trisha Davis-Stacy	Town of Nespelem	Clerk/Treasurer

DESCRIPTION OF THE PLANNING PROCESS

The Okanogan County MHMP was developed through a collaborative planning process involving all the organizations and agencies listed in the tables above (organizations and agencies are also listed on the first page of chapter 1). The planning process included seven distinct phases that are, in general, listed as follows in order in which they began:

1. **Organization of Resources** – Okanogan County and NMI worked together to develop a comprehensive list of potential participants, split between the Planning Team and the Stakeholder group, as well as a project strategy, timeline, and work plan.
2. **Collection of Data** – NMI coordinated with the Planning Team and Stakeholders to gather any available data and information about the extent and periodicity of hazards in Okanogan County to ensure a robust dataset for making inferences about hazards.
3. **Field Observations and Estimations** – NMI and the planning team developed risk models and identified problem areas to better understand risks, juxtaposition of structures and infrastructure to risk areas, access, and potential mitigation projects for all adopting jurisdictions.

4. **Mapping** – NMI developed a comprehensive database and map files relevant to pre-disaster mitigation control and mitigation, structures, resource values, infrastructure, risk assessments, and other related data.
5. **Public Involvement** – NMI and Okanogan County developed a plan to involve the public at the beginning of the planning process. The Planning Team worked together to facilitate press releases, public meetings, public review of draft documents, and acknowledgement of the final plan by the signatory representatives.
6. **Strategies and Prioritization** – NMI and the Planning Team members worked together to review the risk analyses and develop realistic mitigation strategies for the county while the Stakeholder group performed similar tasks for the other adopting jurisdictions.
7. **Drafting of the Report** – NMI drafted a final, updated document that integrated the information that was collected through the planning process. Planning Team members and Stakeholders also had the opportunity to review each section of the final draft, review public comments for incorporation, approve the initiation of the state and federal review processes, and adopt the final document.

MULTI-JURISDICTIONAL PARTICIPATION

CFR requirement §201.6(a)(4) calls for multi-jurisdictional planning in the development of Hazard Mitigation Plans that include multiple jurisdictions. To be included as an adopting jurisdiction in the Okanogan County Multi-Hazard Mitigation Plan, jurisdictions were required to participate in at least one Planning Team meeting or meet with planning team leadership individually, provide a goals statement, submit at least one mitigation strategy, and adopt the final Plan by resolution.

The following is a list of jurisdictions that have met the requirements for an adopting jurisdiction and are thereby included in the Natural Hazard Mitigation Plan*:

- Okanogan County
- City of Brewster
- City of Okanogan
- City of Omak
- City of Oroville
- City of Pateros
- City of Tonasket
- Town of Conconully
- Town of Coulee Dam
- Town of Elmer City
- Town of Nespelem
- Town of Riverside
- Town of Twisp
- Town of Winthrop
- Okanogan Conservation District

****Okanogan County Fire Departments and Fire Districts will be adopting the MHMP at a later date because of the severity of the 2021 wildland fire season.***

These jurisdictions were represented on the planning committee and they participated in the development of hazard profiles, risk assessments, and mitigation measures.

The planning committee meeting was the primary venue for authenticating the planning record. However, additional input was gathered from each jurisdiction in a combination of the following ways:

- Planning Team leadership participated in some local government meetings and meetings with other interest groups.
- One-on-one correspondence between the planning team leadership and representatives of the municipalities and special districts.
- Public meetings where Planning Team members had opportunities to engage with community members.
- Written correspondence was provided periodically between Planning Team leadership and each participating jurisdiction to update cooperators on the planning process, make requests for information, and facilitate feedback.
- A draft of the Okanogan County Hazard Mitigation plan was made available online during the public comment period. If comments were submitted, they were discussed by the Planning Team and considered for inclusion in the plan.
- Once the draft Plan was completed, planning committee leadership emailed the participating jurisdictions to discuss the review process, note any additional revisions in the document, and ensure their understanding of the adoption process.

PLANNING COMMITTEE MEETINGS

Some members of the planning committee were available to residents of the county for questions during public meetings. Additionally, the press releases encouraged interested citizens to contact their county emergency manager or attend planning committee meetings to ensure that all issues, potential solutions, and ongoing efforts were thoroughly discussed and considered by the committee. When the public meetings were held, committee members were encouraged to attend and share their support and experiences with the planning process and their interpretations of the results.

The planning kickoff meeting was held on October 30, 2019 as part of the Okanogan County LEPC meeting. This meeting introduced the LEPC to the Multi-Hazard Mitigation Plan update process and established the planning committee moving forward. Refer to Appendix 1 for a record of attendance and meeting minutes for the planning kickoff meeting as well as subsequent planning meetings.

COVID-19: With the spread of COVID-19 and mandatory state shutdowns, in-person planning team meetings were suspended in March 2020 and did not resume for the remainder of the project. Alternatively, draft-sections of the plan were sent to the Planning Team for review and meetings were held exclusively online via Zoom or Adobe Connect. Because meetings were web-based, the Planning Team met more frequently to discuss sections of the plan and assignments that were given to the group. Additionally, conference calls were conducted with the adopting jurisdictions as needed. Calls were held when representatives from adopting jurisdiction had questions or comments about the materials or excerpts from the plan that were sent out for completion or review.

PUBLIC INVOLVEMENT

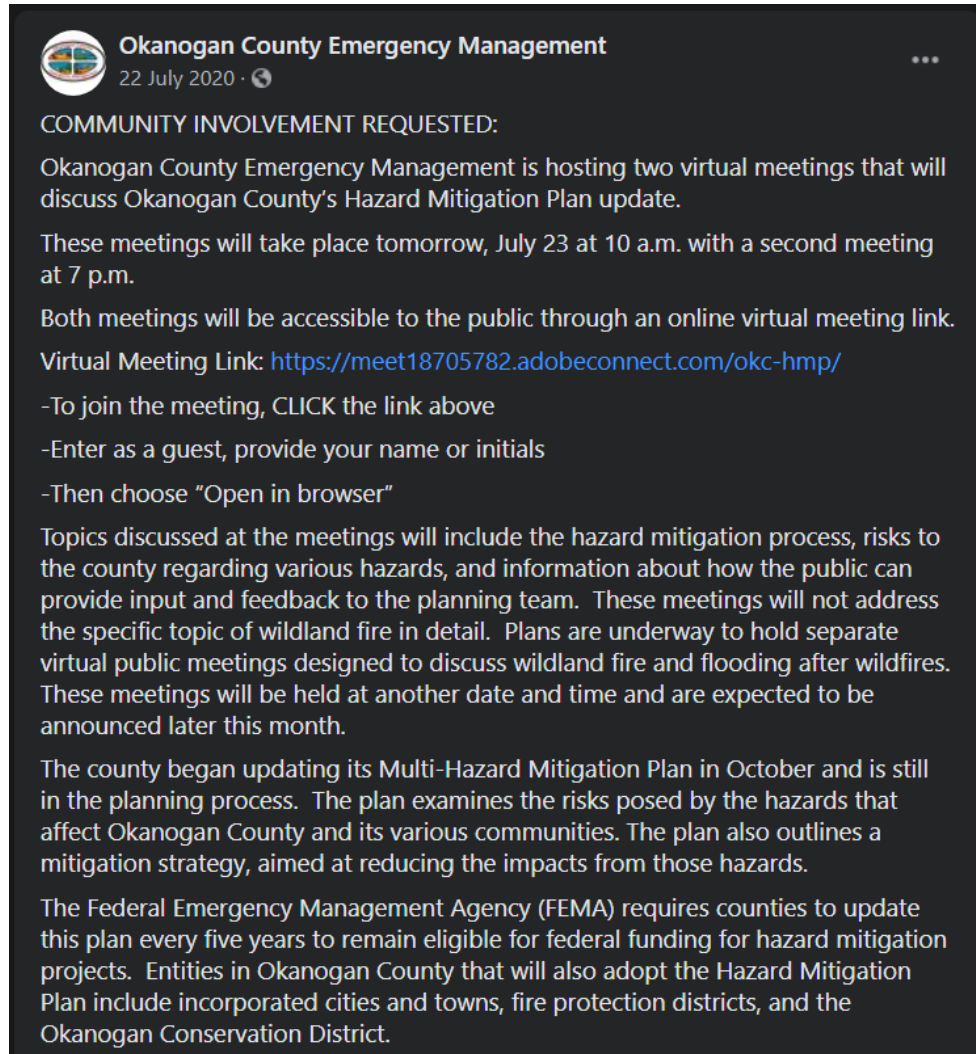
Public involvement in this plan was made a priority from the inception of the project. There were several ways that public involvement was sought and facilitated. Community members had opportunities to communicate with Planning Team leadership during public meetings, which were held exclusively online, see the comment about COVID-19 below, as well as outside of meetings through email. Once it was fully reviewed by the planning team, a draft of the plan was also made available to the public for review and comment.

Three formal media releases were submitted to the local newspapers and/or posted on the Okanogan County Emergency Management Facebook page. The first media release (Figure 1, Participation in the Planning Process) informed the public that the Multi-Hazard Mitigation Plan process was beginning, who was involved, why it was important to Okanogan County, and who to contact for more information. The second media release (Figure 2) was a Facebook post announcing the public meeting dates and times (which were held virtually over Adobe Connect due to COVID-19). The third media release (Figure 3) provided information regarding the public comment period, including the duration of the comment period, where a web-based version of the plan could be viewed, and where comments should be submitted.

COVID-19: With the spread of COVID-19 and mandatory state shutdowns, all in-person meetings were suspended in March 2020. Consequently, the public meetings were held online via Adobe Connect. several different meetings were held to accommodate as many community members and other participants as possible. Participants were able to ask questions and submit comments during the meeting and contact information for Northwest Management Inc. representatives was presented so participants could contact Planning Team leadership outside of the meeting. Additionally, when a complete draft of the document was ready for public comments it was made available online where it could be viewed at home and comments could be submitted electronically.

PUBLIC MEETINGS

In total, three public meetings were held online using Adobe Connect (see statement above regarding COVID-19). Originally, only two meetings were planned for July 23rd (10:00 am and 7:00 pm) but the evening meeting was canceled due to technical difficulties. To make up for the cancellation two more meetings were scheduled for July 30th (also at 10:00 am and 7:00 pm). Information for the meetings was posted online on the Okanogan County Emergency Management Facebook page (Figure 2).



Okanogan County Emergency Management
22 July 2020 · 🌐

COMMUNITY INVOLVEMENT REQUESTED:

Okanogan County Emergency Management is hosting two virtual meetings that will discuss Okanogan County's Hazard Mitigation Plan update.

These meetings will take place tomorrow, July 23 at 10 a.m. with a second meeting at 7 p.m.

Both meetings will be accessible to the public through an online virtual meeting link.

Virtual Meeting Link: <https://meet18705782.adobeconnect.com/okc-hmp/>

- To join the meeting, CLICK the link above
- Enter as a guest, provide your name or initials
- Then choose "Open in browser"

Topics discussed at the meetings will include the hazard mitigation process, risks to the county regarding various hazards, and information about how the public can provide input and feedback to the planning team. These meetings will not address the specific topic of wildland fire in detail. Plans are underway to hold separate virtual public meetings designed to discuss wildland fire and flooding after wildfires. These meetings will be held at another date and time and are expected to be announced later this month.

The county began updating its Multi-Hazard Mitigation Plan in October and is still in the planning process. The plan examines the risks posed by the hazards that affect Okanogan County and its various communities. The plan also outlines a mitigation strategy, aimed at reducing the impacts from those hazards.

The Federal Emergency Management Agency (FEMA) requires counties to update this plan every five years to remain eligible for federal funding for hazard mitigation projects. Entities in Okanogan County that will also adopt the Hazard Mitigation Plan include incorporated cities and towns, fire protection districts, and the Okanogan Conservation District.

Okanogan County Emergency Management
23 July 2020 · 🌐

The Multi Hazard Mitigation Plan meeting that was scheduled for tonight at 7 PM has been canceled due to difficulties with our WEB based meeting platform.

It has been rescheduled to next Thursday, July 30, 2020.

There are two meetings scheduled, the first at 10 AM and the second at 7 PM.

A link will be provided at a later date.

2020-07-23 6:47 PM

👍 14 1 comment 2 shares

Figure 2) Public meeting information posted on the Okanogan County Emergency Management Facebook page. The meetings were held as a part of the 2022 update of the Okanogan County Multi-Hazard Mitigation Plan.

The goal of the public meetings was to share information regarding the planning process, present details of the preliminary risk and vulnerability assessments, and discuss potential mitigation strategies with anyone who was interested. Because the meetings were held online, the chat box and poll questions were the primary means of interaction with meeting participants. The poll question gave participants an opportunity to share their perspectives and experiences with natural hazards and hazard mitigation while specific questions could be submitted in the Adobe Connect chat box. Contact information for the representatives from Northwest Management Inc. was also provided at the end of the meeting. In total, there were approximately 40 different people who attended the public meetings.

Because of the change in meeting format, from in-person to web-based, Planning Team members met on July 21 for a trial of the public meeting presentation. The goal of the meeting was to perform a final test of Adobe Connect as a public meeting platform as well as provide Planning Team members an opportunity to comment on and make edits to the presentation.

The press release used to notify the public of the meetings and the slideshow that was presented are included in Chapter 7: Appendix 1.

PUBLIC COMMENT PERIOD

A public comment period was held from July 23 to July 30, 2021, to allow members of the public an opportunity to view the full draft plan and submit comments (Figure 3). Originally, hard copies of the plan were going to be available at different locations in the county for review, but that did not happen as COVID-19 was still a concern at the time that the full draft was released.

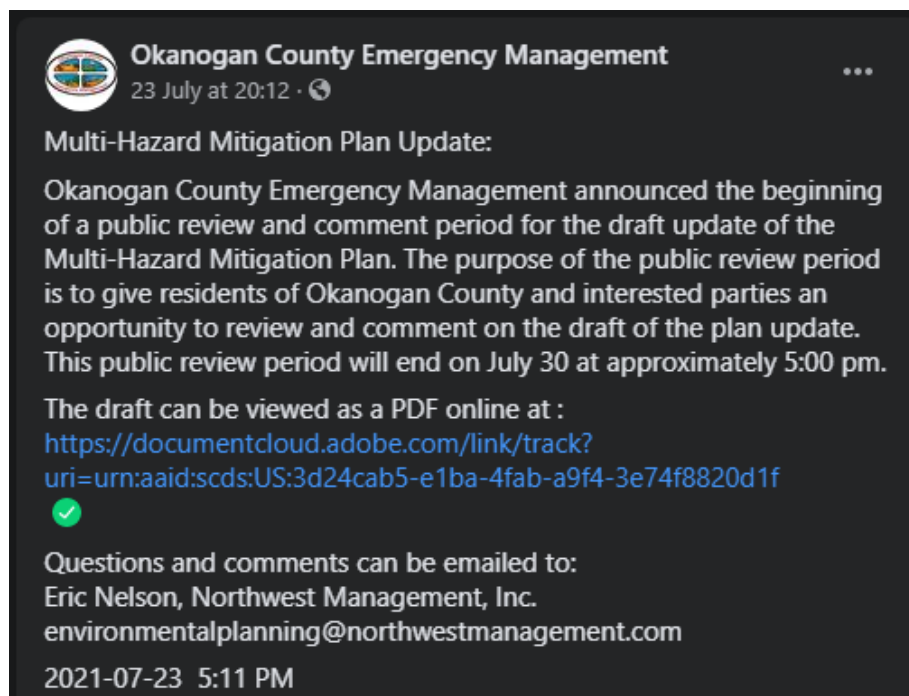


Figure 3) Announcement of the Okanogan County Multi-Hazard Mitigation Plan public comment period; it was posted to the Okanogan County Emergency Management Facebook page on July 23, 2021.

No comments concerning the plan update were submitted by members of the public.

It is also important to note the short duration of the public comment period. Without an approved plan in place, Okanogan County could have lost funding that was available through Fire Mitigation Assistance Grants (FMAG) for post-fire recovery for 2020 wildfires. This resulted in significantly shorter planning team review and public comment periods as the County needed to submit the plan for approval as quickly as possible. However, the public was, and still is, welcome to review and submit comments on the plan at any time, even after the conclusion of the formal public comment period. Comments should be submitted to Okanogan County Emergency Management or to local officials representing the different jurisdictions that have adopted the plan. Those comments will then be compiled and reviewed and considered for inclusion in the plan at the next annual review or full update of the plan.

CONTINUED PUBLIC INVOLVEMENT

Okanogan County is dedicated to involving the public directly in review and updates of this Multi - Hazard Mitigation Plan. The Emergency Management Director, through the planning committee, is responsible for the annual review and update of the plan as recommended in the “Plan Monitoring and Maintenance” section of this document.

The public will have the opportunity to provide feedback about the plan annually on the anniversary of the adoption at a meeting of the Okanogan County Board of Commissioners. Copies of the plan will be kept at the Okanogan County Courthouse. The plan also includes contact information for the Emergency Management Director, who is responsible for keeping track of public comments.

A public meeting will also be held as part of each annual evaluation or when deemed necessary by the planning committee. The meetings will provide the public a forum for which they can express concerns, opinions, or ideas about the plan. The Okanogan County Commissioner’s Office will be responsible for using county resources to publicize the annual meetings and maintain public involvement through the county’s webpage and local news outlets.

DOCUMENTED REVIEW PROCESS

Opportunities to review and comment on the plan were provided to both planning team members and members of the public at different points in the planning process. A record of the review process consists of correspondence descriptions, press releases, social media posts, meeting agendas, meeting minutes, and meeting sign-in sheets. Additional documentation of these activities is included in the Chapter 7 Appendices.

During regularly scheduled planning team meetings in 2020-2021, the group members met to discuss findings, review mapping analyses, and provide written comments on draft sections of the document. During the public meetings attendees observed map analyses, discussed general findings from the risk assessments, and were given an opportunity to make recommendations on potential project areas.

Sections of the draft plan were delivered to the planning team members during the regularly scheduled planning team meetings. The completed first draft of the document was presented to the group in July

Section 2 – Planning Process

2021 for full planning team review. The draft was available online for members of the planning team to review and comment on from July 23 to July 30, 2021. The public comment period took place at the same time.

It is also important to note the short duration of the planning team review period. Without an approved plan in place, Okanogan County could have lost funding that was available through Fire Mitigation Assistance Grants (FMAG) for post-fire recovery for 2020 wildfires. This resulted in significantly shorter planning team review and public comment periods as the County needed to submit the plan for approval as quickly as possible. However, planning team members were, and still are, welcome to review and submit comments on the plan at any time, even after the conclusion of the formal public comment period. Comments should be compiled until they can be reviewed and considered for inclusion in the plan at the next annual review or full update of the plan.

PLAN MONITORING AND MAINTENANCE

The Okanogan County Multi-Hazard Mitigation Plan will be reviewed on an annual basis by the planning team to determine the effectiveness of mitigation programs, projects, or other related activities, and to reflect changes in land development or programs that may affect mitigation priorities and/or strategies. The plan will also be updated every five years. These five-year updates will be delivered to the Washington Emergency Management Division for review and then to the FEMA, Region X Office for final approval. Public involvement will be a priority during both processes.

ANNUAL PLAN REVIEW

To facilitate the annual plan review process, the Okanogan County MHMP planning team will remain a semi-active group following the formal adoption of this plan and shall be charged with the responsibility of conducting annual plan reviews. Every year, the Okanogan County Emergency Manager will initiate and lead the annual review process at the first Local Emergency Planning Committee (LEPC) meeting held after the anniversary of the adoption of the multi-hazard mitigation plan. During this meeting, all participating jurisdictions will report on their respective projects, identify needed changes and updates to the existing plan, and identify what about the plan is working and not working and which goals are being achieved or need to be modified. Maintenance to the plan should be detailed at this meeting, documented, and attached to the formal plan as an amendment to the multi-hazard mitigation plan.

Specifically, the focus of the planning team at the annual review meeting should include at least the following topics:

- Evaluate whether or not the plan is following the planning philosophy and mission statement expressed in Chapter 1 as well as all actionable components of the plan.
- Assess the plan's effectiveness and evaluate whether or not the plan is achieving its stated goals. Make notes of any changes or improvements that can be made during the next full update.
- Update historical events record based on any events in the past year.
- Review county profile and individual community assessments for each hazard and note any major changes or mitigation projects that have altered the vulnerability of each entity.

- Add a section to note accomplishments or current mitigation projects.
- All action items in Chapter 6 will need to be updated as projects are started or completed, and new projects should be discussed as new needs or issues are identified.
- Assess other planning mechanisms – how can we dovetail the MHMP with other plans to make them work for each other? Specifically, how do we incorporate content from other plans into the action items for the regional MHMP?
- Incorporate additional hazard chapters as funding allows.
- **CWPP:** Invite the WADNR to participate in the annual review of the CWPP.

Following the annual plan review process, the Okanogan County MHMP planning team, in cooperation with the Okanogan County Emergency Management, will prepare notes describing: 1) the plan review process and its effectiveness; 2) the status of any current mitigation activities or projects and the addition of any new projects; and 3) any deficiencies in the plan itself as identified through the evaluation of the plan. These notes will then be used to during the next five-year update. All meeting minutes, press releases, and other documentation of revisions should be kept on record by Okanogan County Emergency Management.

FIVE-YEAR PLAN UPDATE

Updates to the Okanogan County Multi-Hazard Mitigation Plan shall be conducted on a five-year cycle and shall commence at the direction of Okanogan County Emergency Management. Upon such direction, the Okanogan County Emergency Manager, in cooperation the Okanogan County MHMP planning team, will begin the process of updating the plan. It is advised that during the third annual update the planning team should begin the FEMA grant process for updating the plan with the following year (fourth year) used to update the plan. The governing body of each of the participating jurisdictions shall approve the updated plan and a copy of the updated plan shall be submitted to the WAEMD.

The focus of the planning committee at the five-year re-evaluation should include all topics suggested for the annual review in addition to the following items:

- Update County demographic and socioeconomic data.
- Address any new planning documents, ordinances, codes, etc. that have been developed by the county or cities.
- Review listed communication sites.
- Review municipal water sources, particularly those in the floodplain or landslide impact areas.
- Redo all risk analysis models incorporating new information such as an updated county parcel master database, new construction projects, development trends, population vulnerabilities, changing risk potential, etc.
- Update county risk profiles and individual community assessments based on new information reflected in the updated models.
- Identify any planning mechanisms that have been recently updated that should be used to update the MHMP; are there any planning mechanisms that should be integrated into the MHMP?

- Improve the “Mechanisms to Incorporate Mitigation Strategies” section in Chapter 6 to include any additional authorities, policies, programs, and resources available to accomplish hazard mitigation.
- Identify and address how changes in development have impacted each jurisdiction’s vulnerability.
- Discuss how planning and mitigation priorities have changed to reflect current financial, legal, and political realities or post-incident conditions. Document this in the updated Plan.
- **CWPP:** Invite the WADNR to participate in the update of all information identified as being a part of the Community Wildfire Protection Plan.

All meeting minutes, press releases, and other documentation of revisions should be kept on record by Okanogan County Emergency Management.

UPDATE AND REVIEW GUIDELINES

Deadlines and Requirements for Regular Plan Reviews and Updates: In order to apply for a FEMA PDM project grant, Tribal and local governments must have a FEMA-approved mitigation plan. Tribal and local governments must have a FEMA-approved mitigation plan in order to receive HMGP project funding for disasters declared on or after November 1, 2004. States and Tribes must have a FEMA-approved Standard or Enhanced Mitigation Plan in order to receive non-emergency Stafford Act assistance (i.e., Public Assistance Categories C-G, HMGP, and Fire Management Assistance Grants) for disasters declared on or after November 1, 2004. State mitigation plans must be reviewed and reapproved by FEMA every three years. Local Mitigation Plans must be reviewed and reapproved by FEMA every five years.

Plan updates. In addition to the timelines referenced above, the Rule includes the following paragraphs that pertain directly to the update of State and local plans:

- ✓ §201.3(b)(5) [FEMA Responsibilities] ...Conduct reviews, at least once every three years, of State mitigation activities, plans, and programs to ensure that mitigation commitments are fulfilled...
- ✓ §201.4(d) Review and updates. [State] Plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities and resubmitted for approval...every three years.
- ✓ §201.6(d) [Local] plans must be reviewed, revised if appropriate, and resubmitted for approval within five years in order to continue to be eligible for project grant funding.

Plan updates must demonstrate that progress has been made in the past three years (for State plans), or in the past five years (for local plans), to fulfill commitments outlined in the previously approved plan. This will involve a comprehensive review and evaluation of each section of the plan and a discussion of the results of evaluation and monitoring activities detailed in the Plan Maintenance section of the previously approved plan. FEMA will leave to State discretion, consistent with this plan update guidance, the documentation of progress made. Plan updates may validate the information in the previously approved plan, or may involve a major plan rewrite. In any case, a plan update is NOT an annex to the previously approved plan; it must stand on its own as a complete and current plan.

The objective of combining these complementary guidelines is to facilitate an integrated natural hazard risk assessment, identify pre-hazard mitigation activities, and prioritize activities and efforts to achieve the protection of people, structures, the environment, and significant infrastructure in Okanogan County while facilitating new opportunities for pre-disaster mitigation funding and cooperation.

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CHAPTER 3: COMMUNITY PROFILES

IN THIS SECTION:

- Okanogan County
- Okanogan Conservation District
- City of Brewster
- Town of Conconully
- Town of Coulee Dam
- Town of Elmer City
- Town of Nespalem
- City of Okanogan
- City of Omak
- City of Oroville
- City of Pateros
- Town of Riverside
- City of Tonasket
- Town of Twisp
- Town of Winthrop
- Local Fire Departments & Districts



CHAPTER 3 - COMMUNITY PROFILES

The purpose of this chapter is to link the unique qualities, features, and characteristics of each jurisdiction to local and regional natural hazards. Each community profile includes relevant information about demographics, infrastructure, commerce, industry, natural resources, and geography and identifies any community-components that are of interest, especially as they relate to natural hazards. Following the community profile is a risk and vulnerability assessment that summarizes the probability of a given natural hazard event affecting a jurisdiction, the potential impacts that a natural hazard event could have on a jurisdiction, and which community-components are at risk.

OKANOGAN COUNTY

DESCRIPTION OF THE REGION

Okanogan means "rendezvous" and refers to the place where the Okanogan River joins the Columbia River. The Washington Territorial Legislature created the County on February 22, 1888.

The total area of Okanogan County is approximately 3,400,000 acres, of which 767,803 acres is privately owned and about 1,565,754 acres is federally owned. Over 95 percent of the federally owned land is encompassed within the jurisdiction of the United States Forest Service, primarily within the Okanogan National Forest, most of the Pasayten Wilderness, and portions of the Lake Chelan – Sawtooth Wilderness.

Larger than several states, Okanogan County is bordered on the north by Canada, on the south by the Columbia River, on the east by Ferry County, and on the west by ominous peaks of the North Cascade Mountains. The county covers 5,281 square miles, making it the largest county in Washington. The Colville Indian Reservation, located in the southeast corner of the county, occupies approximately 700,000 acres and is an integral part of the heritage of the county.

GEOGRAPHY AND NATURAL RESOURCES

Forested highlands, shrub covered hills, and valleys with fertile farmlands comprise Okanogan County, which is located east of the Cascades along the Canadian border in the north-central part of Washington. Bordering the county on the west are Whatcom, Skagit, and Chelan Counties, to the east is Ferry County, and to the south is Douglas County. The western half of the county is comprised of dense, rugged, mountainous terrain, much of which is within Okanogan National Forest. Similar topography also can be found in the northeast corner of the county. From the north part of the county, the land descends into rolling hills, grassy ranges, and fertile valleys that extend through the center of the county.

Summers, on the plains, are sunny, warm and dry with some hot days. During 4 or 5 months, in the lower elevations extreme highs may be 100°F, while, in the higher elevations 1 or 2 months may reach above 90°F. In winter, minimum temperatures of -10° to -20°F are common although a few stations report -25° to -30°F. Normally, precipitation is light in the summer and heaviest in the winter. Valleys and lowlands receive an average of 10 to 14 inches of precipitation; in the mountains, precipitation increases with

elevation where 25 to 30 inches per year can be expected on the higher ridges, with the majority occurring as snow. Growing seasons vary from over 180 days in the Southwest to less than 80 days in the forested highlands.

Okanogan County is a diverse ecosystem with a complex array of vegetation, wildlife, and fisheries that have developed with, and adapted to fire as a natural disturbance process. Nearly a century of wildland fire suppression coupled with past land-use practices (primarily timber harvesting and agriculture) has altered plant community succession and has resulted in dramatic shifts in the fire regimes and species composition. As a result, some forests and rangelands in Okanogan County have become more susceptible to large-scale, higher-intensity fires posing a threat to life, property, and natural resources including wildlife and plant populations. High-intensity, stand-replacing fires have the potential to seriously damage soils and native vegetation. In addition, an increase in the number of large, high-intensity fires throughout the nation's forest and rangelands has resulted in significant safety risks to firefighters and higher costs for fire suppression.

VEGETATION

Vegetation in Okanogan County is a mix of forestland and agricultural ecosystems. An evaluation of satellite imagery of the region provides some insight to the composition of the vegetation of the area. The full extent of the county was evaluated for cover type by the USDA Forest Service in 2001 as determined from Landsat 7 ETM+ imagery in tabular format.

The most represented vegetated cover type is Douglas-fir at approximately 18% of the total area. The next most common vegetation cover types represented are Herbaceous at 16%, Shrub at 14%, Subalpine Forest Mix at 9%, and Ponderosa Pine at 9%. Urban areas and agriculture represent approximately 4.3% of the total area (Table 7).

Table 7) Vegetative Cover Types in Okanogan County.

Cover	Acres	Percent	Cover	Acres	Percent
Douglas-fir	617,979	18.2%	Subalpine Fir	37,474	1.1%
Herbaceous	555,344	16.3%	Western Larch	34,355	1.0%
Shrub	461,886	13.6%	Water	33,090	1.0%
Subalpine Forest Mix	317,536	9.3%	Engelmann Spruce	26,871	0.8%
Ponderosa Pine	291,774	8.6%	Subalpine Larch	14,895	0.4%
Lodgepole Pine	244,267	7.2%	Burned Areas	13,372	0.4%
Ponderosa Pine / Douglas-fir	193,040	5.7%	Snow	13,187	0.4%
Agriculture	140,819	4.1%	Conifer / Deciduous Mixed	7,575	0.2%
Rock	139,852	4.1%	Urban	5,174	0.2%
Dry Mixed Forest	116,988	3.4%	Moist Mixed Forest	4,833	0.1%
Low Canopy Closure Tree	44,811	1.3%	Pacific Silver Fir	1,889	0.1%
Deciduous	41,797	1.2%	Mountain Hemlock	1,058	0.0%
Whitebark Pine	41,385	1.2%	Total	3,401,252	100.0%

HYDROLOGY

The Washington Department of Ecology & Water Resources Program is charged with the development of the Washington State Water Plan. Included in the State Water Plan are the statewide water policy plan and component basin and water body plans, which cover specific geographic areas of the state. The Washington Department of Ecology has prepared general lithologies of the major ground water flow systems in Washington.

The state may assign or designate beneficial uses for particular Washington water bodies to support. These beneficial uses are identified in section WAC 173-201A-200 of the Washington Surface Water Quality Standards (WQS). These uses include:

- Aquatic Life Uses: char; salmonid and trout spawning, rearing, and migration; nonanadromous interior redband trout, and indigenous warm water species
- Recreational Uses: primary (swimming) and secondary (boating) contact recreation
- Water Supply Uses: domestic, agricultural, and industrial; and stock watering

While there may be competing beneficial uses in streams, federal law requires protection of the most sensitive of these beneficial uses.

A correlation to mass wasting due to the removal of vegetation caused by high intensity wildland fire has been documented. Burned vegetation can result in changes in soil moisture and loss of rooting strength that can result in slope instability, especially on slopes greater than 30%. The greatest watershed impacts from increased sediment will be in the lower gradient, depositional stream reaches.

Of critical importance to Okanogan County will be the maintenance of the domestic watershed supplies in the Methow River Watershed (Watershed Resources Inventory Area 48) and the Okanogan River Watershed (Watershed Resources Inventory Area 49).

AIR QUALITY

The primary means by which the protection and enhancement of air quality is accomplished is through implementation of National Ambient Air Quality Standards (NAAQS). These standards address six pollutants known to harm human health including ozone, carbon monoxide, particulate matter, sulfur dioxide, lead, and nitrogen oxides.⁷

The Clean Air Act, passed in 1963 and amended in 1977, is the primary legal authority governing air resource management. The Clean Air Act provides the principal framework for national, state, and local efforts to protect air quality. Under the Clean Air Act, OAQPS (Office for Air Quality Planning and Standards) is responsible for setting standards, also known as national ambient air quality standards (NAAQS), for pollutants which are considered harmful to people and the environment. OAQPS is also responsible for ensuring these air quality standards are met, or attained (in cooperation with state, Tribal,

⁷ USDA-Forest Service (United States Department of Agriculture, Forest Service). 2000. Incorporating Air Quality Effects of Wildland Fire Management into Forest Plan Revisions – A Desk Guide – Draft. April 2000.

and local governments) through national standards and strategies to control pollutant emissions from automobiles, factories, and other sources.⁸

Smoke emissions from fires potentially affect an area and the airsheds that surround it. Climatic conditions affecting air quality in northern Washington are governed by a combination of factors. Large-scale influences include latitude, altitude, prevailing hemispheric wind patterns, and mountain barriers. At a smaller scale, topography and vegetation cover also affect air movement patterns. Air quality in the area is generally moderate to good. However, locally adverse conditions can result from occasional wildland fires in the summer and fall, and prescribed fire and agricultural burning in the spring and fall. All major river drainages are subject to temperature inversions which trap smoke and affect dispersion, causing local air quality problems. This occurs most often during the summer and fall months and would potentially affect all communities in Okanogan County. Winter-time inversions are less frequent, but are more apt to trap smoke from heating, winter silvicultural burning, and pollution from other sources.

DEMOGRAPHICS

Okanogan County grew in population over 220% around 1900 then 175% in 1910. Since the 1920 census, the average increase in population has averaged around 13% with the most recent official census showing an increase of only about 4%.

Table 8) Population of Okanogan County.

Census	Population	Census	Population
1890	1,467	1960	25,520
1900	4,689	1970	25,867
1910	12,887	1980	30,639
1920	17,094	1990	33,350
1930	18,519	2000	39,564
1940	24,546	2010	41,120
1950	29,131	2018 Estimate	42,132

The U.S. Census Bureau estimates that Okanogan County experienced a 3.9% increase in population between 2000 and 2010, compared to a 14.1% increase statewide. The Census Bureau also reported that there were 1,164 private nonfarm establishments (2010) and 15,747 households (2010). The median income for a household in Okanogan County in 2010 was \$40,537, which was less than the statewide median of \$58,890. This plan also uses 2018 American Community Survey (ACS) 5-Year Estimates to report income and poverty. These estimates report the median household income in Okanogan County at \$45,808.

⁸ Louks, B. 2001. Air Quality PM 10 Air Quality Monitoring Point Source Emissions; Point site locations of DEQ/EPA air monitoring locations with monitoring type and pollutant. Oregon Department of Environmental Quality. Feb. 2001. As GIS Data set. Boise, Id.

Census data for each city and town within Okanogan County shows how populations have increased or decreased over time. The 2018 estimates were the most current population numbers available at the time of the 2022 plan update. When comparing 2018 population estimates against the 2010 Census, some communities are estimated to have decreased in population over the course of the decade, while other communities have seen their population increase. The updated, official 2020 U.S. Census data should be included in this plan once that information becomes available. This can be added during an annual review.

Table 9) Populations of the various adopting jurisdictions in the 2022 Okanogan County HMP.

Jurisdiction	2010 Census	2011	2012	2013	2014	2015	2016	2017	2018	Total Change	Percent Change
Okanogan County	41,120	41,330	41,181	41,062	41,252	41,352	41,558	41,898	42,132	1,012	2.4%
City of Brewster	2,370	2,368	2,357	2,353	2,357	2,350	2,346	2,351	2,364	-6	-0.3%
City of Okanogan	2,552	2,606	2,589	2,575	2,574	2,566	2,570	2,578	2,591	39	1.5%
City of Omak	4,845	4,791	4,752	4,717	4,787	4,780	4,777	4,800	4,806	-39	-0.8%
City of Oroville	1,686	1,705	1,694	1,683	1,689	1,682	1,676	1,680	1,681	-5	-0.3%
City of Pateros	667	678	672	667	666	677	699	711	714	47	6.6%
City of Tonasket	1,032	1,144	1,135	1,131	1,128	1,123	1,125	1,128	1,129	97	8.6%
Town of Conconully	210	204	204	204	205	206	207	208	210	0	0.0%
Town of Coulee Dam	1,098	1,097	1,088	1,082	1,082	1,080	1,080	1,082	1,084	-14	-1.3%
Town of Elmer City	238	253	251	249	249	248	247	248	248	10	4.0%
Town of Nespelem	236	235	233	234	246	254	280	314	352	116	33.0%
Town of Riverside	280	280	277	275	275	274	274	274	274	-6	-2.2%
Town of Twisp	919	916	929	928	929	930	943	954	958	39	4.1%
Town of Winthrop	394	411	411	417	418	424	436	441	451	57	12.6%

SOCIOECONOMICS

The 2018 ACS estimates reported that Okanogan County has a total of 23,054 housing units and a homeownership rate of 66.2% (the national rate is 63.8%). Ethnicity is distributed as: 73.1% white alone, 0.5% black or African American alone, 9.8% American Indian or Alaskan Native alone, 0.9% Asian alone, 0.1% Native Hawaiian and Other Pacific Islander alone, 10.4% some other race alone, and 5.3% of two or

more races. People identifying as Hispanic or Latino (regardless of race) make up 19.7%. In Okanogan County, the poverty rate (children under 18 in poverty in the county) is at 28.7%.⁹

Table 10) Income by household for Okanogan County, WA.

Category	Number	Percent
Total Households	17,075	100
Less than \$10,000	1,388	8.10%
\$10,000 to \$14,999	1,506	8.80%
\$15,000 to \$24,999	2,365	13.90%
\$25,000 to \$34,999	1,898	11.10%
\$35,000 to \$49,999	2,771	16.20%
\$50,000 to \$74,999	3,269	19.10%
\$75,000 to \$99,999	1,558	9.10%
\$100,000 to \$149,999	1,634	9.60%
\$150,000 to \$199,999	441	2.60%
\$200,000 or more	245	1.40%
Median household income (dollars)	42,598	(X)

Okanogan County had an unemployment rate at 8.2% in December 2019. This was among the highest in the state for that time (neighboring Ferry County was at 10.6%)¹⁰. The natural resource field (including agriculture, forestry and mining) comprises approximately 16.1% of the employed population in Okanogan County. As a result, much of the indirect employment within this region relies on the employment created through these resource-based occupations. Occupations and Industries are expressed in Table 11.¹¹

Employment within this region leans heavily towards private wage and salary workers which together, comprise just fewer than 65% of the workforce. Government workers represent a significantly smaller proportion of the work force at approximately 25%. Self-employed workers in their own, non-incorporated business comprise about 10% of the workforce.¹²

⁹ <https://data.census.gov/cedsci/profile?q=Okanogan%20County,%20Washington&g=0500000US53047>

¹⁰ Bureau of Labor Statistics website. <https://data.bls.gov/lausmap/showMap.jsp> . Accessed February, 2020.

¹¹ <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>

¹² U.S. Census Bureau. American FactFinder Selected Economic Characteristics for Okanogan County, Washington. Available online at <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>. Accessed February, 2020.

Table 11) Employment and Industry Statistics

Category	Employed	Percent
OCCUPATION		
Management, business, science, and arts occupations	4,873	29.10%
Service occupations	3,227	19.30%
Sales and office occupations	3,459	20.60%
Natural resources, construction, and maintenance occupations	3,105	18.50%
Production, transportation, and material moving occupations	2,098	12.50%
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	2,693	16.10%
Construction	1,336	8.00%
Manufacturing	776	4.60%
Wholesale trade	411	2.50%
Retail trade	1,847	11.00%
Transportation and warehousing, and utilities	861	5.10%
Information	181	1.10%
Finance, insurance, real estate, and rental and leasing	691	4.10%
Professional, scientific, management, administrative, and waste management services	785	4.70%
Educational, health and social services	3,804	22.70%
Arts, entertainment, recreation, accommodation and food services	1,270	7.60%
Other services (except public administration)	716	4.30%
Public administration	1,391	8.30%

DEVELOPMENT TRENDS AND VALUES

A relatively large percentage of the county is publicly owned. Most of the property is held either as public property or as Indian lands (about 78% altogether). According to the 2014 Comprehensive Plan, about 5% of the remaining land mass is “not suitable for substantial development due to topography, access, potable water, critical area features, and other limiting factors”. Table 12 includes a breakdown of land ownership in Okanogan County.

Table 12) Land Ownership Categories in Okanogan County, WA.

Landowner	Acres	Percent
United States Forest Service	1,502,860	44%
Private	767,803	23%
Tribal	669,286	20%
State	385,473	11%
Bureau of Land Management	58,865	2%
United States Fish and Wildlife Service	2,891	<1%
Water	12,111	<1%
Other	1,183	<1%
Total	3,400,472	100%

The remaining land mass (approximately 17% of the total area) must provide the inventory of land necessary to provide for residential, industrial, and commercial needs both in and out of the incorporated cities and towns. The remaining land also supports the agricultural and natural resource-based activities that are important to the local economy. To avoid incompatible land uses, the Okanogan County Comprehensive Plan serves as a long-range planning document that guides future development in the remaining portion of the County that is suitable for such uses.

The Okanogan County Planning and Development Department is responsible for land division, comprehensive planning and zoning, addressing and the master street address guide, shoreline master program, and critical areas ordinance. Okanogan County Building Department is responsible for building plan review, building permits, and inspections. Most of the privately-owned land in the unincorporated area is zoned minimum requirement district (Figure 4). There are also small areas, many of which are located adjacent to cities or general aviation airports, zoned specifically for commercial and industrial uses. The zoning map and regulations are guided by and must be consistent with the Comprehensive Plan.

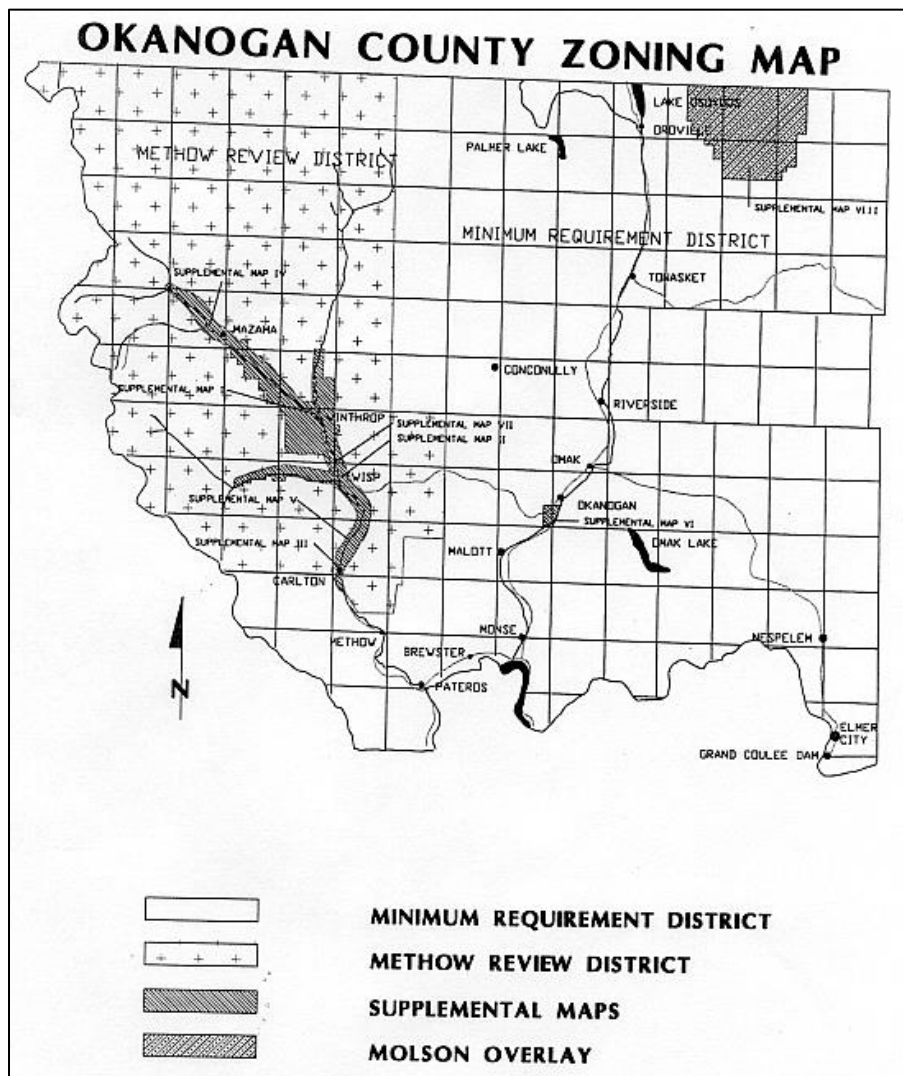


Figure 4) Zoning map of Okanogan County, WA.

Private land is becoming more and more expensive as the population grows and more property is developed. This factor combined with the mountainous nature of the geography is expected to produce significantly higher demands on privately held land in the future. Table 13 displays the total number of parcels, improvements, and improvement values in different cities, towns, and communities and totals for incorporated and unincorporated areas of Okanogan County. Between 25 different cities, towns, and communities there are almost 10,500 privately owned parcels with more than 7,100 improvements valued at almost \$1.05 billion. In unincorporated areas of the county there are 36,000 parcels with almost 16,000 improvements valued at more than \$1.71 billion.

Table 13) Total number of privately owned parcels, improvements, and total improvement values in cities, towns, and communities in Okanogan County, WA as well as totals for unincorporated and incorporated areas of the County.

Okanogan County	Total Parcels	Total Improvements	Total Improvement Value
Brewster	982	617	\$113,179,100
Carlton	33	18	\$2,080,500
Chesaw	142	41	\$1,830,900
Conconully	313	221	\$15,284,800
Coulee Dam	440	379	\$52,869,700
Ellisforde	7	6	\$694,200
Elmer City	255	122	\$7,887,700
Havillah	1	1	\$67,900
Loomis	158	90	\$8,063,400
Malott	73	49	\$2,490,800
Mazama	73	29	\$7,160,500
Methow	69	35	\$1,442,000
Molson	112	45	\$2,237,100
Monse	15	4	\$265,900
Nespelem	135	47	\$1,891,600
Nighthawk	23	7	\$175,500
Okanogan	1,329	1,003	\$149,806,300
Omak	2,283	1,786	\$283,216,200
Oroville	1,182	825	\$113,479,300
Pateros	376	272	\$47,420,400
Riverside	301	145	\$9,876,300
Tonasket	674	468	\$80,980,700
Twisp	763	487	\$68,621,400
Wauconda	1	1	\$170,600
Winthrop	749	440	\$73,476,400
Total Incorporated	10,489	7,138	\$1,044,669,200
Total Unincorporated	36,337	15,793	\$1,714,022,200
Grand Total	46,826	22,931	\$2,758,691,400

The Okanogan Multi-Hazard Mitigation Plan was updated to reflect changes in development in Okanogan County. The development trend that is reflected most prominently in the MHMP is the expansion of residential areas and housing into more rural, rugged parts of the county. This trend places an increasing number of Okanogan County residents at risk to the natural hazards described in this plan with wildland fire being one of the most significant threats.

Changes in development in the County were mostly captured during the update of the hazard maps and mitigation action items. The most current parcel data was used to juxtapose the distribution of structures with different hazard areas which includes, but is not limited to, flood zones, landslide hazard zones, and the wildland-urban interface. Additionally, many of the mitigation action items address concerns related to the distribution of homes and other structures in the County, especially new development in the wildland-urban interface which is identified in the Comprehensive Plan as a significant concern.

Although wildland fire is still a high priority for the County, priorities shifted toward community health once COVID-19 began to affect the region. Several other hazards, including volcano, dam failure, and hazardous materials, were also added to the plan to reflect the importance that the County now places on those hazards.

The County is always focused on mitigation, but no progress was made with the mitigation action items from the previous plan. Given the change in priorities for the County since the 2014 update, it was determined by the planning team that the previous list of projects would be discarded and replaced with a new list of projects that more accurately defines the needs of the County.

HAZARD MANAGEMENT CAPABILITIES

The Okanogan County Department of Emergency Management is responsible for the administration and overall coordination of the emergency management program for Okanogan County and the cities of within the county. The Incident Command System (ICS) is the basis for all direction, control and coordination of emergency response and recovery efforts. Emergency response and supporting agencies and organizations have agreed to carry out their objectives in support of the incident command structure to the fullest extent possible.

The Okanogan County Central Dispatch / 911 Center is the only communications center for Okanogan County. It maintains 24-hour emergency alerting and communications capability for receiving, coordinating and disseminating emergency information. The Okanogan County Central Dispatch / 911 Center provides communications coverage over the entire Okanogan County area. It is the central receiving point for emergency notification and warning information and disseminates pertinent emergency information to support agencies.

Amateur Radio Services volunteers may provide additional local or statewide communications networks. This capability can also provide backup communication systems at the Okanogan County Emergency Operations Center if required.

All fire districts and agencies providing fire protection services in Okanogan County have reciprocal memorandums of understanding with each other.

OKANOGAN CONSERVATION DISTRICT

Most of the information include in this section was taken from the Okanogan Conservation District web site which can be accessed at: <https://www.okanogancd.org/>

The Okanogan Conservation District (CD) works collaboratively with land managers to care for natural resources in Okanogan County. Okanogan CD has been working to conserve and enhance natural resources in Okanogan County, Washington since April 1940. The roles and responsibilities of conservation districts statewide are found in the Revised Code of Washington, Chapter 89.08. Districts exist to serve as a source of local knowledge and expertise on natural resource conservation, providing a counterbalance to federal natural resource agencies. Okanogan CD works closely with landowners, non-governmental organizations, Washington State agencies, and Federal agencies to identify natural resource concerns, then focus efforts to resolve those concerns in a voluntary, non-regulatory approach. In general, the district's services include stewardship planning, conservation incentives and education. Conservation projects conducted by the district include (but are not limited to) irrigation water management, wildlife habitat, erosion control, water quality improvements, and wildfire mitigation and recovery.

Geographically, district programs and services reach across Okanogan County, including the Colville Confederated Tribes Reservation. To date, some cities and towns in the county have not chosen to annex into the district, including Twisp, Oroville, Tonasket, Riverside, Omak, Brewster, and Pateros. Land managers in the county that work with the district are called 'cooperators' and include both landowners and those leasing land (primarily agricultural), on parcels ranging from small lots to farms and ranches with thousands of acres. Services offered to individuals outside of the District are limited.

Given the wide reach of Okanogan CD's service area and cooperators, it is to be expected that there is overlap between the conservation of natural resources and the preparation for, and recovery from, natural disasters. For example, since its inception, Okanogan CD had worked with landowners to prepare for and deal with flooding and erosion issues through best management practices such as streambank stabilization, riparian planting, cover crops, and other methods to reduce loss of life, property, and valuable natural resources. In recent years, the district has taken the lead on the Firewise program, providing wildfire preparedness information to thousands of county residents and visitors and facilitating the establishment of five recognized Firewise Communities USA®. In the wake of historically large wildfires in both 2014 and 2015, Okanogan CD has been working with over 400 cooperators to help them to recover their landscapes and prepare for follow-on risks such as flash flooding and landslides. The district has increased staff and provided training opportunities to ensure that staff can effectively serve the demand from cooperators for technical and, in some cases, financial assistance. Okanogan CD has, and will continue to, work in partnership with Okanogan County Emergency Management, local fire districts, public utility districts, and other agencies and organizations that have a vested interest in improving the resiliency of Okanogan County.

The Okanogan Conservation District is governed by a five-member board of supervisors which meets each month. Three members of the board are elected positions while two members are appointed by the

Washington State Conservation Commission. The district employs eleven full time staff members and their office is housed in the U.S. Department of Agriculture Service Center in the city of Okanogan.

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the Okanogan Conservation District to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

- **Changes in Development:** There have not been any changes in development concerning CD assets or property, but development has changed within the CD project area. As the WUI expands and features an increased number of structures, the CD will likely be tasked with more outreach concerning impacts from wildfire (including mudflows).
- **Mitigation Progress:** The CD has continued to assist landowners with efforts to mitigate impacts from natural hazards, especially impacts related to wildland fire. The CD is available to assist the County with these types of mitigation projects.
- **Changes in Priorities:** As wildfire seasons become longer and more severe, the CD continues to shift its priorities to rehabilitating property impacted by wildfire and addressing hazards associated with mudflows produced by heavy precipitation on fire scars.

CITY OF BREWSTER

Brewster is located in southern Okanogan County along the edge of the Columbia River. Just east of the city limits the Okanogan River flows into the Columbia at a reservoir known as Lake Pateros. The southern and eastern city boundaries of Brewster lie along Lake Pateros. State Route 173 runs south and crosses the Columbia River at the Bridgeport Bridge, connecting Brewster to the neighboring city of Bridgeport in Douglas County. U.S. Route 97 also runs through Brewster, connecting it to the city of Pateros, about six miles to the southwest, and the city of Okanogan, about 24 miles to the north.

The following data was produced by the U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates.¹³

Table 14: Selected Race/Ethnicity Statistics for Brewster

Demographic Category	% of population
White	48.4%
Black or African American	2.4%
American Indian and Alaska Native	0.7%
Asian	0.5%
Native Hawaiian and Other Pacific Islander	0.0%
Hispanic or Latino (of any race)	79.8%

Table 15: Selected Employment Statistics for Brewster

Industry Category	Total	%
Civilian employed population 16 years and over	1,148	
Agriculture, forestry, fishing and hunting, and mining	354	30.8%
Construction	50	4.4%
Manufacturing	24	2.1%
Wholesale trade	74	6.4%
Retail trade	115	10.0%
Transportation and warehousing, and utilities	116	10.1%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	3	0.3%
Professional, scientific, and management, and administrative and waste management services	60	5.2%
Educational services, and health care and social assistance	240	20.9%
Arts, entertainment, and recreation, and accommodation and food services	70	6.1%
Other services, except public administration	33	2.9%
Public administration	9	0.8%

¹³https://data.census.gov/cedsci/table?q=brewster,%20wa&g=1600000US5307835&hidePreview=false&tid=ACSDP5Y2018.DP05&layer=place&cid=DP05_0001E&vintage=2018&d=ACS%205-Year%20Estimates%20Data%20Profiles

Class of worker	Total	%
Private wage and salary workers	1,037	90.3%
Government workers	92	8.0%
Self-employed in own not incorporated business workers	19	1.7%
Unpaid family workers	0	0.0%

Table 16: Selected Income Statistics for Brewster

Income Category	Total
Total households	832
Median household income (dollars)	\$46,442
Mean household income (dollars)	\$45,960

Table 17: Selected Housing Statistics for Brewster

Housing Occupancy Category	Total	%
Total housing units	907	100%
Occupied housing units	832	91.7%
Vacant housing units	75	8.3%
Housing Value Category	Total	
Owner-occupied units	356	
Median (dollars)	\$154,200	

Brewster's estimated population as of 2018 was 2,364.¹⁴ The economy of Brewster relies heavily on agriculture, especially the fruit industry, and the city of Brewster is home to the growers cooperative Chelan Fruit. Brewster is a popular destination for water recreation due to its location on the Columbia River and its system of waterfront parks. Brewster accesses about 20 miles of open water between the Chief Joseph Dam and the Azwell Dam. A number of public events are held in Brewster annually, including Cherries Jubilee and a 4th of July parade.

In total, there are 982 parcels with 617 improvements in the City of Brewster that are worth approximately \$113 million. The city is home to the 30-bed Three Rivers Hospital. Anderson Field Airport is a public-use and city-owned airport located 1.5 miles northeast of Brewster on U.S. Route 97. The National Radio Astronomy Observatory's Very Long Baseline Array, a network of ten observing stations across the United States, operates an antenna site at Brewster. Brewster maintains its own fire department and police department. Brewster School District includes Brewster High School, Brewster Middle School, and Brewster Elementary School.

¹⁴ Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018. U.S. Census Bureau, Population Division. Available online at https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml.

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the City of Brewster to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

- **Changes in Development:** Development within city limits has mostly concerned single family homes along the waterfront in the southernmost end of the city. There has also been limited commercial development in the northern portion of the city. Given the small size of the city, new development has not significantly changed the exposure or vulnerability of the city to natural hazards.
- **Mitigation Progress:** No progress was made with mitigation action items that were included in the 2014 Okanogan County MHMP. Mitigation action items included in the 2022 update are intended to help the City of Brewster build a routine around the development, review, and implementation of mitigation action items in the MHMP. As of October 2021, no specific mitigation action items were identified for inclusion in the plan.
- **Changes in Priorities:** Priorities for mitigation in the City of Brewster have not changed since the last update. Wildland fire is still the greatest concern and highest-ranking priority for the City of Brewster.

TOWN OF CONCONULLY

Conconully is located in the center of Okanogan County, surrounded by forestlands, and flanked by two reservoirs. The town sits in a small mountain valley about 18 miles northwest of Omak. The Conconully Road is essentially the only route into the town for most travel.

The following data was produced by the U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates.¹⁵

Table 18: Selected Race/Ethnicity Statistics for Conconully

Demographic Category	% of population
White	91.6%
Black or African American	0.5%
American Indian and Alaska Native	1.5%
Asian	3.0%
Hispanic or Latino (of any race)	5.9%

Table 19: Selected Employment Statistics for Conconully

Industry Category	Total	%
Civilian employed population 16 years and over	80	
Agriculture, forestry, fishing and hunting, and mining	0	0.0%
Construction	7	8.8%
Manufacturing	0	0.0%
Wholesale trade	1	1.3%
Retail trade	22	27.5%
Transportation and warehousing, and utilities	1	1.3%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	1	1.3%
Professional, scientific, and management, and administrative and waste management services	16	20.0%
Educational services, and health care and social assistance	16	20.0%
Arts, entertainment, and recreation, and accommodation and food services	11	13.8%
Other services, except public administration	2	2.5%
Public administration	3	3.8%
Class of worker	Total	%
Private wage and salary workers	59	73.8%
Government workers	20	25.0%
Self-employed in own not incorporated business workers	1	1.3%
Unpaid family workers	0	0.0%

¹⁵<https://data.census.gov/cedsci/table?q=conconully,%20wa&g=1600000US5314310&tid=ACSDP5Y2018.DP05&d=ACS%205-Year%20Estimates%20Data%20Profiles&vintage=2018>

Table 20: Selected Income Statistics for Conconully

Income Category	Total
Total households	135
Median household income (dollars)	\$37,639
Mean household income (dollars)	\$44,417

Table 21: Selected Housing Statistics for Conconully

Housing Occupancy Category	Total	%
Total housing units	218	100%
Occupied housing units	135	61.9%
Vacant housing units	83	38.1%
Housing Value Category	Total	
Owner-occupied units	83	
Median (dollars)	\$179,200	

The local economy of Conconully relies heavily on tourism and recreation. Conconully State Park is located within the town limits and there are many other opportunities in the area for both winter and summer outdoor recreation. The town sits on the edge of the Okanogan National Forest, near lakes, boat launches, hunting and fishing access, campgrounds, forest roads, ATV access, hiking trails, and snowmobile access. The town hosts several events throughout the winter and summer tourist seasons.

Salmon Creek, which flows southeast toward the city of Okanogan and empties into the Okanogan River, is impounded by two dams at the town of Conconully. The Salmon Lake Dam is just outside the town limits to the east and is about 1,260 feet long and 54 feet high. The Conconully Dam is located south of town a few miles on the south end of Conconully Reservoir and is about 1,075 feet long and 72 feet tall.

In total, there are 313 parcels with 221 improvements in the Town of Conconully that are worth approximately \$15 million. The town of Conconully is part of the Omak School District and does not have any schools. Conconully has a volunteer fire department but does not have its own police force and relies on Okanogan County for law enforcement services. Residents of Conconully rely on neighboring cities, such as Omak and Okanogan, for many other services including retail, healthcare and banking.

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the Town of Conconully to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

- Changes in Development:** Development within town limits has mostly been limited to structural improvements and replacement of existing structures (For example, a new fire hall has been constructed since the last plan update). Given the small size of the town and limited development that has occurred since the last plan update, new development has not significantly changed the exposure or vulnerability of Conconully to natural hazards.

- **Mitigation Progress:** No progress was made with mitigation action items that were included in the 2014 Okanogan County MHMP. Some mitigation action items included in the 2022 update are intended to help the Town of Conconully build a routine around the development, review, and implementation of mitigation action items in the MHMP. As of October 2021, several additional stand-alone mitigation action items concerning landslides and flooding were identified for inclusion in the plan.
- **Changes in Priorities:** Priorities for mitigation in the Town of Conconully have not changed since the last update. Wildland fire is still the greatest concern and highest-ranking priority for the Town of Conconully. However, mudslides resulting from log jams and heavy rainfall on burn scars has become a greater concern for the town since the last plan update.

TOWN OF COULEE DAM

The town of Coulee Dam is in the far southeast corner of Okanogan County, right on the county line. The town limits of Coulee Dam span three counties. Western parts of the town sit on the west side of the Columbia River in both Douglas County and Grant County. Most of the town's land area is on the east side of the Columbia River and is in Okanogan County and on the Colville Reservation. The Grand Coulee Bridge (State Route 155), just downstream of Grand Coulee Dam, spans the Columbia River and connects the two sides of town. SR 155 also connects Coulee Dam to the city of Grand Coulee (in Grant County) to the south and to the towns of Elmer City and Nespelem to the north.

The following data was produced by the U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates¹⁶ unless otherwise noted.

Table 22: Selected Race/Ethnicity Statistics for Coulee Dam¹⁷

Demographic Category	% of population
White	61.5%
Black or African American	0.1%
American Indian and Alaska Native	44.4%
Asian	2.4%
Native Hawaiian and Other Pacific Islander	0.4%
Hispanic or Latino (of any race)	6.2%

Table 23: Selected Employment Statistics for Coulee Dam

Industry Category	Total	%
Civilian employed population 16 years and over	514	
Agriculture, forestry, fishing and hunting, and mining	21	4.1%
Construction	44	8.6%
Manufacturing	12	2.3%
Wholesale trade	0	0.0%
Retail trade	32	6.2%
Transportation and warehousing, and utilities	15	2.9%
Information	4	0.8%
Finance and insurance, and real estate and rental and leasing	29	5.6%
Professional, scientific, and management, and administrative and waste management services	32	6.2%
Educational services, and health care and social assistance	113	22.0%
Arts, entertainment, and recreation, and accommodation and food services	45	8.8%
Other services, except public administration	4	0.8%

¹⁶<https://data.census.gov/cedsci/table?q=coulee%20dam%20town,%20wa&g=1600000US5315115&tid=ACSDP5Y2018.DP03&d=ACS%205-Year%20Estimates%20Data%20Profiles&vintage=2018>

¹⁷<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>

Public administration	163	31.7%
Class of worker	Total	%
Private wage and salary workers	196	38.1%
Government workers	312	60.7%
Self-employed in own not incorporated business workers	6	1.2%
Unpaid family workers	0	0.0%

Table 24: Selected Income Statistics for Coulee Dam

Income Category	Total
Total households	544
Median household income (dollars)	\$53,269
Mean household income (dollars)	\$66,008

Table 25: Selected Housing Statistics for Coulee Dam

Housing Occupancy Category	Total	%
Total housing units	630	
Occupied housing units	544	86.3%
Vacant housing units	86	13.7%
Housing Value Category	Total	
Owner-occupied units	358	
Median (dollars)	\$152,900	

Table 2 shows a high percentage of the employed are government workers. This is because major government employers are located in and around the town of Coulee Dam. The Confederated Tribes of the Colville Reservation have headquarters in nearby Nespelem, the U.S. Reclamation Bureau has offices in Coulee Dam and nearby Grand Coulee, and the headquarters for Lake Roosevelt National Recreation Area is in Grand Coulee. Tourism and travel bring people and revenue to Grand Coulee and the town offers parks, trails, casinos, restaurants, entertainment, and lodging. Coulee Dam also serves people who work and live in the area through education, healthcare, retail, food service, banking, construction, and other support industries.

In total, there are 440 parcels with 379 improvements in the Town of Coulee Dam that are worth almost \$53 million. The town has a police force and fire department, coordinating emergency dispatch through Okanogan County. Lake Roosevelt Jr./Sr. High School and Lake Roosevelt Elementary School make up the Coulee Dam School District. The nearest hospital is about three miles away in the city of Grand Coulee.

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the Town of Coulee Dam to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

- **Changes in Development:** Development within town limits has largely concerned structural improvements and the construction of single-family home. Construction of the Lake Roosevelt Junior/Senior High School was also completed since the last plan. Given the small size of the town and limited development that has occurred since the last plan update, new development has not significantly changed the exposure or vulnerability of Coulee Dam to natural hazards.
- **Mitigation Progress:** No progress was made with mitigation action items that were included in the 2014 Okanogan County MHMP. Mitigation action items included in the 2022 update are intended to help the Town of Coulee Dam build a routine around the development, review, and implementation of mitigation action items in the MHMP. As of October 2021, no project-specific mitigation action items were identified for inclusion in the plan.
- **Changes in Priorities:** Priorities for mitigation for the Town of Coulee Dam have not changed since the last update. Wildland fire and public outreach are still the greatest concern and highest-ranking priorities for Coulee Dam.

TOWN OF ELMER CITY

Elmer City is a town in the southeast corner of Okanogan County. Elmer city is also on the Colville Reservation and is located along SR 155, overlooking the Columbia River. SR 155 connects Elmer City to the town of Nespelem to the north and to the town of Coulee Dam less than three miles to the south.

The following data was produced by the U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates¹⁸ unless otherwise noted.

Table 26: Selected Race/Ethnicity Statistics for Elmer City¹⁹

Demographic Category	% of population
White	48.5%
Black or African American	2.9%
American Indian and Alaska Native	47.7%
Asian	4.4%
Native Hawaiian and Other Pacific Islander	6.7%
Hispanic or Latino (of any race)	4.7%

Table 27: Selected Employment Statistics for Elmer City

Industry Category	Total	%
Civilian employed population 16 years and over	132	
Agriculture, forestry, fishing and hunting, and mining	1	0.8%
Construction	6	4.5%
Manufacturing	0	0.0%
Wholesale trade	0	0.0%
Retail trade	6	4.5%
Transportation and warehousing, and utilities	4	3.0%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	5	3.8%
Professional, scientific, and management, and administrative and waste management services	6	4.5%
Educational services, and health care and social assistance	25	18.9%
Arts, entertainment, and recreation, and accommodation and food services	14	10.6%
Other services, except public administration	3	2.3%
Public administration	62	47.0%
Class of worker	Total	%
Private wage and salary workers	33	25.0%
Government workers	94	71.2%

¹⁸<https://data.census.gov/cedsci/table?q=elmer%20city%20town,%20wa&g=1600000US5321485&tid=ACSDP5Y2018.DP04&d=ACS%205-Year%20Estimates%20Data%20Profiles&vintage=2018>

¹⁹<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>

Self-employed in own not incorporated business workers	5	3.8%
Unpaid family workers	0	0.0%

Table 28: Selected Income Statistics for Elmer City

Income Category	Total
Total households	171
Median household income (dollars)	\$43,672
Mean household income (dollars)	\$52,042

Table 29: Selected Housing Statistics for Elmer City

Housing Occupancy Category	Total	%
Total housing units	189	
Occupied housing units	171	90.5%
Vacant housing units	18	9.5%
Housing Value Category	Total	
Owner-occupied units	124	
Median (dollars)	\$103,800	

Much like the town of Coulee Dam, government agencies are an important component to the economics of the area. As Table 2 shows, government workers make up more than 70% of all workers in Elmer City. Among the employed in Elmer City, 47% work in the field of public administration and most others work in support industries. The major governmental employers in the area include the Confederated Tribes of the Colville Reservation and the U.S. Reclamation Bureau.

In total, there are 255 parcels with 122 improvements in the Town of Elmer City that are worth almost \$8 million. The town contains a United States Post Office and many privately-owned homes. Residents of Elmer City rely on neighboring towns and cities for most services and facilities.

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the Town of Elmer City to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

- **Changes in Development:** Development within town limits has mostly been limited to structural improvements and building upgrades. Given the small size of the town and limited development that has occurred since the last plan update, new development has not significantly changed the exposure or vulnerability of Elmer City to natural hazards.
- **Mitigation Progress:** No progress was made with mitigation action items that were included in the 2014 Okanogan County MHMP. Mitigation action items included in the 2022 update are intended to help the Town of Elmer City build a routine around the development, review, and

implementation of mitigation action items in the MHMP. As of October 2021, one additional stand-alone mitigation action item concerning flooding was identified for inclusion in the plan.

- **Changes in Priorities:** Priorities for mitigation in the Town of Elmer City have not changed since the last update. Wildland fire and public outreach are still the greatest concern and highest-ranking priorities for the Town of Elmer City.

TOWN OF NESPELEM

Nespelem is a town in the southeast corner of Okanogan County on the Colville Reservation. The town sits beside the Nespelem River, which flows down into the Columbia River nearby. Nespelem is also located along SR 155, which connects it to Elmer City and Coulee Dam to the south and to Omak to the northwest. The Cache Creek Road connects Nespelem (and SR 155) to SR 21, 16 miles to the east.

The following data was produced by the U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates²⁰ unless otherwise noted.

Table 30: Selected Race/Ethnicity Statistics for Nespelem²¹

Demographic Category	% of population
White	18.7%
Black or African American	1.0%
American Indian and Alaska Native	88.1%
Asian	2.1%
Native Hawaiian and Other Pacific Islander	2.1%
Hispanic or Latino (of any race)	0.0%

Table 31: Selected Employment Statistics for Nespelem

Industry Category	Total	%
Civilian employed population 16 years and over	83	
Agriculture, forestry, fishing and hunting, and mining	8	9.6%
Construction	11	13.3%
Manufacturing	2	2.4%
Wholesale trade	0	0.0%
Retail trade	4	4.8%
Transportation and warehousing, and utilities	0	0.0%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	0	0.0%
Professional, scientific, and management, and administrative and waste management services	1	1.2%
Educational services, and health care and social assistance	14	16.9%
Arts, entertainment, and recreation, and accommodation and food services	2	2.4%
Other services, except public administration	2	2.4%
Public administration	39	47.0%
Class of worker	Total	%
Private wage and salary workers	19	22.9%

²⁰<https://data.census.gov/cedsci/table?q=nespelem,%20wa&g=1600000US5348540&tid=ACSDP5Y2018.DP05&layer=place>

²¹<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>

Government workers	61	73.5%
Self-employed in own not incorporated business workers	3	3.6%
Unpaid family workers	0	0.0%

According to estimates provided by local officials, there are approximately 80 housing units in the Town of Nespelem. Of those 80 units, approximately 10% are abandoned or uninhabitable. A breakdown of housing units in the Town of Nespelem can be found in Table 32 and Table 33.

Table 32: Selected Income Statistics for Nespelem. *Estimate provided by officials with the Town of Nespelem.

Income Category	Total
Total households*	About 72
Median household income (dollars)	\$37,500
Mean household income (dollars)	\$48,836

Table 33: Selected Housing Statistics for Nespelem. *Estimate provided by officials with the Town of Nespelem.

Housing Occupancy Category	Total	%
Total housing units*	About 80	
Occupied housing units*	About 72	90.0%
Vacant housing units*	About 8	10.0%
Housing Value Category	Total	
Owner-occupied units	54	
Median (dollars)	\$81,400	

Much like the towns of Coulee Dam and Elmer City, government agencies are an important component to the economics of the area. As Table 31 shows, government workers make up more than 73% of all workers in Nespelem. Among the employed in Nespelem, 47% work in the field of public administration and most others work in support industries. The Confederated Tribes of the Colville Reservation are major governmental employer in the area, with their headquarters just south of the town of Nespelem.

In total, there are 135 parcels with 47 improvements in the Town of Nespelem that are worth almost \$2 million. The town contains a United States Post Office, a fueling station and many privately-owned homes. There are other resources and facilities outside of Nespelem, including Nespelem Elementary School and the Town of Nespelem Cemetery which are located out Schoolhouse Loop Road just west of town. On the edge of town along Hwy 155, there is a roadside marker commemorating Chief Joseph and the Joseph Band of Nez Perce. Two miles south is the Colville Confederated Tribes Headquarters along with the Powwow Celebration Grounds, Community Center, and Rodeo grounds. Residents of Nespelem rely on neighboring towns and cities for most services and facilities.

The Town of Nespelem also hosts annual festivities. Every Father’s Day weekend, the Town of Nespelem hosts Millpond Days. Festivities include group meals, dancing, movies, a 5k run/walk, a parade, basketball tournaments, and other street activities.

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the Town of Nespelem to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

- **Changes in Development:** Development within town limits has mostly been limited to structural improvements and the addition of some single-family homes. Given the small size of the town and limited development that has occurred since the last plan update, new development has not significantly changed the exposure or vulnerability of Nespelem to natural hazards.
- **Mitigation Progress:** No progress was made with mitigation action items that were included in the 2014 Okanogan County MHMP. Mitigation action items included in the 2022 update are intended to help the Town of Nespelem build a routine around the development, review, and implementation of mitigation action items in the MHMP. As of October 2021, one stand-alone action item concerning public outreach was also included in the plan.
- **Changes in Priorities:** Priorities for mitigation in the Town of Nespelem have not changed since the last update. Wildland fire and public outreach are still the greatest concern and highest-ranking priorities for Nespelem.

CITY OF OKANOGAN

The city of Okanogan is centrally located in the county along the Okanogan River just a few miles from the city of Omak. Okanogan is the county seat of Okanogan County and highways that pass through the city include U.S. 97, SR 20, and SR 215. U.S. 97 connects the city to Brewster to the south and Omak to the north. SR 20, the North Cascades Highway, connects Okanogan to the town of Twisp to the west and Omak to the north. SR 215 is a 6.24 mile long connector highway between SR 20 in Okanogan to US 97 in Omak.

The following data was produced by the U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates²² unless otherwise noted.

Table 34: Selected Race/Ethnicity Statistics for Okanogan²³

Demographic Category	% of population
White	84.6%
Black or African American	5.6%
American Indian and Alaska Native	3.4%
Asian	0.4%
Native Hawaiian and Other Pacific Islander	0.0%
Hispanic or Latino (of any race)	14.1%

Table 35: Selected Employment Statistics for Okanogan

Industry Category	Total	%
Civilian employed population 16 years and over	896	
Agriculture, forestry, fishing and hunting, and mining	69	7.7%
Construction	33	3.7%
Manufacturing	29	3.2%
Wholesale trade	7	0.8%
Retail trade	144	16.1%
Transportation and warehousing, and utilities	24	2.7%
Information	8	0.9%
Finance and insurance, and real estate and rental and leasing	34	3.8%
Professional, scientific, and management, and administrative and waste management services	23	2.6%
Educational services, and health care and social assistance	254	28.3%
Arts, entertainment, and recreation, and accommodation and food services	109	12.2%
Other services, except public administration	61	6.8%
Public administration	101	11.3%
Class of worker	Total	%

²²<https://data.census.gov/cedsci/table?q=okanogan%20city,%20wa&g=1600000US5350920&tid=ACSDP5Y2018.DP03&layer=place&d=ACS%205-Year%20Estimates%20Data%20Profiles&vintage=2018>

²³ <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>

Private wage and salary workers	587	62.2%
Government workers	251	26.6%
Self-employed in own not incorporated business workers	99	10.5%
Unpaid family workers	6	0.6%

Table 36: Selected Income Statistics for Okanogan

Income Category	Total
Total households	1,060
Median household income (dollars)	34,145
Mean household income (dollars)	42,073

Table 37: Selected Housing Statistics for Okanogan

Housing Occupancy Category	Total	%
Total housing units	1,091	100%
Occupied housing units	988	90.6%
Vacant housing units	103	9.4%
Housing Value Category	Total	
Owner-occupied units	542	
Median (dollars)	\$135,100	

In 2018 Okanogan had an estimated population of 2,591.²⁴ The city of Okanogan is the county seat of Okanogan County and of the 222 government workers highlighted in Table 2, 152 are local government workers.

In total, there are 1,329 parcels with 1,003 improvements in the City of Okanogan that are worth almost \$150 million. The city is home to several county government facilities including the Okanogan County Courthouse, Jail, Sheriff's Office, Public Health Department, and Washington State University Okanogan County Extension Office. The Okanogan Legion Airport, a small, city-owned, public-use airport is located roughly one mile east of the central business district of Okanogan. The Okanogan School District operates Okanogan High School, Okanogan Middle School, Virginia Grainger Elementary School, and Okanogan Alternative Schools. The city of Okanogan operates a volunteer fire department with emergency medical response capabilities. The Okanogan County Fairgrounds are located just east of the city of Okanogan between the Okanogan River and U.S. 97.

²⁴ Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018. U.S. Census Bureau, Population Division. Available online at https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml.

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the City of Okanogan to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

- **Changes in Development:** Development within city limits has mostly concerned single family homes on the NW side of town (on top of the hill) in the 6th Ave N/Conconully Road area. Other development has largely concerned the improvement or expansion of existing structures within the city. Given the size of the area and the number of homes that could yet be built, the new development occurring in the 6th Ave N/Conconully Road area could significantly change the exposure or vulnerability of the city to natural hazards.
- **Mitigation Progress:** No progress was made with mitigation action items that were included in the 2014 Okanogan County MHMP. Some mitigation action items included in the 2022 update are intended to help the City of Okanogan build a routine around the development, review, and implementation of mitigation action items in the MHMP. As of October 2021, two additional mitigation action items related to flooding were identified for inclusion in the plan.
- **Changes in Priorities:** Priorities for mitigation in the City of Okanogan have not changed since the last update. Wildland fire and public awareness of fire and flood hazards are still the greatest concerns and highest-ranking priorities for the City of Okanogan.

CITY OF OMAK

The city of Omak is centrally located in the county along the Okanogan River just a few miles north of the city of Okanogan. Omak is the largest municipality in Okanogan County and highways that pass through the city include U.S. 97, SR 20, SR 215, and SR 155. U.S. 97 and SR 20 connect Omak to the city of Okanogan to the south and Tonasket to the north. SR 215 is a 6.24 mile long connector highway between Omak and Okanogan. SR 155 begins in Omak and runs southeast through the Colville Reservation toward Nespelem and Grand Coulee Dam. The eastern part of the city of Omak lies within the boundary of the Colville Reservation and the area has long been inhabited by various Native American tribes.

The following data was produced by the U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates.²⁵

Table 38) Selected Race/Ethnicity Statistics for Omak.

Demographic Category	% of population
White	78.9%
Black or African American	3.0%
American Indian and Alaska Native	17.7%
Asian	0.4%
Native Hawaiian and Other Pacific Islander	1.0%
Hispanic or Latino (of any race)	16.4%

Table 39) Selected Employment Statistics for Omak

Industry Category	Total	%
Civilian employed population 16 years and over	1,830	
Agriculture, forestry, fishing and hunting, and mining	144	7.9%
Construction	134	7.3%
Manufacturing	68	3.7%
Wholesale trade	0	0.0%
Retail trade	91	5.0%
Transportation and warehousing, and utilities	153	8.4%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	23	1.3%
Professional, scientific, and management, and administrative and waste management services	137	7.5%
Educational services, and health care and social assistance	581	31.7%
Arts, entertainment, and recreation, and accommodation and food services	210	11.5%
Other services, except public administration	56	3.1%

²⁵<https://data.census.gov/cedsci/table?q=omak,%20wa&g=1600000US5351340&tid=ACSDP5Y2018.DP05&layer=place&d=ACS%205-Year%20Estimates%20Data%20Profiles&vintage=2018>

Public administration	233	12.7%
Class of worker	Total	%
Private wage and salary workers	1,060	57.9%
Government workers	722	39.5%
Self-employed in own not incorporated business workers	48	2.6%
Unpaid family workers	0	0.0%

Table 40) Household income in Omak, WA.

Income Category	Total
Total households	2,049
Median household income (dollars)	\$44,943
Mean household income (dollars)	\$53,268

Table 41) Selected Housing Statistics for Omak

Housing Occupancy Category	Total	%
Total housing units	2,293	100%
Occupied housing units	2,049	89.4%
Vacant housing units	244	10.6%
Housing Value Category	Total	
Owner-occupied units	1,005	
Median (dollars)	\$110,000	

In 2018 Omak had an estimated population of 4,806.²⁶ Omak's proximity to the county-seat of Okanogan contributes significantly to the relatively high percentage of government workers. The 722 government workers shown in the bottom of Table 39 were mostly made up of local government (408) and state (228), workers, the remaining 86 were employed by the federal government and the Confederated Tribes of the Colville Reservation. Most government workers work full-time and year-round.

Omak serves a regional hub for trade and commerce within Okanogan County. The city contains many services that several nearby rural communities in the area rely on, including a more diverse retail sector, state and federal offices and vital health care services. The city also plays a role in the regional recreation and tourism industries with a mild climate and recreational destinations located nearby. Omak provides many of the services that support these industries including hotels, restaurants, retail, fueling stations, and gaming. The 12 Tribes Resort Casino is located just south of Omak on U.S. 97.

²⁶ Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018. U.S. Census Bureau, Population Division. Available online at https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml.

In total, there are 2,283 parcels with 1,786 improvements in the City of Omak that are worth approximately \$283 million. Omak has a 44-bed, acute care hospital, Mid-Valley Hospital, and includes an EMS heliport. In 2018 Mid-Valley Hospital saw 7,969 emergency room patients, 1,739 surgical patients, 911 admitted patients, and 216 newborn deliveries.²⁷

A rail freight line, the Cascade and Columbia River Railroad runs from Wenatchee to Oroville and passes through Omak. Commodities transported by rail have included agriculture products, cement, limestone, lumber, propane and LPG, and pulpwood.

The city owns and operates the Omak Municipal Airport, located three miles north of downtown and provides daily chartered flights, EMS transport, seasonal aerial firefighting base and a base for privately owned aircraft.

Omak has is served by TRANGO which provides both intracity and regional bus services. The Omak School District is the largest in the county and it operates a high school, alternative school, a middle school and two elementary schools, as well as a virtual academy. Wenatchee Valley College maintains a campus in Omak. Omak maintains its own fire department and police department.

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the City of Omak to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

- **Changes in Development:** Development within city limits has mostly concerned single family homes in the residential areas in the north and south ends of the city. Other development has largely concerned the improvement or expansion of existing structures within the city. Although Omak is one of the larger cities in Okanogan County, new development that has occurred since the last plan update has not significantly changed the exposure or vulnerability of the city to natural hazards.
- **Mitigation Progress:** No significant progress was made with mitigation action items that were included in the 2014 Okanogan County MHMP. Of the projects included in the 2022 update, the City of Omak has pursued the replacement of the Central Street bridge but was unable to get funding through the State of Washington. Other mitigation action items included in the 2021 update are intended to help the City of Omak build a routine around the development, review, and implementation of mitigation action items in the MHMP.
- **Changes in Priorities:** Priorities for mitigation in the City of Omak have not changed since the last update. Wildland fire and public outreach are still the greatest concerns and highest-ranking priorities for the City of Omak.

²⁷ <https://www.mvhealth.org/>

CITY OF OROVILLE

The city of Oroville is located in northeast Okanogan County, about four miles south of the U.S.-Canadian border, on the south end of Osoyoos Lake. The city sits with the Okanogan River on the east side of town and the Similkameen River on the west side of town. U.S. Route 97 runs through the city, south to Tonasket and north to the U.S. Customs and Border Protection – Oroville Port of Entry. State Route 7 begins in Oroville at U.S. 97 and runs parallel to U.S. 97, south toward Tonasket on the west side of the Okanogan River.

The following data was produced by the U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates.²⁸

Table 42: Selected Race/Ethnicity Statistics for Oroville

Demographic Category	% of population
White	72.8%
Black or African American	1.7%
American Indian and Alaska Native	11.8%
Asian	0.4%
Hispanic or Latino (of any race)	27.9%

Table 43: Selected Employment Statistics for Oroville

Industry Category	Total	%
Civilian employed population 16 years and over	827	
Agriculture, forestry, fishing and hunting, and mining	141	17.0%
Construction	75	9.1%
Manufacturing	57	6.9%
Wholesale trade	36	4.4%
Retail trade	150	18.1%
Transportation and warehousing, and utilities	44	5.3%
Information	19	2.3%
Finance and insurance, and real estate and rental and leasing	15	1.8%
Professional, scientific, and management, and administrative and waste management services	7	0.8%
Educational services, and health care and social assistance	97	11.7%
Arts, entertainment, and recreation, and accommodation and food services	91	11.0%
Other services, except public administration	65	7.9%
Public administration	30	3.6%
Class of worker	Total	%
Private wage and salary workers	604	73.0%
Government workers	95	11.5%

²⁸https://data.census.gov/cedsci/table?q=oroville,%20wa&g=1600000US5351970&tid=ACSST5Y2018.S2409&vintage=2018&hidePreview=false&cid=DP05_0001E&layer=place

Self-employed in own not incorporated business workers	128	15.5%
Unpaid family workers	0	0.0%

Table 44: Selected Income Statistics for Oroville

Income Category	Total
Total households	887
Median household income (dollars)	\$33,156
Mean household income (dollars)	\$44,189

Table 45: Selected Housing Statistics for Oroville

Housing Occupancy Category	Total	%
Total housing units	998	100%
Occupied housing units	887	88.9%
Vacant housing units	111	11.1%
Housing Value Category	Total	
Owner-occupied units	454	
Median (dollars)	\$126,300	

In 2018 Oroville had an estimated population of 1,681.²⁹ Traditionally, agriculture has been a major component to the economy of Oroville, especially fruit production. The area in and adjacent to the city limits contains numerous orchards and vineyards. Recreation and tourism are other important elements to the local economy and Oroville has a number of parks and access points for outdoor recreation. Retail, food service, construction, and transportation industries contribute to Oroville's economy.

In total, there are 1,182 parcels with 825 improvements in the City of Oroville that are worth approximately \$113 million. Oroville maintains its own police department and fire department. Dorothy Scott Airport is a public, international airport, north of town and is owned and operated by the city. It is classified as an airport of entry by the state of Washington. The northern terminus of the Cascade and Columbia River Railroad line is at Oroville. Commodities transported include agriculture products, cement, limestone, lumber, propane and LPG, and pulpwood. The Oroville School District includes an elementary school and a high school.

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the City of Oroville to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

²⁹ Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018. U.S. Census Bureau, Population Division. Available online at https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml.

- **Changes in Development:** Development within town limits has mostly been limited to structural improvements and building upgrades. Given the small size of the town and limited development that has occurred since the last plan update, new development has not significantly changed the exposure or vulnerability of Oroville to natural hazards.
- **Mitigation Progress:** No progress was made with mitigation action items that were included in the 2014 Okanogan County MHMP. Some mitigation action items included in the 2022 update are intended to help the City of Oroville build a routine around the development, review, and implementation of mitigation action items in the MHMP. As of October 2021, multiple project-specific mitigation action items from the 2014 plan were revised and included in the plan update.
- **Changes in Priorities:** Priorities for mitigation in the City of Oroville have changed since the last update. Although wildland fire and flooding are still the greatest concerns and highest-ranking priorities for the City of Oroville, updates and improvements to the airport have also been identified as a high priority.

CITY OF PATEROS

Pateros is located in southwest Okanogan County where the Methow River flows into the Columbia U.S. Route 97 crosses the Columbia River to the south and cuts through the city, connecting Pateros to Brewster. State Route 153, junctions with U.S. 97 just south of town and connects Pateros to the Methow Valley and the town of Twisp. In 2018 Pateros had an estimated population of 714.³⁰

The following data was produced by the U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates.³¹

Table 46: Selected Race/Ethnicity Statistics for Pateros

Demographic Category	% of population
White	66.7%
Black or African American	0.7%
American Indian and Alaska Native	10.0%
Hispanic or Latino (of any race)	49.4%

Table 47: Selected Employment Statistics for Pateros

Industry Category	Total	%
Civilian employed population 16 years and over	311	
Agriculture, forestry, fishing and hunting, and mining	105	33.8%
Construction	34	10.9%
Manufacturing	34	10.9%
Wholesale trade	17	5.5%
Retail trade	0	0.0%
Transportation and warehousing, and utilities	9	2.9%
Information	6	1.9%
Finance and insurance, and real estate and rental and leasing	0	0.0%
Professional, scientific, and management, and administrative and waste management services	6	1.9%
Educational services, and health care and social assistance	60	19.3%
Arts, entertainment, and recreation, and accommodation and food services	32	10.3%
Other services, except public administration	8	2.6%
Public administration	0	0.0%
Class of worker	Total	%
Private wage and salary workers	261	83.9%
Government workers	38	12.2%

³⁰ Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018. U.S. Census Bureau, Population Division. Available online at https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml.

³¹<https://data.census.gov/cedsci/table?q=pateros,%20wa&g=1600000US5353720&tid=ACSDP5Y2018.DP03&layer=place&d=ACS%205-Year%20Estimates%20Data%20Profiles&vintage=2018>

Self-employed in own not incorporated business workers	12	3.9%
Unpaid family workers	0	0.0%

Table 48: Selected Income Statistics for Pateros

Income Category	Total
Total households	213
Median household income (dollars)	\$49,375
Mean household income (dollars)	\$63,431

Table 49: Selected Housing Statistics for Pateros

Housing Occupancy Category	Total	%
Total housing units	240	100%
Occupied housing units	213	88.8%
Vacant housing units	27	11.3%
Housing Value Category	Total	
Owner-occupied units	113	
Median (dollars)	\$180,100	

Much like its neighbor, Brewster, Pateros is an important hub for the agriculture industry, especially fruit production. The city is adjacent to the Columbia River and the Methow River, and is surrounded by irrigated farmland, primarily orchards. In addition to agriculture, recreation and tourism are also important components of the local economy. Pateros is used as an access point for both summer and winter recreation because of its proximity to both water and the Cascade Mountains. The city hosts several annual events that attract visitors from outside the area.

In total, there are 376 parcels with 272 improvements in the City of Pateros that are worth approximately \$47 million. Pateros maintains a volunteer fire department and fire station, and contracts with Okanogan County Sheriff's Office for police services. The freight line, Cascade and Columbia River Railroad runs from Wenatchee to Oroville and passes through the city of Pateros. Commodities transported include agriculture products, cement, limestone, lumber, propane and LPG, and pulpwood. Pateros School District operates one K-12 school and district office.

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the City of Pateros to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

- **Changes in Development:** Development within city limits has mostly concerned structure replacement and improvement and the construction of single-family homes. Wildfires caused significant damage to the city in 2014 resulting in the loss of numerous structures that are in the process of being replaced. Given the small size of the city, new development, which has mostly

concerned structure replacement, has not significantly changed the exposure or vulnerability of the city to natural hazards.

- **Mitigation Progress:** Pateros has pursued and completed numerous mitigation projects since the 2014 wildfires. Information concerning the details and values of the projects can be found in the Wildland Fire Hazards section in the City of Pateros Annex. With changes in city leadership and changes in priorities since the 2014 wildfires, the list of mitigation action items from the previous plan was discarded and a new list of action items was prepared by city representatives.
- **Changes in Priorities:** Priorities for mitigation in the City of Pateros have changed significantly since the last plan update. Wildland fire is still the highest priority for Pateros, but the focus has shifted to rebuilding and recovery due to the impacts from the 2014 wildfires.

TOWN OF RIVERSIDE

Riverside is located on the east side of Okanogan County, about 8 miles north of Omak. The town lies along the Okanogan River and U.S. 97, which connects Riverside to Omak and Okanogan to the south and the city of Tonasket to the north.

The following data was produced by the U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates.³²

Table 50: Selected Race/Ethnicity Statistics for Riverside

Demographic Category	% of population
White	86.4%
Black or African American	0.0%
American Indian and Alaska Native	22.0%
Asian	0.0%
Hispanic or Latino (of any race)	6.1%

Table 51: Selected Employment Statistics for Riverside

Industry Category	Total	%
Civilian employed population 16 years and over	140	
Agriculture, forestry, fishing and hunting, and mining	26	18.6%
Construction	11	7.9%
Manufacturing	4	2.9%
Wholesale trade	2	1.4%
Retail trade	28	20.0%
Transportation and warehousing, and utilities	2	1.4%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	0	0.0%
Professional, scientific, and management, and administrative and waste management services	2	1.4%
Educational services, and health care and social assistance	46	32.9%
Arts, entertainment, and recreation, and accommodation and food services	2	1.4%
Other services, except public administration	0	0.0%
Public administration	17	12.1%
Class of worker	Total	%
Private wage and salary workers	95	67.9%
Government workers	43	30.7%
Self-employed in own not incorporated business workers	2	1.4%
Unpaid family workers	0	0.0%

³²<https://data.census.gov/cedsci/table?q=riverside,%20wa&g=1600000US5358795&tid=ACSDP5Y2018.DP05>

Table 52: Selected Income Statistics for Riverside

Income Category	Total
Total households	136
Median household income (dollars)	\$36,250
Mean household income (dollars)	\$46,568

Table 53: Selected Housing Statistics for Riverside

Housing Occupancy Category	Total	%
Total housing units	141	
Occupied housing units	136	96.5%
Vacant housing units	5	3.5%
Housing Value Category	Total	
Owner-occupied units	71	
Median (dollars)	\$118,400	

The local economy of Riverside relies heavily on agriculture and natural resource industries. Support industries such as education, healthcare, retail, and public administration, also employ many of the workers in Riverside. As Table 2 shows, about 30% of all workers are employed by some form of government agency. Among those government workers, more than 53% work for state government and about 37% are employed by local government.

In total, there are 301 parcels with 145 improvements in the Town of Riverside that are worth almost \$10 million. The town is part of the Omak School District and does not have any schools. Riverside has a volunteer fire department but does not have its own police force and relies on Okanogan County for law enforcement services. Riverside has some services, but the residents rely on Omak and other cities for most services, including education, finance, retail, healthcare, and food service.

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the Town of Riverside to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

- **Changes in Development:** Development within town limits has mostly been limited to structural improvements and building upgrades. Given the small size of the town and limited development that has occurred since the last plan update, new development has not significantly changed the exposure or vulnerability of Riverside to natural hazards.
- **Mitigation Progress:** No significant progress was made with mitigation action items that were included in the 2014 Okanogan County MHMP. Of the projects included in the 2022 update, the Town of Riverside has pursued the construction of a new fire station but was unable to proceed with the project over a discrepancy regarding flood zones and the proposed placement of the facility. Other mitigation action items included in the 2022 update are intended to help the

Riverside build a routine around the development, review, and implementation of mitigation action items in the MHMP.

- **Changes in Priorities:** Priorities for mitigation in the Town of Riverside have not changed since the last update. Wildland fire and public outreach are still the greatest concern and highest-ranking priorities for the Town of Riverside.

CITY OF TONASKET

The city of Tonasket is located in northeast Okanogan County along the Okanogan River. U.S. Route 97 runs through town, connecting Tonasket to Oroville to the north and Riverside to the south. State Route 20 runs from U.S. 97 in Tonasket and runs east toward Republic in Ferry County.

The following data was produced by the U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates.³³

Table 54: Selected Race/Ethnicity Statistics for Tonasket

Demographic Category	% of population
White	90.4%
Black or African American	1.7%
American Indian and Alaska Native	7.9%
Hispanic or Latino (of any race)	12.3%

Table 55: Selected Employment Statistics for Tonasket

Industry Category	Total	%
Civilian employed population 16 years and over	333	
Agriculture, forestry, fishing and hunting, and mining	20	6.0%
Construction	0	0.0%
Manufacturing	18	5.4%
Wholesale trade	5	1.5%
Retail trade	118	35.4%
Transportation and warehousing, and utilities	2	0.6%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	5	1.5%
Professional, scientific, and management, and administrative and waste management services	19	5.7%
Educational services, and health care and social assistance	116	34.8%
Arts, entertainment, and recreation, and accommodation and food services	19	5.7%
Other services, except public administration	8	2.4%
Public administration	3	0.9%
Class of worker	Total	%
Private wage and salary workers	266	79.9%
Government workers	31	9.3%
Self-employed in own not incorporated business workers	36	10.8%
Unpaid family workers	0	0.0%

³³<https://data.census.gov/cedsci/table?q=tonasket,%20wa&g=1600000US5371890&tid=ACSDP5Y2018.DP03&layer=place&vintage=2018&d=ACS%205-Year%20Estimates%20Data%20Profiles>

Table 56: Selected Income Statistics for Tonasket

Income Category	Total
Total households	499
Median household income (dollars)	\$27,375
Mean household income (dollars)	\$32,922

Table 57: Selected Housing Statistics for Tonasket

Housing Occupancy Category	Total	%
Total housing units	532	
Occupied housing units	499	93.8%
Vacant housing units	33	6.2%
Housing Value Category	Total	
Owner-occupied units	263	
Median (dollars)	\$154,200	

In 2018 Tonasket had an estimated population of 1,129.³⁴ Tonasket is an important hub to the agriculture industry with irrigated fruit producers surrounding the city and fruit storage facilities within the city. Forest industries and recreation industries are both important components to the local culture and economy.

In total, there are 674 parcels with 468 improvements in the City of Tonasket that are worth almost \$81 million. The North Valley Hospital in Tonasket, services northern Okanogan County and the surrounding cities and towns. The Tonasket Airport is located about two miles northwest of town and is owned and operated by the city. The Tonasket School District includes an elementary school, middle school, high school, and choice high school. The Cascade and Columbia River Railroad runs through Tonasket on its line between Wenatchee and Oroville. Commodities transported include agriculture products, cement, limestone, lumber, propane and LPG, and pulpwood. The Tonasket Ranger District office of the Okanogan National Forest is located in the city.

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the City of Tonasket to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

- Changes in Development:** Development within town limits has mostly been limited to structural improvements and building upgrades. Given the small size of the town and limited development that has occurred since the last plan update, new development has not significantly changed the exposure or vulnerability of Tonasket to natural hazards.

³⁴ Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018. U.S. Census Bureau, Population Division. Available online at https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml.

- **Mitigation Progress:** No progress was made with mitigation action items that were included in the 2014 Okanogan County MHMP. Mitigation action items included in the 2022 update are intended to help the City of Tonasket build a routine around the development, review, and implementation of mitigation action items in the MHMP. As of October 2021, one additional mitigation action item focused on public outreach and education was identified for inclusion in the plan update.
- **Changes in Priorities:** Priorities for mitigation in the City of Tonasket have not changed since the last update. Wildland fire and public outreach are still the greatest concern and highest-ranking priorities for the City of Tonasket.

TOWN OF TWISP

Twisp is located in western Okanogan County, where the Twisp River flows into the Methow River. It is the largest town in the Methow Valley with a population of 958 according to 2018 U.S. Census Bureau estimates.³⁵ State Route 20 intersects with SR 153 just south of Twisp and continues northwest through town and up the Methow Valley to the town of Winthrop. The scenic SR 20 also connects the Twisp area to the city of Okanogan to the east across a mountain pass. SR 153 (the Methow Valley Highway) connects Twisp to the city of Pateros and the Columbia River, about 33 miles south.

The following data was produced by the U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates.³⁶

Table 58: Selected Race/Ethnicity Statistics for Twisp

Demographic Category	% of population
White	98.5%
Black or African American	0.0%
American Indian and Alaska Native	1.3%
Asian	0.0%
Native Hawaiian and Other Pacific Islander	0.0%
Hispanic or Latino (of any race)	5.3%

Table 59: Selected Employment Statistics for Twisp

Industry Category	Total	%
Civilian employed population 16 years and over	534	
Agriculture, forestry, fishing and hunting, and mining	46	8.6%
Construction	15	2.8%
Manufacturing	23	4.3%
Wholesale trade	0	0.0%
Retail trade	107	20.0%
Transportation and warehousing, and utilities	16	3.0%
Information	19	3.6%
Finance and insurance, and real estate and rental and leasing	15	2.8%
Professional, scientific, and management, and administrative and waste management services	25	4.7%
Educational services, and health care and social assistance	57	10.7%
Arts, entertainment, and recreation, and accommodation and food services	142	26.6%
Other services, except public administration	28	5.2%
Public administration	41	7.7%

³⁵ Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018. U.S. Census Bureau, Population Division. Available online at https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml.

³⁶<https://data.census.gov/cedsci/table?q=twisp,%20wa&g=1600000US5373080&tid=ACSDP5Y2018.DP05>

Class of worker	Total	%
Private wage and salary workers	301	56.4%
Government workers	144	27.0%
Self-employed in own not incorporated business workers	89	16.7%
Unpaid family workers	0	0.0%

Table 60: Selected Income Statistics for Twisp

Income Category	Total
Total households	515
Median household income (dollars)	\$44,180
Mean household income (dollars)	\$63,713

Table 61: Selected Housing Statistics for Twisp

Housing Occupancy Category	Total	%
Total housing units	572	
Occupied housing units	515	90.0%
Vacant housing units	57	10.0%
Housing Value Category	Total	
Owner-occupied units	307	
Median (dollars)	\$184,700	

The local economy of Twisp relies heavily on tourism and recreation. This is evident in Table 2, which shows that more than 46% of wage earners in Twisp work in either “retail trade” or “arts, entertainment, and recreation, and accommodation and food services”. Most workers in Twisp are employed privately but about 27% are employed by the government and almost two-thirds of those are local government employees. Federal workers make up about 33% of all government workers.³⁷ The Okanogan National Forest Methow Valley Ranger District has its office in nearby Winthrop.

Twisp is a jumping-off point for both winter and summer outdoor recreation tourism in the area. The town sits on the edge of the Okanogan National Forest near hunting and fishing access, campgrounds, forest roads, ATV access, hiking, skiing, and snowmobile access. The town hosts several public events throughout the year, including the Twisp Farmers Market from April through October.

In total, there are 763 parcels with 487 improvements in the Town of Twisp that are worth approximately \$68 million. The town owns and operates the Twisp Municipal Airport, located on the southeast end of town. The Washington State Department of Transportation operates the Methow Valley State Airport, about six miles north of Twisp. This airport is also a USDA Forest Service Smoke Jumper Operations Base.

³⁷<https://data.census.gov/cedsci/table?q=twisp,%20wa&g=1600000US5373080&tid=ACSST5Y2018.S2408&vintage=2018>

The Methow Valley School District serves the Twisp area. The Independent Learning Center, a choice high school, is located in the town of Twisp. Liberty Bell Junior-Senior High School and Methow Valley Elementary School are located a few miles up SR 20, between Twisp and Winthrop. Twisp operates a police force and fire service through Okanogan Fire District #6.

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the Town of Twisp to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

- **Changes in Development:** Development within city limits has mostly concerned single family homes within new and existing subdivisions. Other development has largely concerned the improvement or expansion of existing structures within the city. Given the size of the new residential area off May Street and the number of homes that could yet be built, new residential development could significantly change the exposure or vulnerability of the city to natural hazards.
- **Mitigation Progress:** No progress was made with mitigation action items that were included in the 2014 Okanogan County MHMP. Some mitigation action items included in the 2022 update are intended to help the Town of Twisp build a routine around the development, review, and implementation of mitigation action items in the MHMP. As of October 2021, several project-specific mitigation action item from the 2014 plan were revised and included in the plan update.
- **Changes in Priorities:** Priorities for mitigation in the Town of Twisp have not changed since the last update. Wildland fire is still the greatest concern and highest-ranking priority for Twisp.

TOWN OF WINTHROP

Winthrop is located in western Okanogan County, in the Methow Valley. The Chewuch River flows into the Methow River at Winthrop. State Route 20 passes through town connecting Winthrop south to Twisp and northwest to the community of Mazama and North Cascades National Park. SR 20 west of Mazama is closed in winter.

The following data was produced by the U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates.³⁸

Table 62: Selected Race/Ethnicity Statistics for Winthrop

Demographic Category	% of population
White	92.1%
Black or African American	0.0%
American Indian and Alaska Native	2.7%
Asian	0.0%
Native Hawaiian and Other Pacific Islander	0.0%
Hispanic or Latino (of any race)	19.7%

Table 63: Selected Employment Statistics for Winthrop

Industry Category	Total	%
Civilian employed population 16 years and over	171	
Agriculture, forestry, fishing and hunting, and mining	0	0.0%
Construction	18	10.5%
Manufacturing	16	9.4%
Wholesale trade	2	1.2%
Retail trade	0	0.0%
Transportation and warehousing, and utilities	9	5.3%
Information	3	1.8%
Finance and insurance, and real estate and rental and leasing	12	7.0%
Professional, scientific, and management, and administrative and waste management services	16	9.4%
Educational services, and health care and social assistance	35	20.5%
Arts, entertainment, and recreation, and accommodation and food services	41	24.0%
Other services, except public administration	5	2.9%
Public administration	14	8.2%
Class of worker	Total	%
Private wage and salary workers	117	68.4%
Government workers	36	21.1%
Self-employed in own not incorporated business workers	18	10.5%
Unpaid family workers	0	0.0%

³⁸<https://data.census.gov/cedsci/table?q=winthrop,%20wa&g=1600000US5379380&tid=ACSDP5Y2018.DP05>

Table 64: Selected Income Statistics for Winthrop

Income Category	Total
Total households	207
Median household income (dollars)	\$46,875
Mean household income (dollars)	\$65,121

Table 65: Selected Housing Statistics for Winthrop

Housing Occupancy Category	Total	%
Total housing units	369	
Occupied housing units	207	56.1%
Vacant housing units	162	43.9%
Housing Value Category	Total	
Owner-occupied units	119	
Median (dollars)	\$242,800	

According to U.S. Census Bureau estimates, Winthrop had a population of 451 in 2018. That would be more than 12% growth since the 2010 Census.³⁹ The local economy of Winthrop relies heavily on tourism and recreation. This is evident in Table 2, which shows that more than 24% of wage earners in Winthrop work in the “arts, entertainment, and recreation, and accommodation and food services” industries. Most workers in Winthrop are employed privately (about 79% total) and about 21% are employed by the government. The Okanogan National Forest Methow Valley Ranger District has its office in Winthrop.

Winthrop is well located for both winter and summer outdoor recreation tourism in the area. The town sits on the edge of the Okanogan National Forest near hunting and fishing access, campgrounds, forest roads, ATV access, hiking, skiing, and snowmobile access. The town hosts several public events throughout the tourist seasons.

In total, there are 749 parcels with 440 improvements in the Town of Winthrop that are worth approximately \$73 million. The Washington State Department of Transportation operates the Methow Valley State Airport, a few miles south of Winthrop. This airport is also a USDA Forest Service Smoke Jumper Operations Base.

Housing statistics for the Town of Winthrop are displayed in Table 65. In total, there are approximately 369 (+/- 72) total housing units in Winthrop. It should be noted that almost 44% of those housing units are reported as being vacant. Most of these homes are probably either second homes (vacation homes) or rental units and not homes that are uninhabitable or abandoned.

The Methow Valley School District serves Winthrop with Liberty Bell Junior-Senior High School and Methow Valley Elementary School located a few miles south on SR 20. Winthrop receives fire service

³⁹ Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018. U.S. Census Bureau, Population Division. Available online at https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml.

through Okanogan Fire District #6. The Town provides its own law enforcement through the Winthrop Marshal's Office.

Winthrop carries out a "Westernization" program, designed enhance the overall visual attractiveness of the town and promote the local economy. Structures and building elements are required to remain consistent with the western theme of the town.⁴⁰

Overview of 2022 MHMP Revisions

The following is a summary of how the plan was updated for the Town of Winthrop to best reflect changes in development, progress in local mitigation efforts, and changes in planning priorities. Any changes or progress reported is reflective of what has happened since the last plan update in 2014.

- **Changes in Development:** Development within city limits has mostly concerned new single-family home construction as well as upgrades or improvements to existing structures. Given the small size of the city, new development has not significantly changed the exposure or vulnerability of the city to natural hazards.
- **Mitigation Progress:** No progress was made with mitigation action items that were included in the 2014 Okanogan County MHMP. Mitigation action items included in the 2022 update are intended to help the Town of Winthrop build a routine around the development, review, and implementation of mitigation action items in the MHMP. As of October 2021, one additional project-specific mitigation action item from the 2014 plan was revised and included in the plan update.
- **Changes in Priorities:** Priorities for mitigation in the Town of Winthrop have not changed since the last update. Wildland fire is still the greatest concern and highest-ranking priority for Winthrop.

⁴⁰ <http://www.townofwinthrop.com/westernization.html>

LOCAL FIRE DEPARTMENTS & DISTRICTS

The firefighting resources and capabilities information provided in this section is a summary of information provided by the fire chiefs or representatives of the wildland firefighting agencies listed. Each organization completed a survey with written responses. Their answers to a variety of questions are summarized here. These synopses indicate their perceptions and information summaries.

Appendix 4 contains contact information and a complete equipment list for each of the following fire service organizations.

CITY OF OKANOGAN FIRE DEPARTMENT



Department Summary: The City of Okanogan Fire Department covers approximately 3.2 square miles of commercial and residential area. The area is mostly valley floor with steep pitches of grass and sage brush hills to benches with residences. There are fire hydrants that cover 95% of the city at this time. There are 19 volunteers in the fire department with a paid Fire Chief. Volunteers cover both the City and part of Fire District #3. The Department is responsible for mainly structure fire protection but are trained and can respond to wildland fires within the City of Okanogan and Fire District #3 and surrounding areas. The City of Okanogan Fire Department provides lease space to Okanogan County Fire District #3. With residences mixed in with the wildland fuels, steep slopes, erratic winds, and dry summers coupled with elaborate private landscaping schemes can create extreme wildland fire behavior.

Priority Areas:

- **Residential Growth:** After little or no growth in the past, the City of Okanogan is experiencing a moderate to heavy expansion, with several new annexations and developments. These areas were previously agricultural areas that have been subdivided into varying densities; the upper benches are R-1 designations with the valley floor being of denser R-3 zoning.
- **Communications:** Dispatched by Okanogan County Sheriff's Office (OCSO) dispatch on the Pitcher Mountain repeater. Motorola Pagers are Minitor 6 and Kenwood 2312, 2180, and NEXEDGE – 200 radios are utilized. The Department currently maintains a back-up dispatch system for emergencies when OCSO dispatch has a system failure. The Department currently has 2 licensed tactical channels in the City of Okanogan for fire department use.
- **Burn Permit Regulations:** The City of Okanogan has a burn permit program that was established 1989 by City Ordinance #716. The Outdoor burning code has been changed throughout the years to stay in compliance with the Clean Air Act. Permits cost \$20.00 and are issued for one year, there is a period of no burning that starts on June 1 and goes through September 30. Permits are for natural vegetation only, minimal pile size and conditions pertain to each individual permit, Violation of any part of OMC 8.36 results in citation to reflect current fee schedule.

District Needs

The major obstacle that stands before the fire department today is the limited amount of room for expansion of the Okanogan Fire Station; it has reached its capacity. The need for a much larger joint fire station would provide the area needed to increase equipment cache and provide a large classroom for training scenarios and the setup for training aids.

A dispatcher is needed that is solely dedicated to fire and EMS dispatch at the OCSO dispatch center.

CITY OF OMAK FIRE DEPARTMENT

District Summary: The City of Omak Fire Department covers approximately 3.3 square miles of commercial and residential area. The area is mostly valley floor with steep pitches of grass and sage brush hills to benches with residences. With residences mixed in with the wildland fuels, steep slopes, erratic winds, and dry summers coupled with elaborate private landscaping schemes can create extreme wildland fire behavior.

The department is centrally located downtown at 16 North Ash Street. There are 31 volunteers in the fire department with a paid Fire Chief. The department is responsible for mainly structure fire protection but volunteers are trained and respond to wildland fires, vehicle fires, and vehicle accidents, hazardous materials incidents and assist with some EMS incidents. Volunteers cover both the City and part of Fire District #3. The department provides lease space to Okanogan County Fire District #3 to store equipment.

Priority Areas:

- **Residential Growth:** Currently experiencing light to moderate growth within the City of Omak.
- **Communications:** Since switching to narrow band, communications are good for the central valley locations. The City is tied into the County 911 response system.
- **Burn Permit Regulations:** There is a burn permit program that works very well inside the City of Omak.

Issues of Concern:

For many years there has been a high number of wildland related fires caused by careless outdoor burning in rural areas all over the County. The local volunteer fire chiefs do not have the authority to enforce the outdoor burning. The department believes that if a County Fire Marshal were hired it would help to cut down on a lot of the wildfire threat through better public education and enforcement.

District Needs:

No needs at this time.

TOWN OF CONCONULLY FIRE DEPARTMENT



District Summary: The Town of Conconully is a small resort community nestled in a valley about 20 miles northwest of the City of Okanogan. The town has 210 residents, mostly retired. There are 189 housing units in the town, of which, only 54.5% are permanently occupied housing units.

The town borders National Forest, DNR, BLM and private lands. The town is flanked by two separate reservoirs managed by the US Bureau of Reclamation (Conconully and Salmon Lake Dams). The southern town limit is Conconully State Park.

In addition to providing support to the town citizens the Department has an MOU with Fire District #9 to provide structure protection within a 5-mile radius. The Department also provides EMS but does not transport (due to limited capabilities) unless deemed necessary.

The Department is a completely volunteer agency with 12 volunteer firefighters trained in structure and wildfire procedures.

Priority Areas:

- **Residential Growth:** Conconully has had a very slow growth rate during the last few years.
- **Communications:** The Department is dispatched through the OCSO Dispatch. Pagers and portable radios do not work in our area due to the town resting in a hole between several mountains.
- **Burn Permit Regulations:** The town does have regulations on burning but can be hard to enforce.

Issues of Concern:

The Fire Hall was condemned in 1980 but continues to be used.

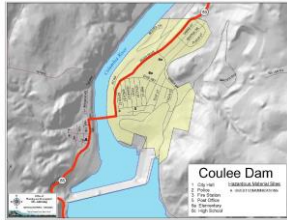
District Needs:

A new fire hall to house all of the Department's fire vehicles. A Class A fire engine is needed to replace some aging equipment. Conconully needs an increase of year-round water sources for fire suppression. A repeater near town would solve some communication issues due to the geography surrounding Conconully.

The Department needs help with recruitment, retention, and training of volunteers. This is a problem because most residents are beyond the age of joining the department along with most working age folks cannot afford the high price to drive a 40-mile round trip to work to get to the Omak-Okanogan area so they do not live in Conconully very long.

The Department's fire vehicles are old and in need of some major repairs which the town cannot afford. The Department needs a four-wheel drive brush truck. The fire department budget for the last several years has been a total of \$14,000 which does not go far when maintaining vehicles, fire hall, PPE, training, etc.

TOWN OF COULEE DAM FIRE DEPARTMENT



District Summary: The Town of Coulee Dam is located in eastern Washington along the Columbia River with a population of 915 residents in Okanogan County and across the Columbia River there are another 315 residents in Douglas County. The Okanogan County portion of Coulee Dam lies within the Colville Indian Reservation and forms the southern limit of the Okanogan Highlands. The town has a total area of 0.7 square miles.

There are 20 volunteers in the fire department with NO paid staff. The volunteers perform structure protection and wildland firefighting duties.

Issues of Concern:

- **Residential Growth:** The population has only increased by 5.2% since 2000 with little or no development in the area.
- **Communications:** The Department is dispatched through the OC Sheriff's Office Communications Center/Dispatch. Tactical communication is still an issue.

Cooperative Agreements:

Coulee Dam is part of the Okanogan Mutual Aid Agreement and has a mutual aid agreement with Fire District 3 from Douglas County. The department also has agreements with BIA and Bureau of Reclamation.

District Needs/Wish List:

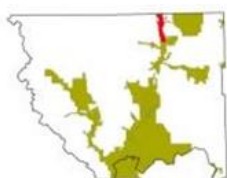
A repeater near town is needed to solve communication issues throughout the Department's jurisdiction. Narrow banding did not solve this problem it has left the area with only one channel to contact dispatch.

A new fire hall is needed as the current hall will not house all of the fire vehicles and equipment and does not provide adequate training areas.

Firefighter recruitment and retention continues to be a problem that the Department faces annually. This is a problem because most residents are beyond the age of joining the department.

The Department needs more training but this is hard to do with every member working their regular 40 hour+ jobs.

OKANOGAN COUNTY FIRE DISTRICT #1



District Summary: Okanogan County Fire District #1 covers approximately 30 square miles (2 miles in the district and 0.2 within Oroville city limits) along the Okanogan River valley. The City of Oroville sits on the south end of Lake Osoyoos and at the convergence of the Okanogan and Similkameen Rivers. The city is 4 miles south of the Canadian border.

The District and city has one combined Fire Department which is operated by the City of Oroville and contracts with FD #1 for services. All equipment and operations are housed and conducted from the city fire station in downtown Oroville.

The population of FD #1 and city is 3,641 full time residents. There are 25 volunteer firefighters with no fulltime paid staff. The economy is primarily based on agricultural with an influx of tourist during the summer months. There are numerous orchards within the town's limits and a few grape vineyards.

The fire district responds to structural fire, EMS major medical calls and rescue, wildland fire, vehicle accidents, hazardous material calls non-operational, and water rescues. The District/Department responded to 72 calls in 2011. The District will respond as initial attack to incidents on USFS and DNR lands until the responsible agency takes charge.

Priority Areas:

- **Residential Growth:** Growth in the area is primarily caused by the proximity to the Canadian market, just 4 miles away in British Columbia, Canada. Three vacation cottage developments have been built on the fringes of the city limits. Over 60% of the property owned on the US side of Lake Osoyoos is owned by Canadians.
- **Communications:** Development of a countywide communication plan is needed; the District is tied to Okanogan County 911 dispatch system. Pagers, portable radios, and mobile phones do not work in all areas as the district is in a low-lying area surrounded by mountains.
- **Burn Permit Regulations:** The District/Department does not have a general burn permit program. However, it does issue recreational burn permits, which follow the requirements of IBC 307, once the County Commissioners declare a burn ban in all areas of the County.

District Needs:

Localized training available without the need to send each volunteer to training centers outside our local area. A countywide Fire Marshal is needed for enforcement of the fire codes and building inspections.

OKANOGAN COUNTY FIRE DISTRICT #2



District Summary: Fire District #2 includes an area approximately 1-mile wide beginning at the northern edge of the Town of Coulee Dam and proceeds north approximately 6 miles. The District includes the Town of Elmer City and the unincorporated villages of Belvedere to the north, McGinnis Lake to the east, Lone Pine, Koontzville, and Seaton's Grove. Rural residences are scattered along both

State Route 155 (Coulee Corridor Scenic Byway) and the Elmer City access road. Bureau of Reclamation land is located on the south and west sides of the district and Colville Tribal trust land is scattered throughout the area.

The district has no paid staff and therefore relies completely on volunteers. Currently 15 volunteers are trained on both structure protection and wildland fire.

Fire hydrants are located in the Town of Elmer City, a local trailer park, and the River View Subdivision.

Priority Areas:

- **Residential Growth:** Population in the district has remained about the same for the past few years. The town of Elmer City is approximately 240 and the rest of the district is approximately 250.
- **Communications:** FD #2 is tied into the Okanogan County 911 response system.
- **Burn Permit Regulations:** Follow US BIA (Mt. Tolman Fire Center) restrictions and guidelines. Permits are required and issued at the Elmer City Hall.

Issues of Concern: There is a current active effort to annex the villages of Belvedere to the north and McGinnis Lake to the east. This will effectively more than double the size of our district.

District Needs: Primary need is a new fire station and training facility. Updated equipment (i.e., a Class A structure truck with all equipment) is also a critical concern. Maintaining a volunteer firefighting work force is very difficult. People don't volunteer anymore or have reached an age that makes it hard for them to be a viable asset.

OKANOGAN COUNTY FIRE DISTRICT #3



District Summary: Okanogan County Fire District #3 is located in center of Okanogan County and currently has 78 volunteers serving a population of approximately 8,000 over 71 square miles. The area is predominately valley floor with steep slopes to benches, residences are located at the edge of these benches with very little regard to the wildland fuel that abuts their residence. Fuel types are natural grasses and sage, some areas have sage as tall as 10' in height. The area was heavy towards agriculture until recent years where the loss of orchard ground has provided large tracts of land that provide avenues for fire to enter the district or leave the district whatever the case maybe.

The area, which comprises FD #3, is fire prone with a high frequency of lightning ignitions in June, July, August and September. Additionally, there are frequent human fire starts throughout the region.

There are 3 stations within the fire district - Station 1 is located in downtown Omak, the fire district rents space from the City of Omak; Station 2 is located in downtown Okanogan this station is located approximately 5 miles from the Omak Station, the fire district rents space from the City of Okanogan; and Station 3 is located in Malott a non-incorporated community 7 miles south of Okanogan. Each station maintains its own roster and handles its own recruitment and training. Departments are responsible for mainly structure fire protection but are trained and respond to wildland fires, vehicle accidents, EMS calls, hazardous material spills, and other types of rescues.

Priority Areas:

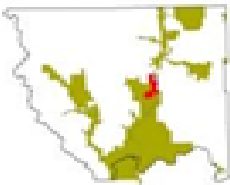
- **Residential Growth:** One challenge FD #3 faces is the large number of houses in the urban/rural fringe compared to twenty years ago. The growing population has expanded further into traditional forest or resource lands and other rural areas. The "interface" between urban and

suburban areas and unmanaged forest and rangelands created by this expansion has produced a significant increase in threats to life and property from fires and has pushed existing fire protection systems beyond original or current design or capability. Many property owners in the interface are not aware of the problems and threats they face and owners have done very little to manage or offset fire hazards or risks on their own property. Furthermore, human activities increase the incidence of fire ignition and potential damage.

- **Communications:** FD #3 is tied into the County 911 response system.
- **Burn Permit Regulations:** No burn permit program at this time other than those issued by the Department of Ecology.

District Needs: None at this time.

OKANOGAN COUNTY FIRE DISTRICT #4



District Summary: FD #4 covers 174 square miles and with a population of about 6,000. The District includes the incorporated City of Tonasket and the unincorporated communities of Ellisforde and Crumbacher, as well as a municipal airport. The City of Tonasket is about 20 miles south of the Canadian border. The town is at the intersection of US Highway 97 and State Highway 20, about 28 miles north of Okanogan, the county seat. Apple, pear, peach, apricot, plum, and cherry orchards, wineries, cattle ranches, dude ranches, farms and rugged mountain wilderness with sage-covered foothills make up the fire district.

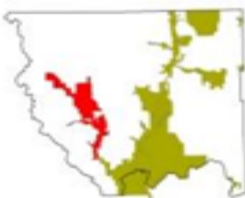
FD #4 is 100% volunteer and currently has 35 volunteers. The district responds to both structural and wildland fires.

Priority Areas:

- **Residential Growth:** FD #4 growth is moderate to slow.
- **Communications:** FD #4 is tied into the County 911 response system and maintains interoperable with other districts and agencies (DNR & USFS).
- **Burn Permit Regulations:** Burn permits are issued by district personnel and DNR.

District Needs: A satellite station for Crumbacher, Thermal imager, new PPEs (structural and wildland), new SCBAs, replace hoses on fire trucks, and an updated structural engine.

OKANOGAN COUNTY FIRE DISTRICT #6



District Summary: Fire District #6 is the largest Fire District in the County by area covering approximately 350 square miles with a population of approximately 4,000. The District provides contracted support to the Towns of Twisp and Winthrop. The District has four stations in the main communities of Mazama, Winthrop, Twisp and Carlton. The District includes a wide variety of fuel types ranging from grassland to heavy timber and everything in between.

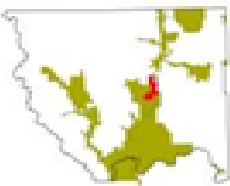
It is an all-volunteer department except for a full time Chief, Assistant Chief, and three Division Chiefs. Currently the District's roster consists of 37 volunteer firefighters. The top priority for the District is structure protection but responds to wildfires. The District lands have a dual jurisdiction with the DNR which results in a good working relationship. Also, much of the District borders National Forest and again cooperation with this agency is excellent.

Priority Areas:

- **Residential Growth:** FD #6 has the highest rate of new construction in Okanogan County. Most of the construction is residential in the urban interface areas. Urban interface area is the biggest concern.
- **Communications:** The Department is dispatched through the OC Sheriff's Communications Center/Dispatch. FD #6 has good communications throughout the District.
- **Burn Permit Regulations:** FD #6 does not issue burning permits. When fire danger is high, a complete burn ban is instigated.

District Needs: The Winthrop Station is inadequate to handle equipment and training needs. Replacement of the station is the highest priority. Need to replace 2 water tenders and 3 brush trucks. Additional full-time paid firefighter staff to provide better service to the area.

OKANOGAN COUNTY FIRE DISTRICT #7



District Summary: The District covers 33 square miles and is made up of orchards and other crops grown both within the valley area and on many of the low benches where irrigation water is available. The surrounding foothills are vegetated primarily by sagebrush and various lower growing grasses. Sparse ponderosa pine can be found in a few of the nearby draws.

The District provides coverage for the Town of Riverside (population 348) and is 100% volunteer with around 18 volunteers. The district responds to both structural and wildland fires.

Individual residents in the Tunk Valley have purchased land they hope will eventually house a small fire department. It should be noted that it is 28 miles of gradual incline from the beginning of Tunk Creek Road near Riverside to its culmination at Crawfish Lake; thus the response time for a neighboring fire department to respond to a fire in the upper extent of Tunk Valley could be significant.

Priority Areas:

- **Residential Growth:** FD #7's growth is moderate to slow.
- **Communications:** FD #7 is tied into the County 911 response system and maintains interoperable with other districts and agencies.
- **Burn Permit Regulations:** None at this time.

District Needs: New fire station with classroom facility and an urban interface engine.

OKANOGAN COUNTY FIRE DISTRICT #8



District Summary: District encompasses 160,000 acres (250 mi²) all on the Colville Indian Reservation. The District is bordered on the south by the Columbia River (Brewster/Bridgeport), east and north by Columbia River Road, and west by Highway 97. Borders by Brewster/Bridgeport near Smith Ranch (Wakefield/Cameron Lake) exit. Population is approximately 350. The terrain is high plateau which breaks down to low elevations on all four compass points with scattered timbers, sagebrush and open grass areas. In addition, wheat field dominate approximately 15,000 acres mostly in central and south-central district.

The District has 30 active volunteer members who are nearly all red card trained. All members receive annual refresher training through DNR and have completed their annual first aid training.

District 8 is a wildland fire only unit – no structure capabilities exist. The District has eight Type 6 engines, one 3,000-gallon tender and one command vehicle.

Priority Areas:

- **Residential Growth:** WUI with newcomers.
- **Communications:** The District is dispatched out of the County communications center and is adequate except for tone out issues.
- **Burn Permit Regulations:** Burn permits are issued by Mt Tolman, BIA.

Cooperative Agreements: Mutual aid agreements with Fire District #3 and Mt Tolman, BIA.

District Needs/Wish List:

- Tone out through county is sporadic; district doesn't use pagers due to terrain features – open to suggestions.
- With small budget, (\$12,000 annually) vehicle upkeep is a constant concern.

OKANOGAN COUNTY FIRE DISTRICT #9



District Summary: District #9 is about 64 square miles. It is made up of farms, ranches and open range lands. Structures are fairly scattered in most parts. The District does surround the Town of Conconully; however, the town has its own fire department. FD #9 only has wildland fire equipment; the residents rely on the Town of Conconully Fire Department for structure protection within 5 miles of the town. For other residents, FD #9 has a mutual aid agreement with FD #3 for structure protection. FD #9 borders FS, BLM, DNR, and Washington Fish and Wildlife.

FD #9 is an entirely volunteer fire district with no paid staff and 23 volunteer fire fighters.

Priority Areas:

- **Residential Growth:** Little to no growth within the last few years.
- **Communications:** FD #9 is dispatched by OCS Communication Center/Dispatch.
- **Burn Permit Regulations:** Burn permits through Okanogan County and WA Department of Natural Resources.

District Needs:

A new fire hall is needed because the trucks are currently stored in a barn owned by Fish and Wildlife during the winter months. The barn has only one heated room big enough for our water tender and one brush truck.

The District needs a water tender, two brush trucks, and draftable mobile pumps.

FD #9 needs a repeater to improve the radio communications.

Volunteers need additional training; however, this is tough to do when all our members work 40 or more hours a week either on their own farms or regular jobs.

OKANOGAN COUNTY FIRE DISTRICT #10

District Summary: District #10 is about 24 square miles. It is made up of orchards, farms, ranches, open range lands and timber. Structures are fairly scattered in most parts. The District does surround the unincorporated Town of Loomis. The volunteers are responsible for both wildland fire and structure fire protection. FD #10 borders BLM, DNR, and Washington Fish and Wildlife.

FD #10 is an entirely volunteer fire district with no paid staff and 13 volunteer fire fighters.

Priority Areas:

- Residential Growth: Little to no growth within the last few years.
- Communications: FD #10 is dispatched by OCS Communication Center/Dispatch.
- Burn Permit Regulations: District 10 follows Washington DNR regulations.

District Needs: A new fire hall to replace the current fire hall in Loomis, which was built in 1963 and is in need of major repairs or replacement.

Update equipment, (i.e. water tender, newer brush trucks, etc.). Volunteers need additional training; however, this is tough to do when all our members work 40 or more hours a week either on their own farms or regular jobs.

OKANOGAN COUNTY FIRE DISTRICT #11

District Summary: Fire District #11 is located in North Central Okanogan County and encompasses 71,040 private acres (111 square miles) with approximately 550 citizens and an estimated 350 structures. The area is primarily mountainous with numerous drainages. Northern boundary is 13 miles of east/west international border with the closest Canadian fire station being 20 miles from our Molson satellite station. Western boundary follows Nine Mile road adjoining private ground. Eastern boundary is the Chesaw highway and adjoins private and USFS property. The Southern boundary is intermixed with FS and private property. FD #11 adjoins approximately 300,000 acres of land not protected by any fire protection district.

Historically, the fire regime has been frequent, low-severity wildfires. Successful fire suppression, coupled with the various land management practices have led to overstocking of small trees (dog hair thickets) and an excess of surface debris and brush. This overstocking of vegetation and buildup of surface fuels has led to conditions with higher potential to result in frequent moderate to high-severity wildfires. These fires come with an elevated potential for negative effects to our communities.

The area, which comprises FD #11, is fire prone with a high frequency of lighting ignitions in June, July, August and September. Additionally there are frequent human fire starts throughout the region. The DNR Urban Interface Risk Assessment program has completed assessments on over 260 structures.

Approximately 30,000 acres of FD #11 is privately managed timber in need of fuels reduction caused by numerous developments with poor forest practice planning i.e., extensive ladder fuels from developments, doghair thickets and logging slash. This greatly increases the risk of a severe wildfire event in FD #11 either from a lighting strike or human caused fire.

FD#11 has one centrally located station (Fields Hall) and three 'satellite' stations located in the communities of Molson and Chesaw and at Rawhide Road (located at the junction of Molson and Chesaw Highways).

FD #11 is a completely volunteer fire district with 42 volunteer firefighters who are trained as basic structural and wildland firefighting. The majority of the red carded members are also Firefighter type 1 rated. One officer is certified as Incident Commander Type 4, Single Resource Boss, Dozer Boss and Engine Boss.

Priority Areas:

- **Residential Growth:** The district continues to see unchecked development with urban interface neighborhoods. The district is made up of 20-acre parcels surrounded by large and small ranches, isolated mountain homes and cabins. Approximately 70% of land in North Central Okanogan County is under the governmental management of the USFS, Washington State Department of Natural Resources, Washington State Department of Fish and Wildlife and the Bureau of Indian Affairs.
- **Communications:** FD #11 is tied into the county 911 response system.

- **Burn Permit Regulations:** Permits are issued by DNR.

District Needs: While only one member is certified in a line rated position for wildland fire, we have many long-term members who have skills, knowledge, and abilities as Resource Boss, Strike Team Leader and other advanced levels. The majority of FD #11 members are red carded and the majority of those are FFT1 rated. The primary obstacle for obtaining more training is the unpaid time commitments for the several weeks of required training at the ISC 230, 231 & 232 plus ISC 290 and leadership courses. At present FD #11 performs a very limited rescue service due to lack of equipment and training. The Kinross Mine operations at Buckhorn Mountain greatly increase the training demands on FD #11. The district is not trained in the use of SCBA equipment due to lack of training, equipment, and facilities. A live fire training facility to facilitate training opportunities for district members would increase the effectiveness of firefighters and other emergency responders.

The district needs to update the fleet. A few newer vehicles have been obtained but this continues to be a problem. The initial response engines will need to be equipped with rescue gear as well as fire gear to handle the increased heavy equipment traffic caused by the mining operation, the increased population supporting the mine and the associated mining support services.

While the primary station in the district (Fields Hall) is located centrally in the district and is a relatively new 4 bay facility (built in 1999) the district still needs the additional development of stations. The stations in Molson, Chesaw and Rawhide are much less than adequate for current needs.

The district is severely lacking in personal equipment. At present no members have certified turnout gear. What turnout gear the district does have is outdated. Over 80% of the members have wildland gear but increased demands on the district will leave us short in the very near future.

OKANOGAN COUNTY FIRE DISTRICT #12



District Summary: Located in Northern Okanogan County with approximately 9,702 private acres (15.76 square miles) in size and a population of 302 citizens. Tax revenue estimate for 2012 is \$11,900. Assessed value real property is \$19,358,095. The area within the district is mountainous with rock bluffs, valleys, and many steep drainages.

Okanogan Fire District #12 has one fire station located on Swanson Mill Road approximately in the center of the district. The district has one operation division primarily for the purpose of wildland fire suppression. Every firefighter is trained in current First Aid/CPR, but there are no qualified EMS personnel or equipment.

The District currently has 18 volunteer firefighters (no paid staff) and is governed by a three member Board of Commissioners. All of the officers and fire commissioners have many years of involvement with the District. With an average of 18 volunteers in total, all have some level of experience on large and complex wildfires. Most of the firefighters have received training to the woodland Firefighter 1 level. DNR red cards are kept current with annual refresher classes. A current certification in basic First Aid is

required of all firefighters. There are two Single Resource Bosses with several others in training. While wildfire ready, the district lacks in training for structure fires. And, although the District responds to vehicle accidents within the district, personnel are not EMS trained or equipped.

All of Okanogan Fire District #12 is under governmental management by DNR, BIA, BLM, and is adjacent to the USFS.

The western boundary is bordered by Fire District #4, Tonasket, and Fire District #1, Oroville, in the Okanogan Valley. The elevation ranges from 1400 ft. at these boundaries to 3800 ft. on the north where DNR, BLM, and USFS properties border. The eastern boundary is a point approximately one-half mile west of Fancher Lake. The southeast roughly parallels the western side of the Antoine Canyon. The southern boundary traverses broken country to the southwest corner two miles west of Ellisford.

A wide variety of fuel models exists within FD #12. The lowest elevations are in the south and west with a total gain of 2400 feet rising in the north and east half of the District. This creates an overall southern and western exposure. The fine low elevation grasses are typically dry enough to ignite easily by July. Sagebrush transitions into scattered ponderosa pine forests. This then becomes a complex mix with fir, tamarack and brush. This combination coupled with summertime upslope, up valley winds has historically created many fast moving large fires, very difficult to control. Roadways create the most significant firebreaks. Some overstocking and doghair thickets exist at various points along Swanson Mill Road. Water sources are limited/seasonal and widely scattered. Many water storage tanks are stationed on private lands throughout the District.

The area within FD #12 is fire prone with a high frequency of lightning ignitions in June, July, August, and September. Additionally there are frequent human fire starts through the area. There are many absentee owners who frequent their property to recreate during the summer and hunting season. The lack of local fire danger knowledge adds to the human caused fires.

Priority Areas:

- **Residential Growth:** The district is experiencing unchecked development of interface neighborhoods in mountains and valleys. Mountain homes and cabins are served by primitive county road and primitive auxiliary roads and driveways.
- **Communications:** The District is dispatch out of the County communications center.
- **Burn Permit Regulations:** Permits are issued by DNR.

District Needs: An aging fleet of vehicles remains our primary limitation to responses. All but two of our engines are loaned/leased old military surplus. The District owns a 2000 Chevy ¾ ton and a 1995 Ford F-350 purchased through DNR/Military surplus. The District needs to upgrade our overloaded engines with newer vehicles which would be more reliable and would provide the safety margin required by law. In the last year, our water tenders have been upgrade, but they still require some maintenance work to get them fully operational.

The FD #12's fire station is limited by size (two bays) to housing three vehicles year round. This severely limits our response time and capability for approximately 6 months out of the year, when freezing weather becomes a problem. The fire station has no well. The only water on site is a 10,000 gallon tank for seasonal firefighting use. All of the FD #12's water sources are located out of the district. Another fire station better located with a well would provide the district with a water source within the district and storage for additional apparatus. This would also provide room for training and education.

Our district has a 2-watt VHF radio repeater for in-district communications. Due to the steep terrain, our communications has many gaps. While the District now has access to the North County fire repeater which offers better coverage, it is generally reserved for inter-district communications and cannot be used as a tactical frequency. FD #12 would like to apply for a FCC license to increase the power wattage of our 2-watt VHF repeater, in order to improve communications throughout the district.

Some of our truck radios and handheld radios are not capable of all of the required frequencies and should be upgraded to newer, more capable radios. Only some of our radios can communicate on the required National Interoperability channels as recommended by the Department of Homeland Security.

OKANOGAN COUNTY FIRE DISTRICT #13

District Summary: The Okanogan Fire Protection District #13 is authorized and guided by Title 52 of the Revised Code of Washington for Fire Protection Districts. Its primary responsibility is the protection of structural improvements and developments on lands within its district. It also has joint protection responsibilities with the Washington State Department of Natural Resources for protection from wildland fires.

The fire district boundary generally coincides with that of the Republic School District #309, with the addition of an annexed portion extending westward from Ferry County into Okanogan County along the state highway route 20 corridor. The district area is approximately 140 square miles with a population of approximately 3300.

Fire district staffing consists of:

- 35 – Firefighters (volunteer)
- 3 - Fire Commissioners (volunteer)
- 1 - District Secretary (part-time paid)
- 1 – Maintenance Worker (part-time paid)

The fire district is generally situated within the wooded valleys of the San Poil River and the Curlew Lake valley, including their tributaries. The valley bottoms are typically open and grassy where agriculture and development has cleared the forests. Uplands are generally wooded. Natural vegetation throughout the district creates a widespread Wildland/urban interface fire threat potential.

Approximately 1/3 of fire district values lie within the city limits of Republic, Washington with remaining values existing in the rural areas of the district.

The local area has an active fire history. Large wildfires have been documented throughout Okanogan County. When large fires occur, citizens are reminded of the threat to their homes, and awareness of hazard fuels peaks for a time. However, the mental vividness of evacuations, warning bulletins, and firefighters and equipment pouring into the community to render assistance dulls with time. It is important for residents to understand the vulnerability of living within dense vegetation where dry summers create the potential for catastrophic fire events.

Priority Areas:

- **Residential Growth:** Fire prone developments in subdivisions surrounding Curlew Lake and up tributary creek drainages, and north of the City of Republic on Klondike Mountain.
- **Communications:** Establish another repeater for fire/ems to cover the dead spots around the boundary area between Curlew Lake and Malo.
- **Fire Fighting Vehicles:** The district will need an additional structural engine for the planned satellite station on the west side of Curlew Lake. The district will need to upgrade the old tender stationed at the East Lake Hall. The tank leaks and the pump is too small for efficient use of the vehicle. Some of the older vehicles in the fleet are higher maintenance than the newer vehicles, and also do not provide as many efficiencies and safety features for firefighters as newer models that are up to the latest standards. Replacement or refurbishment of older apparatus must be an ongoing program as funding opportunities develop.
- **Burn Permit Regulations:** The fire district does not administer a burn permit system. The fire district has relied upon a system established by the Washington State Department of Natural Resources (DNR) that allows outdoor burning under certain times of the year according to particular rules.

During times of the year when DNR burning rules are relaxed, usually early spring and late fall, the fire district is frequently called out to suppress escaped fires started by homeowners burning grass and debris. Escape fire incidents have a negative impact upon the time and patience of volunteer firefighters. The volunteers are willing to help those in genuine need when fire threatens the community due to accidental reasons, but their enthusiasm wanes when their personal lives are interrupted by fires that have escaped due to poor planning or carelessness. Because of escaped burning incidents, there is a need to develop further cooperation and education between local law enforcement and Fire Chiefs to cooperatively enforce current laws regarding reckless and negligent fire use.

Issues of Concern: The trend of dwindling industrial activity in the fire district will degrade the tax revenues over time. Poor economics will continue to be a limiting factor in providing adequate fire protection unless business and industry can be attracted to the area.

District Needs: Fire district leaders have developed a list of general issues and considerations that pertain to multiple neighborhoods or the district in general, which have been incorporated into the Chapter 5 of this document.

OKANOGAN COUNTY FIRE DISTRICT #14

District Summary: Located in Northern Okanogan County with approximately 79,953 private acres (124 square miles) in size and a population of 1,700 citizens. The area within the district is mountainous with three major valleys and many steep drainages.

Okanogan Fire District #14 has one primary fire station located in Curlew and three satellite stations in the communities of Danville, Malo, and Toroda. The district has two operations divisions (fire and medical). Every firefighter is trained in current First Aid/CPR, but there are no qualified EMS personnel or equipment.

The District currently has 30 volunteer firefighters and 23 volunteer EMS providers (no paid staff) and is governed by a three member Board of Commissioners. All of the officers and fire commissioners have many years of involvement with the District. With an average of 30 volunteers in total, all have some level of experience on large and complex wildfires. Most of the firefighters have received training to the woodland Firefighter 1 level. DNR red cards are kept current with annual refresher classes. A current certification in basic First Aid is required of all firefighters. One commander is certified at Incident Command Type 3 and Division Group Supervisor.

Priority Areas:

- **Residential Growth:** There continues to be unchecked development of interface neighborhoods in narrow, mountainous valleys. Small ranches and farms make up the majority of development in the larger valley bottoms and some upland areas. Isolated homes and cabins exist in the mountainous areas of the District.
- **Communications:** The valley is difficult place for effective communications. The topography makes radio communication spotty, and the District does not have cell phone coverage to fall back on. Firefighters in the field frequently need contact with people or organizations that are only reachable by phone. The District's own dispatch attempts to make that connection but because the District relies on volunteers, someone to fill that role is not always available. Topography enters into the communications problem again because reported fires are often not easy to spot, due to limited vantage points, and a lot of time can be wasted in getting eyes on them and then trying to calculate a way into that area.
- **Burn Permit Regulations:** The fire district does not administer a burn permit system. The fire district has relied upon a system established by the Washington State Department of Natural Resources (DNR) that allows outdoor burning under certain times of the year according to particular rules.

District Needs: The primary obstacle for obtaining wildland fire training is unpaid time commitments for the several weeks of required training at the ISC 230, 231, & 232 plus ISC 290 and leadership courses.

An aging fleet of apparatus is our primary limitation. The newest vehicle of our fleet is a 1999 F-450 Ford which came to the District surplus from the USFS Colville National Forest in 2005. Much of our heavy rolling stock is late 1960 vintage and up for replacement.

Additionally, the District currently has no water tenders on inventory. This is a gaping hole in our water transport and portable hydrant ability. We have recently acquired one surplus Kenworth tractor truck for building a tender but have not yet amassed the funding to do so.

While the primary station of the District is a new (2004/05) five bay facility located in the town of Curlew, the District is still in need of additional development of stations. The two bay, three apparatus station in Toroda (1998) is adequate for current needs. The single bay, single apparatus stations in Malo and Danville are much less than adequate for current needs. Stations similar to the Toroda station need to be built in both the Danville and Malo locations.

OKANOGAN COUNTY FIRE DISTRICT #15



District Summary: Fire District #15 covers 230 square miles in two counties (Okanogan and Douglas). Within those two counties FD #15 covers a population of over 4,000. The area is mostly agricultural in nature with apple, pears, cherries and wheat. Also, FD #15 has a vast diversity of low-income minority agricultural workers, mostly Hispanic. During the peak harvest months, August through

November, the population of the district could double in numbers. The District also covers a wide range of topography, from grass/sagebrush to dense timber.

The district operates four stations: Brewster, Pateros, Methow and Rocky Butte on the Bridgeport Bar. The District provides coverage for the Cities of Brewster, Pateros, and Bridgeport. The district responds to over 120 calls a year covering brush fires, structure fires, vehicle fires and vehicle accidents. The district also owns and operates an ambulance service that employs 4 EMT-I's and an EMS Supervisor, who is also an EMT-I.

FD #15 has a paid District Fire Chief and over 60 volunteers. All our firefighters are red card qualified. Along with that the District has several who are Crew Boss and Engine Boss qualified.

Priority Areas:

- **Residential Growth:** The Alta Lake, Methow, and French Creek areas have had a big growth of new homes over the past two to three years. The District needs to improve fire service to those areas as well as Brewster, Pateros and Bridgeport Bar areas. The Alta Lake area has a State Park as well as a popular golf course with a motel, both of which has increased our call volume to those areas. The closest station to the Alta Lake area is 3-4 miles away in Pateros. The Alta Lake area should be covered more efficiently with a station and equipment assigned to the area.
- **Communications:** The District needs to improve our communications in the Methow area as well as the areas of our district surrounding Bridgeport. The topography in these areas makes it difficult to get good signal from the current repeater sites. Dispatched by OC Sheriff's Office Communications Center/Dispatch (911) for both counties.
- **Burn Permit Regulations:** The City of Brewster has a burn permit requirement and the cost is \$30.00 and is good from Oct 1 – Apr 30. The district has no permit process in place at this time.

District Needs: A training facility, either within the district or somewhere within the County, is necessary for volunteers to get good quality training without having the burden and costs of traveling out of the area, especially now with the proposed new LIVE fire training requirements.

A fire station and equipment (Class A Engine) in the Alta Lake and Methow areas to improve the current overcrowding conditions. Improve communications with repeaters in dead areas. Retention and recruitment of volunteers is a major problem. The District is always in need of volunteer firefighters and EMS.

Update contracts with neighboring agencies. Developing contingency plans for the urban interface areas of the district. The District needs to continue to improve relationships with the cities (Brewster, Pateros, and Bridgeport).

OKANOGAN COUNTY FIRE DISTRICT #16



District Summary: The Aeneas Valley is located in NE Okanogan County approximately 18 miles SE of Tonasket. The rough district boundaries are: all private land, on both sides of the valley, from Peony Creek road to just past the Aeneas Valley Road general store. FD #16 encompasses approximately 51.5 square miles or 33,000 acres.

The general Aeneas Valley is a broad drainage running NW to SE with numerous smaller drainages dropping into the main valley from the surrounding mountains. The main valley floor at 2,200 - 2,600 feet is bordered to the east and west with mountains reaching up to 6,000. While the lower reaches of Aeneas Valley can be broad and open the topography is typically steeper and rugged approaching the higher elevations.

This topographic arrangement has multiple effects on fuels, demographics, infrastructure, landownership, and wildland fires (see topics below).

The valley floor is much denser in both structures and population with smaller parcels of land with easier access for fire equipment. The valley presents challenges with regards to both weather as well as an adequate water supply, especially in the higher elevations. There are also many isolated homes and cabins with difficult, often single road access and/or closely surrounded with heavy fuels. Most side roads are not maintained so access is, at best, difficult, and in the winter months it can be impossible. The district borders approximately 9 miles of the Okanogan National Forest. In the valley floor the vegetation ranges from grassland to smaller, isolated stands of Ponderosa pine. This trend continues as you move up in elevation, changing to a higher density of trees with 3,500' and up. The Northeast portion of the district borders the Okanogan National Forest with a very high density of ponderosa pines.

Aeneas Valley floor fuel composition is given to a mixture of timber plots, grazing pastures and irrigated agricultural lands. These are also a limited area of scrub brush and indigenous grasses. Stringers of timber extend into the valley floor from intersecting drainages. Both the lower valley area and the upper reaches of the surrounding mountains are dry site, fire prone landscapes.

Adjacent forests of ponderosa pine are intermixed with Douglas-fir and occasional western larch. These timber stands are often thick with heavy ground and ladder fuels. There is also a lack of management of these forests tracks leading to overstocking, unhealthy stands and fire prone conditions. At all levels grass and shrub fuels and needle cast are the primary fire carriers.

The Aeneas Valley is prone to lightning strikes throughout the dry-season summer months. With the rapid increase of population and structures the additional risk of human fire starts is increasing. The Washington DNR Interface Risk Assessment program lists the Aeneas Valley as a high-risk area.

Priority Areas:

- **Residential Growth:** One of the fastest growing areas in Okanogan County is the Aeneas Valley, which is a textbook example of the Wildland/Urban Interface (WUI). The population base is moving more towards retired couples building their retirement home. There are a few small, home-based businesses as well as those who commute to either Tonasket, Okanogan, or as far away as the West side of the state. The growth in the Aeneas Valley is well documented both by value through the Assessor's Office as well as building permits issued through the Okanogan County Building Department. In the past 3 years, District 16 has experienced growth of 138%.
- **Communications:** The valley is difficult place for effective communications. The topography makes radio communication spotty, and the District does not have cell phone coverage to fall back on. Firefighters in the field frequently need contact with people or organizations that are only reachable by phone. The District's own dispatch attempts to make that connection but because the District relies on volunteers, someone to fill that role is not always available. Topography enters into the communications problem again because reported fires are often not easy to spot, due to limited vantage points, and a lot of time can be wasted in getting eyes on them and then trying to calculate a way into that area.
- **Burn Permit Regulations:** Enforcement of fire regulations will remain the responsibility of the Department of Natural Resources and the Okanogan County Sheriff's office.
- **Manpower:** Being an all-volunteer organization the manpower available at any given time for an incident can be rather slim with a lot of the same people being repeatedly called upon to respond. In fact, during the hot dry summer we tend to have the least amount of people available. Our goal is to have approximately 30 training firefighters, but we can't seem to get much above 20 at any given time. Because as is typical in volunteer organization, about 80% of the work is done by about 20% of the people. The loss of one or two key individuals can severely impact the ability of the fire district to adequately perform its duties.
- **Other:** Unless your district has a very large tax base not only can't you hire full time employees, but you also cannot provide them with the necessary professional training needed. Seldom mentioned is the fact this problem extends onto the administrative side as well. For the commissioners on down, there are a multitude of RCW's and WAC's which seem to be written for large districts that have to be implemented and followed. Very little training, especially affordable training, is available to cover this area. This exposes the district, as well as the taxpayers to

potentially costly risk and litigation. People are stepping into roles for which they have no training and very little chance of getting it and being expected to perform flawlessly.

District Needs: Currently District #16 has 19 red-carded firefighters. The goal is to have all firefighters trained to NWCG level of FF2. Other goals include trained qualified Engine Boss/Incident Commander Type 4 or higher. The District's biggest challenge is recruiting volunteers from the resident population. Training is limited to available open classes provided by DNR and FS. Our current high training priority is getting our physically able firefighters trained to fight structural fires, complete with SCBA (which is a big financial challenge.)

District #16 is at its desired number of fire department vehicles but most are 1990's vintage or older and are higher maintenance vehicles requiring more labor hours and therefore not as reliable. The District's goal is to upgrade vehicles and capacities as opportunities permit.

At this time there is not a district supplied place to park fire apparatus out of the weather therefore, an indoor heated training and maintenance facility would increase cold weather fire protection as well as reduce the use of district members' homes and property.

Other needs: A big concern is the availability of an adequate water supply in the district and surrounding area. Therefore, the district needs multiple water tenders. Qualified drivers for water tenders is the most critical skill shortage the district has.

BUREAU OF LAND MANAGEMENT

Spokane District Mission Statement: The mission of the Spokane District is to share their unique capability and interest in sustaining the full diversity of natural and cultural landscapes across Washington State and invite their discovery and use. This includes protecting the natural resources, such as water for fish and wildlife; preserving environmental and cultural values on the lands they manage; providing for multiple uses, that include some commercial activities; and enhancing opportunities for safe and enjoyable outdoor recreation. The Spokane District also assesses energy and mineral resources and works to ensure that their development is in the best interest of the public. Another major responsibility is to ensure consideration of Tribal interests and administration the Department of Interior's trust responsibilities for American Indian Reservation communities.

Spokane District Summary: Up through the 1970's, BLM's policy was to divest ownership of all federal public (BLM) lands in the state of Washington. But in 1980, at the height of the Sage Brush Rebellion (a social movement to give control over federal lands to the states and local authorities), Washington voted to have the public lands remain under federal ownership and management. In the 1980 general election, the state put a measure on the ballot asking voters if the state constitution should "be amended to provide that the state no longer disclaim all rights to unappropriated federal public lands." Approximately 60% of the people and the majority in every county voted no, signaling to BLM that there was strong support for continued federal management of the public lands in the state.

The Spokane District Fire Management Program currently consists of 2 type six wildland engines (300 gallons) with two full time Engine Captains, four engine crew members, one Fuels Specialist, Seasonal Dispatcher, and a Fire Management Officer (FMO). One engine is stationed in Spokane at the District office and the other in Wenatchee at the field office. There are approximately 16 other specialist (staff) from across the district that assist the Fire Management Program in wildland and/or prescribed fire efforts. With the District's scattered ownership pattern, the engines are usually on scene after initial attack forces have arrived. Our engines and personnel are available for off District and out of state fire assignments that aide in support, training, and experience. The Spokane District BLM has cooperative agreements with the Colville National Forest, DNR, Spokane County FD #10 & #3, Grant County FD #5, Douglas County FD #4, Chelan County FD #1, Benton County FD #1, and Kennewick City FD.

USDA FOREST SERVICE

District Summary: The Okanogan-Wenatchee National Forests (OWF) cover nearly 4 million acres of forested lands on the eastern slopes of the Cascade Mountains. National forest lands span from the Canadian border south to the Yakima Indian Reservation and from the Cascade crest east to the Columbia River on the Wenatchee National Forest and to the Okanogan County line on the Okanogan National Forest. The OWF has 7 Ranger Districts, two of which are in Okanogan County. There are approximately 900 red carded Forest Service employees that participate directly in fire suppression or support fire suppression activities.

WASHINGTON DEPARTMENT OF NATURAL RESOURCES

District Summary: Washington State Department of Natural Resources is the state's largest on-call fire department with employees who fight fire on about 12.7 million acres of non-federal (private, state and tribal) forest land. The DNR has the primary protection responsibilities on private and state forest land throughout Northeast Region in the State of Washington. The DNR may also respond to fires outside of DNR jurisdiction that threaten DNR protection. The DNR provides wildland fire prevention and regulation on private and state forestland. The DNR works cooperatively during suppression operations with the private sector, local protection entities, and other State and Federal agencies. The DNR does not provide formal EMT services. Most DNR employees have first-aid training and some, individually may have had EMT and/or first-responder training.

South Okanogan and Highlands Districts cooperate and share equipment, personnel and resources when initial attack resources are minimal.

The Northeast Region Interagency Communications Center (NEWICC) maintains lists of "call when needed" Faller Agreements and Dozer Agreements. Operators are equipped and trained for fire suppression throughout the local districts. Dozer sizes can range from D-4 to D-8.

DNR helicopter(s) are staged at the Omak Airport initially, and later at Colville throughout fire season for initial attack. The helicopter staged at the Omak Airport is usually a Bell 205 with helitack crew.

The Fire Boss (SEAT on pontoons) water scooper is generally staged at Deer Park.

The BIA SEAT has been available to DNR at the Omak Airport for initial attack during recent fire seasons.

Canadian air tankers and lead plane are requested for initial attack when needed.

The DNR South Okanogan District is located in the southwest quadrant of the Northeast Region of the State of Washington. The South Okanogan District spans more than 1,000,000 acres and is located geographically within the south half of Okanogan County. The district is comprised of private, county, state, federal and tribal property ownerships with numerous jurisdictions. Within the district there are approximately 250,000 acres of state land (including both WA DNR and WDFW managed lands), and approximately 300,000 acres of private land (including private lands within the Colville Reservation).

The Northeast Region Office is located in Colville, Washington. The South Okanogan District has 1 work center located at the Omak Airport. South Okanogan District Fire Control staff number 24 employees during the peak of fire season. Of which, 3 are permanent full time employees. The remaining 21 employees are comprised of 7 Natural Resource Worker 2 (NRW2), engine drivers and 14 firefighters. Employment duration for the 7 NRW2 positions is usually between mid-April and mid-October and employment duration for the firefighters is usually three months. South Okanogan District State Lands staff number 4 permanent employees who participate in the fire program as needed. DNR resources are neither trained nor equipped for structure suppression.

The South Okanogan District seasonally staffs 7 (4 - Type 6 and 3 - Type 5) 4X4 engines. The engines are usually staffed with a 3 person firefighting crew 5 days per week and are on offset schedules to provide 7 day a week coverage. Staffing levels vary as fire season begins and draws to an end. A strike team of engines are requested to assist the district with initial attack when "Red Flag" warnings are predicted.

The DNR Highlands District is located in the northwest quadrant of the Northeast Region of the State of Washington; and spans a 1,330,000 acre mosaic of ownerships and jurisdictions. Highlands District is located in the northern portions of both Okanogan and Ferry Counties; and is bordered on the north by Canada, on the south by the boundaries of the Colville Confederated Tribes, on the west by the foothills of the Cascade Range, and on the East by the Kettle Range. The district is comprised of private, county, state, federal and tribal ownerships with numerous jurisdictions and interests. Within Highlands district in Okanogan County there are about 178,711 acres of WA DNR managed land, about 25,811 acres of WDFD managed land and about 601,193 acres of private land. Highlands district also has about 26,785 acres of WA DNR managed land located in Ferry county. Topographic variations range from 900' to 8,000'. Uplands are a mixture of very rugged, often rocky slopes giving way to either rolling highlands or partially timbered rounded mountains.

The Highlands district fire program has one work center at Highlands Fire Camp (HFC), two miles south of Loomis. There is a memo of understanding with two Fire Protection Districts (Tonasket and Curlew) for minimal office use. Highlands state lands staff use a work center in downtown Loomis. The Highlands District Fire Control staff totals 43 individuals at the peak of fire season of which includes 3 permanent employees, 7 career-seasonal employees who work from about April to October, and 33 seasonal fire fighter employees on staff from roughly June to September. The Highlands 20 Person Hand Crew resides and trains at Highlands Fire Camp, until they are needed for fire response anywhere in the District, or

across the state. HFC also has a permanent Heli-spot and Fire Base Camp location. When needed, additional fire resources, such as Incident Management Teams and Strike Teams are brought in for peak workloads. Highlands State Lands staff has 8 additional staff that participate in the fire program when needed.

The Highlands District seasonally staffs six (five – Type 5 and one – Type 6) 4X4 Engines, with a three-person firefighting crew in each engine. Engine staffing is on a varied schedule that provides seven day per week coverage June through September. The DNR utilizes a “home guard” approach in that the seasonal engine drivers park their assigned engines at their residence within their assigned geographic area of the district. Supervisors also drive a type 7 4X4 Engine.

Inside the DNR Highlands District are portions of Ferry and Okanogan counties with two E-911 Dispatching Centers and Emergency Service Operations. Three incorporated cities; Oroville, Tonasket and Republic, all have WUI neighborhoods developing outside their city boundaries. Additionally six towns and numerous communities provide a multiplex of rural/urban interface neighborhoods developing in mountainous drainages within perennial fire ecology with a history of complex, costly wildfires.

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CHAPTER 4:

LOCAL & REGIONAL HAZARD PROFILES

IN THIS SECTION:

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- Earthquake Hazard Profile
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- Severe Weather Hazard Profile
- Wildland Fire Hazard Profile
- Volcano Hazard Profile
- Hazardous Materials Hazard Profile
- Pandemic Hazard Profile

CHAPTER 4 – LOCAL AND REGIONAL HAZARD PROFILES

FLOOD HAZARD PROFILE

DEFINITIONS

100-Year Floodplain: The 100-year flooding event is the flood having a one percent chance of being equaled or exceeded in magnitude in any given year. Contrary to popular belief, it is not a flood occurring once every 100 years. The 100-year floodplain is the area adjoining a river, stream, or watercourse covered by water in the event of a 100-year flood.

Base Flood Elevation (BFE): The term “Base Flood Elevation” refers to the elevation (normally measured in feet above sea level) that the base flood is expected to reach. Base flood elevations can be set at levels other than the 100-year flood. Some communities choose to use higher frequency flood events as their base flood elevation for certain activities, while using lower frequency events for others. For example, for the purpose of storm water management, a 25-year flood event might serve as the base flood elevation, while the 500-year flood event may serve as base flood elevation for the tie down of mobile homes. The regulations of the NFIP focus on development in the 100-year floodplain.

Community Rating System (CRS): A voluntary program within the NFIP that encourages and recognizes community floodplain management activities that exceed the minimum NFIP standards for local mitigation, outreach, and education. Under the CRS, flood insurance rates are adjusted to reflect the reduced flood risk resulting from community activities that reduce flood losses, facilitate accurate insurance rating, and promote the awareness of flood insurance.

Dam Failure Flooding: Loss of life and damage to structures, roads, utilities and crops may result from a dam failure. Economic losses can also result from a lowered tax base and lack of utility profits. These effects would certainly accompany the failure of one of the major dams affecting the Columbia, Snake, or Yakima rivers. Because dam failure can have severe consequences, FEMA requires that all dam owners develop Emergency Action Plans (EAP) for warning, evacuation, and post-flood actions. Although there may be coordination with municipal officials in the development of the EAP, the responsibility for developing potential flood inundation maps and facilitation of emergency response is the responsibility of the dam owner.

Development: For floodplain ordinance purposes, development is broadly defined to mean “any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation, or drilling operations located within the area of special flood hazard.” The definition of development for floodplain purposes is generally broader and includes more activities than the definition of development used in other sections of local land use ordinances.

Flood: An inundation of dry land with water caused by weather phenomena and events that deliver more precipitation to a drainage basin than can be readily adsorbed or stored within the basin.

Floodplain: A floodplain is a land area adjacent to a river, stream, lake, estuary, or other water body that is subject to flooding. This area, if left undisturbed, acts to store excess floodwater. The floodplain is made up of two sections: the floodway and the flood fringe.

Floodway: The floodway is one of two main sections that make up the floodplain. Floodways are defined for regulatory purposes. Unlike floodplains, floodways do not reflect a recognizable geologic feature. For National Flood Insurance Program (NFIP) purposes, floodways are defined as the channel of a river or stream, and the overbank areas adjacent to the channel. The floodway carries the bulk of the floodwater downstream and is usually the area where water velocities and forces are the greatest. NFIP regulations require that the floodway be kept open and free from development or other structures that would obstruct or divert flood flows onto other properties. The NFIP floodway definition is “the channel of a river or other watercourse and adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot.” Floodways are not mapped for all rivers and streams but are generally mapped in developed areas.

Flood Fringe: The flood fringe refers to the outer portions of the floodplain, beginning at the edge of the floodway and continuing outward. This is the area where development is most likely to occur, and where precautions to protect life and property need to be taken.

Flood Stage: A height at which a watercourse overtops its banks and begins to cause damage to any portion of the river valley.

Flood Warning: Issued by the National Weather Service when a hazardous flooding event is occurring, is imminent, or has a high probability of occurrence within 12 hours. A Flood Warning is issued for conditions posing a threat to life and/or property.

Flood Watch: Issued by the National Weather Service when the probability of a hazardous flooding event has increased significantly but its occurrence, location, or timing is still uncertain. The public can set their plans in motion to prepare for the event. A Flood Watch is issued from 12 to 36 hours before the occurrence of the event.

National Flood Insurance Program (NFIP): A Federal program enabling property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods. Participation in the NFIP is based on an agreement between local communities and the Federal Government which states if a community will adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas, the Federal Government will make flood insurance available within the community as a financial protection against flood losses.

Rill: A small stream.

Riverine Flooding: Riverine flooding is over-the-bank flooding of rivers and streams. The natural processes of riverine flooding add sediment and nutrients to fertile floodplain areas. Flooding in large river systems,

like the Columbia River, typically results from large-scale weather systems that generate prolonged rainfall over a wide geographic area, causing flooding in hundreds of smaller streams, which then drain into the major rivers. Shallow area flooding is a special type of riverine flooding. FEMA defines shallow flood hazards as areas that are inundated by the 100-year flood with flood depths of only one to three feet. These areas are generally flooded by low-velocity sheet flows of water.

Small-Stream Flooding: As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization of a watershed changes the hydrologic systems of the basin. Heavy rainfall collects and flows faster off roofs and on impervious concrete and asphalt surfaces. The water moves from the clouds to the ground and into streams at a much faster rate in developed areas, particularly in cities, and storm drains can clog from leaves and debris washing off streets. Adding these elements to local drainages can result in floodwaters that rise very rapidly. Rural towns and cities typically only have moderate concentrations of impermeable surfaces that either collect water or concentrate the flow of water in man-made channels, but it can be enough to cause local flooding. During periods of small-stream flooding, streets can become inundated and impassable, and basements can flood.

BACKGROUND INFORMATION

Floods have been a serious and costly natural hazard that have had and will continue to have a significant impact on people, property, and infrastructure in Washington. Floods damage roads, farmlands, and structures, often threatening and disrupting lives and businesses.

Simply put, flooding occurs when water leaves the river channels, lakes, ponds, and other confinements where we expect it to stay. Flood-related disasters occur when property and lives are impacted by flood waters. Local and regional weather, hydrology, landscape features, and human development are all factors that determine the frequency, severity, extent, and overall impact of flood hazards. Since 1956, 30 flood-related disaster declarations have been made for the state of Washington; every county has received at least one Presidential Disaster Declaration since 1970.

For decades, Washington has faced a nearly constant increase in the myriad costs associated with floods and flood damage. Since 1980, the State, federal, and local governments have invested millions of dollars to help the citizens of Washington recover from floods, repair flood-damaged public facilities, and fund measures to reduce or prevent future flood damage.

Although the effectiveness of emergency preparation, response, and recovery efforts has increased considerably over the years, the threat of recurrent damage and destruction resulting from floods continues to be a serious issue⁴¹.

⁴¹ Mitigation: Washington State Success Stories DR-1671-WA. <https://www.fema.gov/media-library-data/20130726-1622-20490-7464/successstoriesweb.pdf>

TYPES OF FLOODING

The 2018 Washington State Enhanced Hazard Mitigation Plan recognizes that flooding is one of the most common, damaging natural hazards in Washington. Floods can be divided into two major categories in eastern Washington: *riverine flooding and flash flooding*.

RIVERINE FLOODING

Riverine flooding affects entire watersheds, from rills to large rivers; these natural drainage basins are the systems that convey water runoff from rain and snowmelt. Riverine flooding occurs when the flow of runoff is greater than the carrying capacities of the natural drainage systems. Rainwater that is not absorbed by soil or vegetation seeks surface drainage lines following natural topography lines. These lines merge to form a hierarchical system of rills, creeks, streams and rivers. Generally, floods can be slow or fast rising depending on the size of the river or stream.

FLASH FLOODING

Flash floods are much more dangerous and flow much faster than riverine floods. Flash floods may have a higher velocity in a smaller area and will likely recede relatively quickly. Such floods are caused by the introduction of a large amount of water into a limited area (e.g., extreme precipitation events in watersheds less than 50 square miles), crest quickly (e.g., eight hours or less), and generally occur in hilly or otherwise confined terrain. Flash floods occur in both urban and rural settings, principally along smaller rivers and drainage ways that do not typically carry large amounts of water. This type of flood poses more significant safety risks because of the rapid onset, the high-water velocity, the potential for channel scour, and the debris load⁴². *There are three types of flash flooding:*

- Extreme precipitation and runoff events
- Inadequate urban drainage systems overwhelmed by small intense rainstorms
- Dam failures (discussed in more detail below)

Events that may lead to flash flooding include significant rainfall and/or snowmelt on frozen ground in the winter and early spring months, high intensity thunderstorms (usually during the summer months), and rainfall onto burned areas where high heat has caused the soil to become hydrophobic or water repellent which dramatically increases runoff and flash flood potential.

Flash floods from thunderstorms do not occur as frequently as those from general rain and snowmelt conditions but are far more severe. The onset of these flash floods varies from slow to very quick and is dependent on the intensity and duration of the precipitation and the soil types, vegetation, topography, and slope of the basin. When intensive rainfall occurs immediately above developed areas, the flooding may occur in a matter of minutes. Sandy soils and sparse vegetation, especially recently burned areas, are conducive to flash flooding. Mountainous areas are especially susceptible to damaging flash floods,

⁴² Statewide Regional Evacuation Study Program. Central Florida Region Technical Data Report. Volume 1-7, Chapter II – Regional Hazards Analysis. Available online at <http://www.cfrpc.org/EVACUATION%20MASTER%20DVD%20-%20PDF%20VERSION/VOLUME%201/Chapter%202/CFRPC%20Chapter%20II%20-%20Hazards%20Analysis.pdf>.

as steep topography may stall thunderstorms in a limited area and may also funnel runoff into narrow canyons, intensifying flow. A flash flood can, however, occur on any terrain when extreme amounts of precipitation accumulate more rapidly than the terrain can allow runoff. Flash floods are most common in Washington during the spring and summer months due to thunderstorm activity.

ICE AND DEBRIS JAMS

Occasionally, floating ice or debris can accumulate at a natural or man-made obstruction and restrict the flow of water. Ice and debris jams can result in two types of flooding:

- Water held back by the ice jam or debris dam can cause flooding upstream, inundating a large area and often depositing ice or other debris which remains after the waters have receded. This inundation may occur well outside of the normal floodplain.
- High velocity flooding can occur downstream when the jam breaks. These flood waters can have additional destructive potential due to the ice and debris load that they may carry⁴³.

Flooding from ice or debris jams is a relatively common phenomenon in north central Washington, and in Okanogan County specifically. Small jams can occur in many of the streams throughout Okanogan County, particularly at bridge abutments and culverts; however, these jams rarely cause significant damage or flooding.

DAM FAILURE

Dam failures also pose a potential flood hazard. A dam failure is the structural collapse of a dam that releases the water stored in the reservoir behind the dam. A dam failure is usually the result of the age of the structure, inadequate spillway capacity, or structural damage caused by an earthquake or flood. The sudden release of water has the potential to cause human casualties, economic loss, and environmental damage. This type of disaster is dangerous because it can occur rapidly, providing little warning and evacuation time for people living downstream. The flows resulting from dam failure generally are much larger than the capacity of downstream channels causing extensive flooding. Flood damage occurs because of the momentum of the flood waters, the sediment load carried by flood waters, flooding over channel banks, and impact of debris carried by the flow.

LOCAL HYDROLOGICAL CHARACTERISTICS

The major source of flood waters in Okanogan County is normal spring snow melt. As spring melt is a “natural” condition; the stream channel is defined by the features established during the average spring high flow (bank-full width). Small flow peaks exceeding this level and the stream’s occupation of the floodplain are common events. The magnitude of most floods in Okanogan County depend on the particular combinations of intensity and duration of rainfall, pre-existing soil conditions, area of a basin, elevation of the rain or snow level, and amount of snowpack. Man-made changes to a basin also can affect the size of floods. Although floods can happen at any time during the year, there are typical

⁴³ Barnhill, Dave, et al. “Flash Floods – How do they occur?”. [Waterlines](#). Division of Water, Indiana Department of Natural Resources. Spring-Summer 1999. Indianapolis, Indiana.

seasonal patterns for flooding in central Washington, based on the variety of natural processes that cause floods:

- Heavy rainfall on wet or frozen ground, before a snowpack has accumulated, typically cause fall and early winter floods
- Rainfall combined with melting of the low elevation snowpack typically cause winter and early spring floods
- Late spring floods in Okanogan County result primarily from melting of the snowpack
- Summer flash floods are caused by thunderstorms⁴⁴

BASE FLOODING

The most commonly reported flood magnitude measure is the “base flood.” This is the magnitude of a flood having a one-percent chance of being equaled or exceeded in any given year. Although unlikely, “base floods” can occur in any year, even successive ones. This magnitude is also commonly referred to as the “100-year Flood” or “Regulatory Flood”. Floods are usually described in terms of their statistical frequency. A “100-year flood” or “100-year floodplain” describes an event or an area subject to a 1% probability of a certain size flood occurring in any given year. This concept does not mean such a flood will occur only once in one hundred years. Whether or not it occurs in a given year has no bearing on the fact that there is still a 1% chance of a similar occurrence in the following year. Since floodplains can be mapped, the boundary of the 100-year flood is commonly used in floodplain mitigation programs to identify areas where the risk of flooding is significant. Any other statistical frequency of a flood event may be chosen depending on the degree of risk that is selected for evaluation, e.g., 5-year, 20-year, 50-year, 500-year floodplain.

The areas adjacent to the channel that normally carry water are referred to as the floodplain. In practical terms, the floodplain is the area that is inundated by flood waters. In regulatory terms, the floodplain is the area that is under the control of floodplain regulations and programs (such as the National Flood Insurance Program which publishes the FIRM maps). The floodplain is often defined as:

“That land that has been or may be covered by floodwaters, or is surrounded by floodwater and inaccessible, during the occurrence of the regulatory flood.”⁴⁵

PRECIPITATION AND RUNOFF

Winter weather conditions are the main driving force in determining where and when base floods will occur. The type of precipitation that a winter storm produces is dependent on the vertical temperature

⁴⁴ Kresch, David and Karen Dinicola. “What Causes Floods in Washington State”. Fact Sheet 228-96. U.S. Geological Survey. Tacoma, Washington.

⁴⁵ FEMA. Federal Emergency Management Agency. National Flood Insurance Program. Washington D.C. Available online at www.fema.gov.

profile of the atmosphere over a given area⁴⁶. Unusually heavy snowpack or unusual spring temperature regimes (e.g., prolonged warmth) may result in the generation of runoff volumes significantly greater than can be conveyed by the confines of the stream and river channels. Such floods are often the ones that lead to widespread damage and disasters. Floods caused by spring snow melt tend to last for a period of several days to several weeks, longer than the floods caused by other meteorological sources.

Floods that result from rainfall on frozen ground in the winter, or rainfall associated with a warm, regional frontal system that rapidly melts snow at low and intermediate altitudes (rain-on-snow) can be the most severe. Both of these situations quickly introduce large quantities of water into the stream channel system, easily overloading its capacity.

On small drainages, the most severe floods are usually a result of rainfall on frozen ground; however, moderate quantities of warm rainfall on a snowpack, especially for one or more days, can also result in rapid runoff and flooding in streams and small rivers. Although meteorological conditions favorable for short-duration warm rainfall are common, conditions for long-duration warm rainfall are relatively rare. Occasionally, however, the polar front becomes situated along a line from Hawaii through Oregon, and warm, moist, unstable air moves into the region.

The nature and extent of a flood event is the result of the hydrologic response of the landscape. Factors that affect this hydrologic response include soil texture and permeability, land cover and vegetation, land use and land management practices. Precipitation and snow melt, known collectively as runoff, follow one of three paths, or a combination of these paths, from the point of origin to a stream or depression: overland flow, shallow subsurface flow, or deep subsurface (“ground water”) flow. Each of these paths delivers water in differing quantities and rates. The character of the landscape will influence the relative allocation of the runoff and will, accordingly, affect the hydrologic response.

MITIGATION AND DEVELOPMENT

Unlike precipitation and ice formation, steps can be taken to mitigate flooding through manipulation or maintenance of the floodplain. Insufficient natural water storage capacity and changes to the landscape can be offset through water storage and conveyance systems that run the gamut from highly engineered structures to constructed wetlands. Careful planning of land use can build on the natural strengths of the hydrologic response. Re-vegetation of burned slopes diverts overland flow (fast and flood producing) to subsurface flow (slower and flood moderating).

The failure to recognize or acknowledge the extent of the natural hydrologic forces in an area has led to development and occupation of areas that can clearly be expected to flood on a regular basis. Despite this, communities are often surprised when the stream leaves its channel to occupy its floodplain. A past reliance on structural means to control floodwaters and “reclaim” portions of the floodplain has also contributed to inappropriate development and continued flood-related damages.

⁴⁶ “Snowstorms”. Rampo College. Resource Section for Meteorology. Available online at http://mset.rst2.edu/portfolios/k/khanna_n/meteorology/snowstorms.htm. October 2006.

Development in or near floodplains increases the likelihood of flood damage. New developments near a floodplain add structures and people in flood areas thereby increasing, not the extent of the flood itself, but the impacts or damages that may be caused. New construction can also alter surface water flows by diverting water to new courses or increasing the amount of water that runs off impervious pavement and roof surfaces. This second effect diverts waters to places previously unaffected by flood issues. Unlike the weather and the landscape, this flood-contributing factor can be controlled. Development and occupation of the floodplain places individuals and property at risk. Such use can also increase the probability and severity of flood events (and consequent damage) downstream by reducing the water storage capacity of the floodplain, or by pushing the water further from the channel or in larger quantities downstream⁴⁷.

SECOND ORDER HAZARD EVENTS

With the exception of dam failure, flood events are typically caused by severe weather events such as thunderstorms or rapid spring runoff. Okanogan County has a relatively low risk of major flood damages; however, flood events can trigger other types of hazard events that may be more damaging than the flood itself. The following chart outlines the interconnection between flood and other types of hazard events.

Table 66) Second-order hazards related to flood events.

Related Causal Events	Related Effects
Severe Weather	Landslide
Dam Failure	Dam Failure
	Transportation Systems
	Infectious Disease/Epidemic/Pandemic
	Crop Loss
	Hazardous Materials
	Power Outage

⁴⁷ Planning and Flood Risk. Planning Policy Statement 15. The Planning Service, Department of Environment. June 2006. Available online at http://www.planningni.gov.uk/index/policy/policy_publications/planning_statements/pps15-flood-risk.pdf.

EARTHQUAKE HAZARD PROFILE

DEFINITIONS

Amplification: increased ground shaking that occurs where earthquake waves pass from hard bedrock into softer geologic materials such as loose or poorly cemented sediments or soil. Buildings constructed on soft material will typically see more damage than buildings on hard or very firm material.

Earthquake: waves of energy moving rapidly through the earth and along the earth's surface (seismic waves), resulting in ground shaking. Earthquakes are generated by a sudden rupture and displacement of the earth's crust that typically occurs along a fault. Volcanic or magmatic activity, or other sudden stress changes in the earth's crust, can also cause earthquakes.

Fault: a crack or fracture in the earth's brittle crust where relative movement has occurred between the two sides. Movement (also called displacement) can be down on one side with respect to the other (a *normal fault*); up on one side with respect to the other (a *reverse fault*, also called a *thrust fault* when the fault plane dip angle is less than 45 degrees); or, horizontal sliding (right or left) of one side with respect to the other (a *strike-slip fault*). Normal faults typically form where the earth's crust is being extended (pulled apart); reverse and thrust faults form where the earth's crust is being compressed (pushed together); and strike-slip faults occur where the earth's crust is being horizontally pulled or pushed in opposite directions. Some faults are actually boundaries between tectonic plates (*interplate faults*); *subduction zones* are interplate thrust faults, and *transform faults* are interplate strike-slip faults. Faults contained within a single tectonic plate are called *intraplate faults*.

Ground Shaking: the motion felt on the earth's surface in response to passage of earthquake seismic waves. It is the primary cause of earthquake damage. The extent of damage depends on the duration and strength, or intensity, of ground shaking. The duration of shaking is a function earthquake magnitude and distance from the source of the earthquake. Intensity of ground-shaking depends on the magnitude of the earthquake, the type of fault, distance from the epicenter (the point on the ground surface above where the earthquake originates), and depth within the earth of the source of the earthquake waves. Ground shaking intensity generally decreases with distance from the earthquake source due to loss of wave energy during travel ("attenuation"), but shaking can be intensified locally, relative to adjacent areas, by amplification in soft substrates (see below). The Modified Mercalli Intensity (MMI) scale measures seismic ground-shaking intensity during an earthquake at a specified location; the scale ranges from 1 to 10 but is shown with Roman numerals. *Moderate intensity ground shaking* (MMI = V) can stop pendulum clocks, break dishes and windows, and overturn unstable objects. *Strong ground shaking* (MMI = VI) can move some heavy furniture and cause plaster to fall; damage to some buildings is slight. *Very strong ground shaking* (MMI = VII) can cause considerable damage in poorly built or badly designed structures and cause some chimneys to break or collapse; damage is slight to moderate in well-built ordinary structures, and negligible in buildings of good design and construction.

Liquefaction: occurs when water-saturated sands, silts, or (less commonly) gravels are shaken so violently that the sediment grains rearrange, causing the sediment to lose strength and to essentially turn into

quicksand. Buildings can tilt or sink into the ground, and lateral spreading of the ground can produce large fissures. Liquefaction is common during earthquakes in ground built up by artificial fill (dredge spoils) adjacent to bodies of water.

Richter Magnitude Scale: The Richter magnitude scale measures the amount of energy released by an earthquake and was developed in 1935 by Charles F. Richter as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Magnitude is expressed in whole numbers and decimal fractions from 0-10. For example, a magnitude 5.3 (M5.3) might be computed for a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3 (M6.3). Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

Seiche: The up and down movement of the water surface (a standing wave) in a bay or lake (like water sloshing in a bathtub) that can be caused by earthquakes, wind, tides, and changes in atmospheric pressure.

BACKGROUND INFORMATION

An earthquake is trembling of the ground resulting from the sudden shifting of rock beneath the earth's crust. Earthquakes may cause landslides and rupture dams. Severe earthquakes destroy power and telephone lines, gas, sewer, or water mains, which, in turn, may set off fires and/or hinder firefighting or rescue efforts. Earthquakes also may cause buildings and bridges to collapse.

By far, earthquakes pose the largest single natural hazard, in terms of exposure, faced by Washington. They may affect large areas, cause great damage to structures, cause injury, loss of life and alter the socioeconomic functioning of the communities involved. The hazard of earthquakes varies from place to place, dependent upon the regional and local geology.

EARTHQUAKE CHARACTERISTICS

Earthquakes occur along faults, which are fractures or fracture zones in the earth across which there may be relative motion. If the rocks across a fault are forced to slide past one another, they do so in a *stick-slip* fashion; that is, they accumulate strain energy for centuries or millennia, then release it almost instantaneously. The energy released radiates outward from the source, or focus, as a series of waves – a phenomenon known as an earthquake. The primary hazards presented by earthquakes are groundbreaking (as the rocks slide past one another) and ground shaking caused by seismic waves. Secondary earthquake hazards result from distortion of the surface materials such as water, soil, or structures.

Ground shaking may affect areas 65 miles or more from the epicenter (the point on the ground surface above the focus). As such, it is the most significant threat presented by an earthquake. Ground shaking from earthquakes can collapse buildings and bridges; disrupt gas, electric, and phone service; and

sometimes trigger landslides, avalanches, flash floods, fires, and create huge, destructive waves called tsunamis (when they occur in the ocean) and seiches (when they occur in inland bodies of water). Ground shaking can change the mechanical properties of some fine grained, saturated soils, whereupon they liquefy and act as a fluid (liquefaction). The dramatic reduction in bearing strength of such soils can cause buried utilities to rupture and otherwise undamaged buildings to collapse. Buildings with foundations resting on unconsolidated landfill and other unstable soil, or trailers and homes not tied to their foundations, are at risk because they can be shaken off their mountings during an earthquake.

Weakened buildings can be further damaged or destroyed by aftershocks which are smaller earthquakes that follow the main shock. Aftershocks can occur in the first hours, days, weeks, or even months after the quake. Some earthquakes are actually foreshocks, and a larger earthquake might occur afterwards.

When an earthquake occurs in a populated area, it may cause deaths and injuries and extensive property damage. Ground movement during an earthquake is seldom the direct cause of death or injury. Most earthquake-related injuries result from collapsing walls, flying glass, and falling objects as a result of the ground shaking, or people trying to move more than a few feet during the shaking.⁴⁸

To help forecast future earthquake activity, geologists attempt to locate faults and determine which are active and inactive. This helps identify where the greatest earthquake potential exists. Many faults mapped by geologists, are inactive and have little earthquake potential; others are active and have a higher earthquake potential.

REGIONAL EARTHQUAKE THREAT

Earth scientists believe that most earthquakes are caused by slow movements inside the Earth that push against the Earth's brittle, relatively thin outer layer, causing the rocks to break suddenly. This outer layer is fragmented into a number of pieces, called plates. Most earthquakes occur at the boundaries of these plates.

In Washington, the small Juan de Fuca plate off the coast of Washington, Oregon, and northern California is slowly moving eastward beneath a much larger plate that includes both the North American continent and the land beneath part of the Atlantic Ocean. Plate motions in the Pacific Northwest result in shallow earthquakes widely distributed over Washington and deep earthquakes in the western parts of Washington and Oregon. The movement of the Juan de Fuca plate beneath the North America plate is, in many respects, similar to the movements of plates in South America, Mexico, Japan, and Alaska, where the world's largest earthquakes occur.⁴⁹

⁴⁸ FEMA. Federal Emergency Management Agency. Available online at www.fema.gov. September 2007.

⁴⁹ Noson, Linda, Anthony Qamar, and Gerald Thorsen. "Washington State Earthquake Hazards". Pacific Northwest Earthquake Information. Available online at http://www.pnsn.org/INFO_GENERAL/NQT/summary.html.

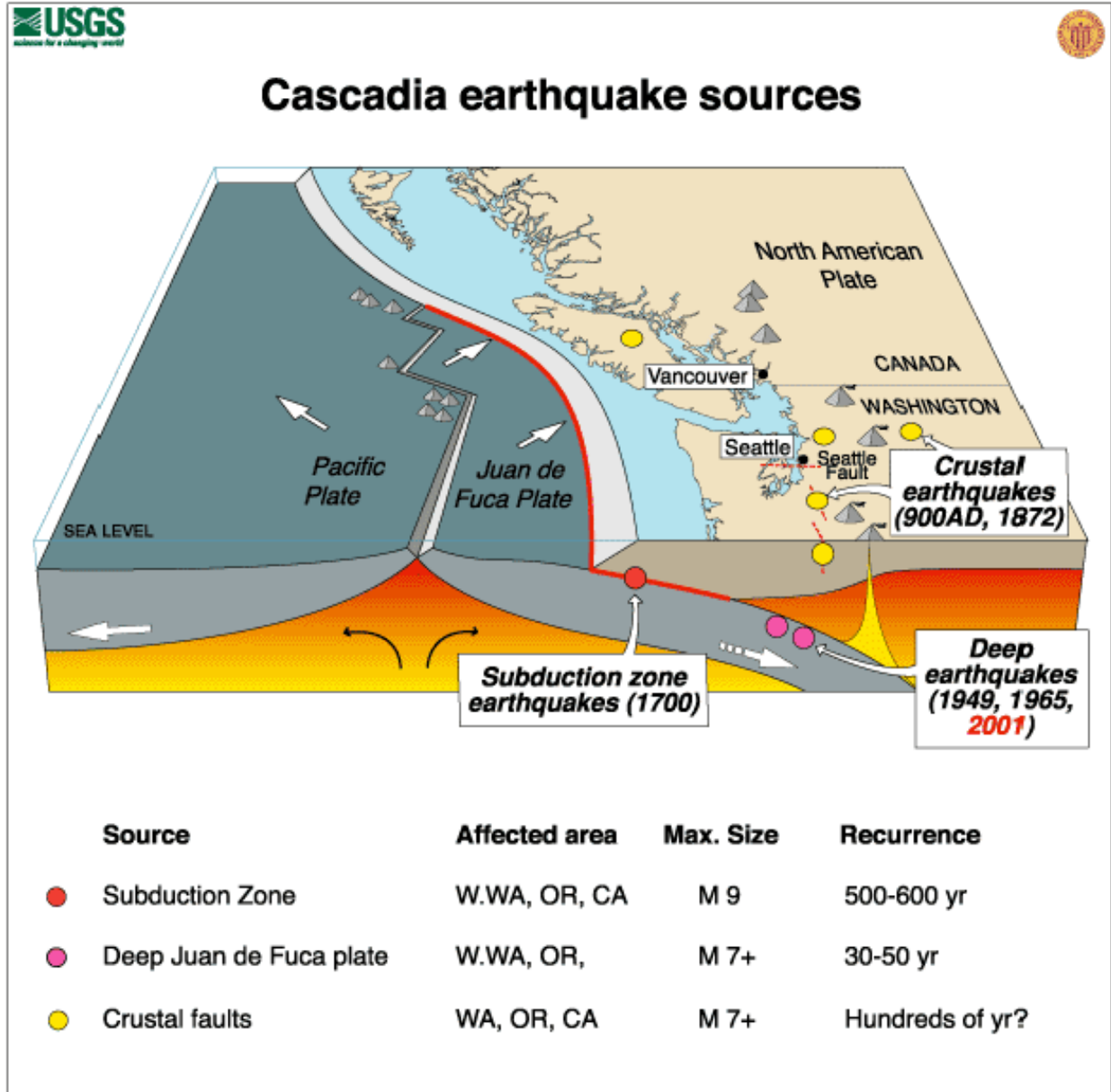


Figure 5) Diagram of tectonic plate subduction zone along the Pacific Coast.

The following is a summary of the three sources, as described above, capable of producing earthquakes in the Pacific northwest. All three sources are capable of producing earthquakes that can cause damage ranging from light to severe; these locations can also be seen in Figure 5:

- **Deep Earthquakes:** Occur beneath the Puget Sound; they have caused damage in the Seattle and Olympia areas.
- **Crustal Earthquakes:** Shallow faults can cause intense local shaking – urban areas are especially vulnerable

- **Subduction Zone Earthquakes:** An offshore subduction zone fault can cause strong shaking across the entire region.⁵⁰

The next large earthquake expected to occur in the Pacific Northwest is a shallow subduction-style earthquake similar to some destructive earthquakes in Alaska and Mexico, which had magnitudes greater than 8.0. An earthquake this large would be expected to occur along the coast of Washington or Oregon. Although we have no record of such large earthquakes in the Pacific Northwest within the last 150 years, some scientists believe that rocks and sediments exposed along the coasts of Washington and Oregon show evidence that as many as eight such earthquakes have occurred in the last several thousand years. This evidence indicates an average interval of time of several hundred years between subduction earthquakes. A magnitude 8.0 subduction earthquake would not only cause widespread dangerous ground shaking but would also likely produce water waves capable of inundating coastal areas in a matter of minutes.

The largest earthquake reported in Washington did not occur in the Puget Sound region, but rather at a shallow depth under the North Cascade Mountains. Recent studies in the southern Cascades near Mount St. Helens indicate that other areas in the Cascades may produce large, shallow earthquakes, comparable in size to the 1949 and 1965 Puget Sound earthquakes. The average interval of time between occurrences of such earthquakes in the Cascade Mountains is uncertain because they have occurred infrequently.⁵¹

More than 1,000 earthquakes are recorded in Washington each year with a dozen or more producing significant shaking or damage (Figure 6). Although we cannot predict precisely where, when, and how large the next destructive earthquake will be, seismological and geological evidence supports several possibilities. Large earthquakes reported historically in Washington have most frequently occurred deep beneath the Puget Sound region. The most recent and best documented of these were the 1949 Olympia earthquake and the 1965 Seattle-Tacoma earthquakes that killed 15 people and caused more than \$200 million (1984 dollars) property damage. The pattern of earthquake occurrence observed in Washington so far indicates that large earthquakes similar to the 1965 Seattle-Tacoma earthquake are likely to occur about every 35 years and large earthquakes similar to the 1949 Olympia earthquake about every 110 years.

MEASURING EARTHQUAKES

Earthquakes are measured in two ways. One determines the power, the other describes the physical effects. Magnitude is calculated by seismologists from the relative size of seismograph tracings. This measurement has been named the Richter scale, a numerical gauge of earthquake energy ranging from 1.0 (very weak) to 9.0 (very strong). The Richter scale is most useful to scientists who compare the power in earthquakes. Magnitude is less useful to disaster planners and citizens, because power does not

⁵⁰ USGS. "Earthquake Hazards in Washington and Oregon Three Source Zones." U.S. Geological Survey. The Pacific Northwest Seismic Network. Available online at <http://www.geophys.washington.edu/SEIS/PNSN/>. August 2008.

⁵¹ Noson, Linda, Anthony Qamar, and Gerald Thorsen. "Washington State Earthquake Hazards". Pacific Northwest Earthquake Information. Available online at http://www.pnsn.org/INFO_GENERAL/NQT/summary.html.

describe and classify the damage an earthquake can cause. The damage we see from earthquake shaking is due to several factors like distance from the epicenter and local rock types. Intensity defines a more useful measure of earthquake shaking for any one location. It is represented by the modified Mercalli scale. On the Mercalli scale, a value of I is the least intense motion and XII is the greatest ground shaking. Unlike magnitude, intensity can vary from place to place. In addition, intensity is not measured by machines. It is evaluated and categorized from people's reactions to events and the visible damage to man-made structures. Intensity is more useful to planners and communities because it can reasonably predict the effects of violent shaking for a local area.

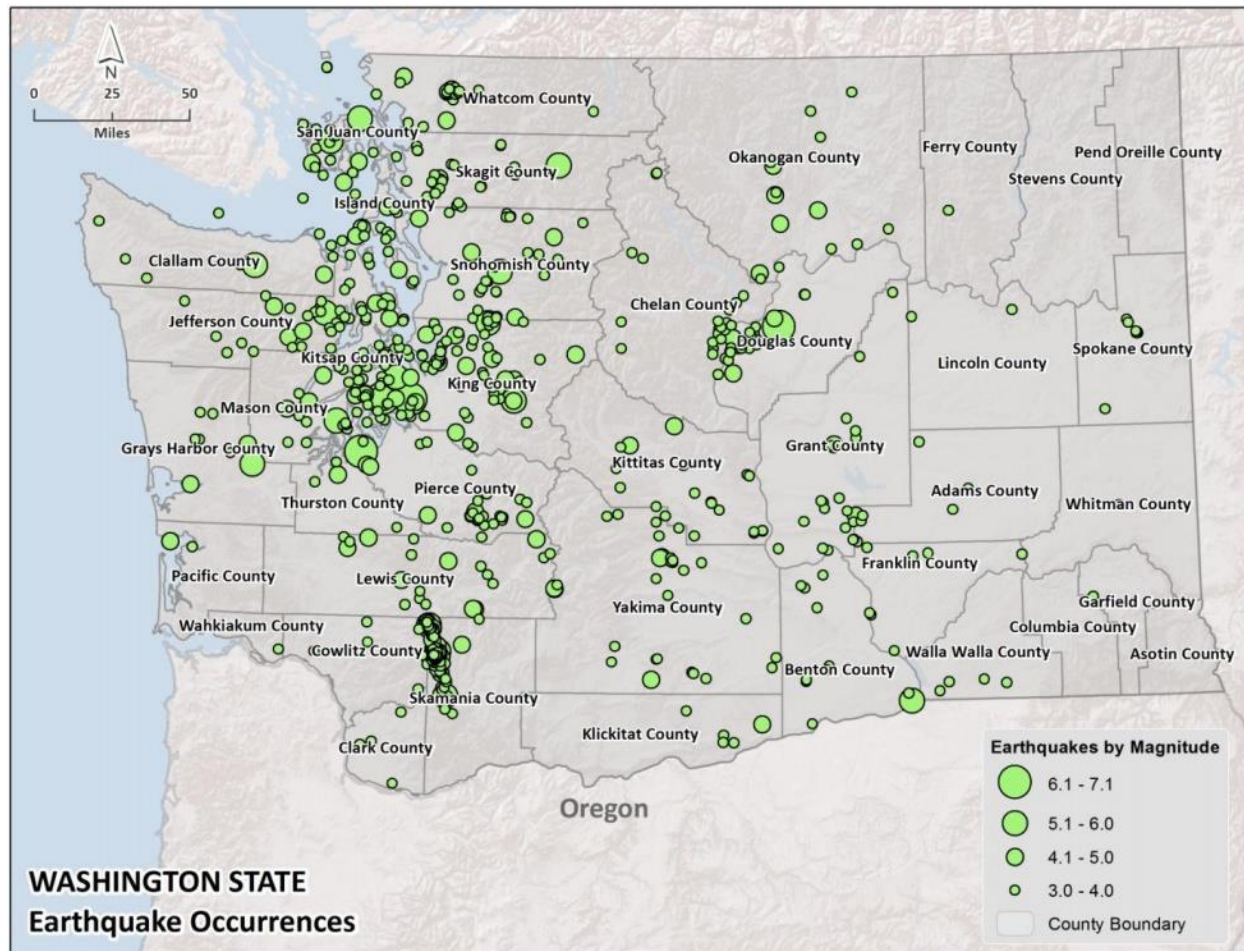


Figure 6) Historic earthquake epicenters with magnitudes of 3.0 or greater (1872-2011).

The U.S. Geological Survey has gathered data and produced maps of the nation, depicting earthquake shaking hazards. This information is essential for creating and updating seismic design provisions of building codes in the United States. The USGS Shaking Hazard maps for the United States are based on current information about the rate at which earthquakes occur in different areas and on how far strong shaking extends from quake sources. The values shown on the map are "peak ground acceleration (PGA) in percent of g with 2% probability of exceedance in 50 years". Therefore, the map represents longer-term likelihood of ground accelerations. The "2% probability of exceedance in 50 years" refers to the fact

that earthquakes are somewhat random in occurrence. One cannot predict exactly whether an earthquake of a given size will or will not occur in the next 50 years. The map takes the random nature of earthquakes into account. It was constructed so that there is a 2% chance (2 chances in 100) that the ground acceleration values shown on the map will be exceeded in a 50-year time period. This map is based on seismic activity and fault-slip rates and takes into account the frequency of occurrence of earthquakes of various magnitudes.⁵² Locally, this hazard may be greater than that shown, because site geology may amplify ground motions.

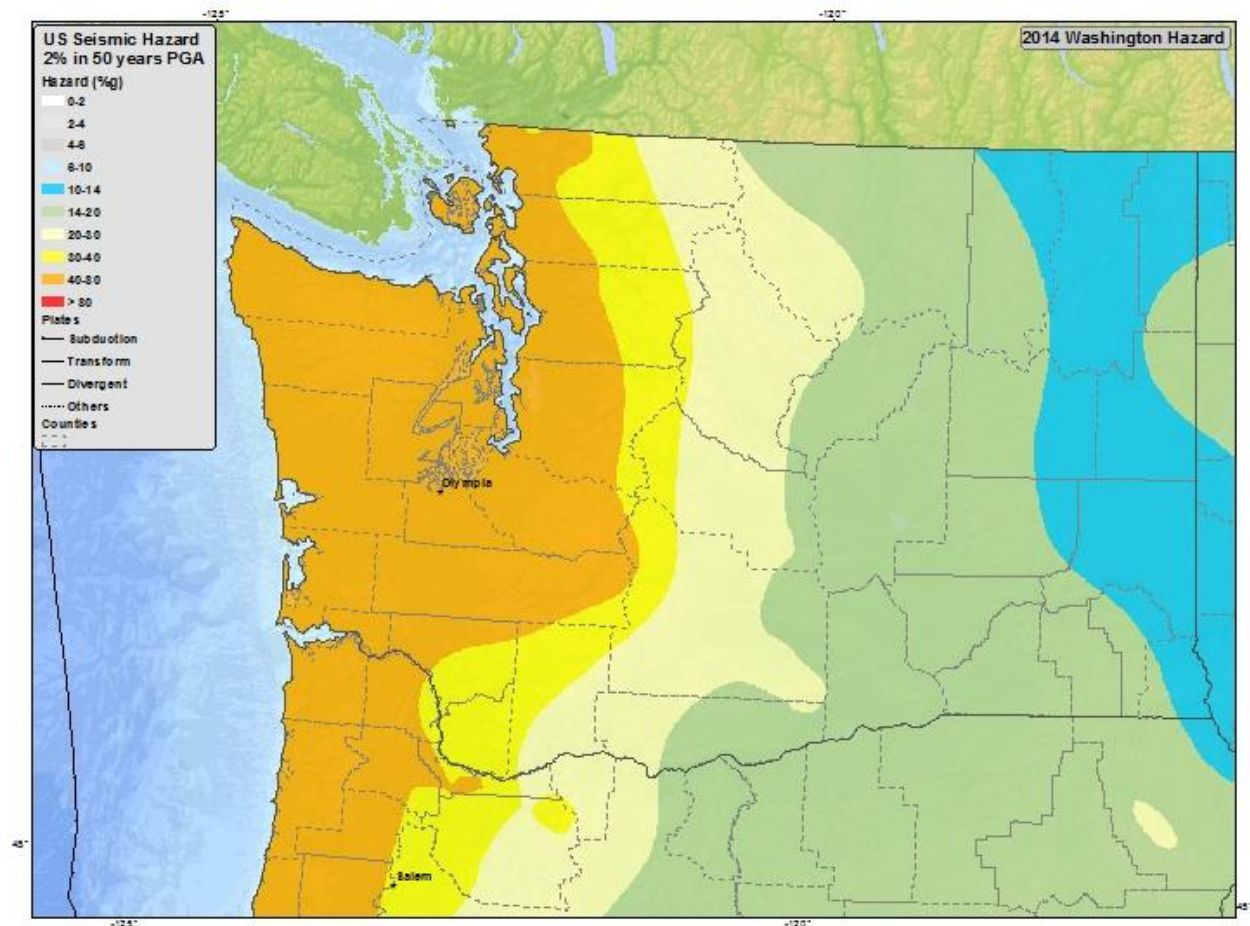


Figure 7) USGS 2014 Seismic Hazard Map of Washington⁵³

BUILDING CODES AND STRUCTURE DAMAGE

Earthquake damage is primarily caused by ground shaking. However, wood frame houses, well attached to their foundations and built on firm ground, generally sustain little structural damage during earthquakes. In contrast, unreinforced brick buildings commonly suffer severe damage. Ground shaking may also displace and distort the non-structural parts of a building including windows, ceiling tiles,

⁵² <http://earthquake.usgs.gov/hazards/products/conterminous/2008/maps/wus/pacnw/PGA.Wash.jpg>. June 2013.

⁵³ <https://www.usgs.gov/media/images/2014-seismic-hazard-map-washington>. April 2020.

partitions and furniture-producing property damage and endangering life. Other hazards, such as ground liquefaction, are commonly triggered by strong ground shaking.

The International Building Code (IBC), a nationwide industry standard, sets construction standards for different seismic zones in the nation. IBC seismic zone rankings for Washington are among the highest in the nation. When structures are built to these standards, they have a better chance to withstand earthquakes.

Structures that are in compliance with the 1970 Uniform Building Codes (UBC), which are now replaced by the International Building Code, are generally less vulnerable to seismic damages because that was when the UBC started including seismic construction standards to be applied based on regional location. This stipulated that all structures be constructed to at least seismic risk Zone 2 Standards. The State of Washington adopted the UBC as its state building code in 1972, so it is assumed that buildings built after that date were built in conformance with UBC seismic standards and have a lesser degree of vulnerability. Obviously, issues such as code enforcement and code compliance are factors that could impact this assumption. However, for planning purposes, establishing this line of demarcation can be an effective tool for estimating vulnerability. In 1994, seismic risk Zone 3 Standards of the UBC went into effect in Washington, requiring all new construction to be capable of withstanding the effects of 0.3 times the force of gravity. More recent housing stock is in compliance with Zone 3 standards. In 2009, the state again upgraded the building code to follow International Building Code Standards.

The Washington State Legislature has also adopted the 2015 version of the International Residential Code as the official state building code starting on July 1, 2016. The 2015 IRC governs the new construction of detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories in height with separate means of egress. Provisions in the 2015 IRC for earthquake structural and foundation design are determined by the seismic design category of a proposed structure.⁵⁴

Future injuries and property losses from earthquake hazards can be reduced by considering these hazards when making decisions about land use, by designing structures that can undergo ground shaking without collapse, by securely attaching the non-structural elements of a building, and by educating the public about what to do before, during, and after an earthquake to protect life and property.⁵⁵

⁵⁴ Washington State Building Code. 2015. International Residential Code. State Building Code Council. Available online at: <https://sbcc.wa.gov/state-codes-regulations-guidelines>. Accessed April 2020

⁵⁵ Noson, Linda Lawrance, et al. Washington State Earthquake Hazards. Washington Division of Geology and Earth Resources Information Circular 85. Olympia, Washington. 1988.

SECOND-ORDER HAZARD EVENTS

Earthquakes events can result in other types of hazard incidents. In a disaster event, the first hazard event may not be the primary cause of damages or losses within the community. Historical earthquake events have often resulted in structural fires due to broken gas lines, candles, electrical malfunctions, etc. The following chart outlines the interconnection between earthquake hazards and other types of hazard events.

Table 67) Second-Order Hazards Related to Earthquake Events.

Related Causal Events	Related Effects
None	Dam Failure
	Structural/Urban Fire
	Wildland Fire
	Transportation Systems
	Hazardous Materials
	Landslide
	Seiche
	Volcano
	Power Outage

LANDSLIDE HAZARD PROFILE

DEFINITIONS

Refer to Figure 8 for diagrams of the italicized terms in the following definitions. Figure 9 is a more detailed diagram of the “anatomy” of a rotational landslide with commonly used terminology.

Slide: A slide is a downslope movement of soil or rock mass occurring dominantly along a failure surface—a distinct surface of rupture or a relatively thin zone of intense shear strain. Slide failure surfaces are usually slope-parallel (typical of shallow slides) or concave (typical of deep-seated slides).

Shallow slides: Shallow landslides typically are less than 5 to 10 m thick, depending on the material on the slope, have slope-parallel or spoon-shaped failure surfaces, and involve only the uppermost layer of unconsolidated material on the slope, usually only the soil. Shallow slides can be triggered quickly during intense rainstorms, commonly when the rainfall is most intense, and their failure planes typically occur at interfaces between relatively permeable material above and relatively impermeable material below. Shallow slides of earth material typically move rapidly (meters per second) and commonly transform almost instantaneously to *debris flows*. Shallow slides generally involve relatively small volumes of material (hundreds to thousands of cubic meters).

Deep-seated slides: Deep-seated landslides commonly have failure planes that are strongly concave and involve material deeper than the surface soil layer. In these cases, the slide material generally rotates backward (into the slope) as failure occurs—a *slump*. In other cases, the deep failure plane can be more or less slope-parallel—a *translational slide*, *block slide*, or *lateral spread*. Deep-seated slides typically move slowly (<1 m/day), although under certain conditions, movement can accelerate to meters per second. Volumes are commonly large, tens to hundreds of thousands of cubic meters. Because failure planes are deep, and infiltration of rainwater is slow, deep-seated landslides rarely move in response to a single intense rainstorm. Instead, deep-seated slides more commonly move in response to the cumulative effect of many rainstorms.

Flow: Flow involves the spatially continuous downslope movement of earth material in a form resembling a highly viscous fluid. Shear within the moving mass is not confined to a thin zone of shear at the base, but rather distributed well up into the moving mass. *Earthflows* are relatively dry, deep-seated, slowly moving (meters per day) types of flows. *Debris flows* are water-saturated and rapidly moving (meters per second) types of flows. *Debris avalanches* are rapid but unsaturated flows of soil and rock debris.

Fall: A fall of rock or earth material starts with the detachment from a steep slope along a surface on which little or no shear displacement takes place. The material then descends mainly through the air by falling, bouncing, or rolling. Falls are common along steep road cuts.

Topple: Toppling is the forward or outward rotation of a mass of soil or rock away from the slope. Toppling is sometimes driven by gravity exerted by material upslope of the displaced mass and sometimes by ice formation in vertical cracks in rock slopes.

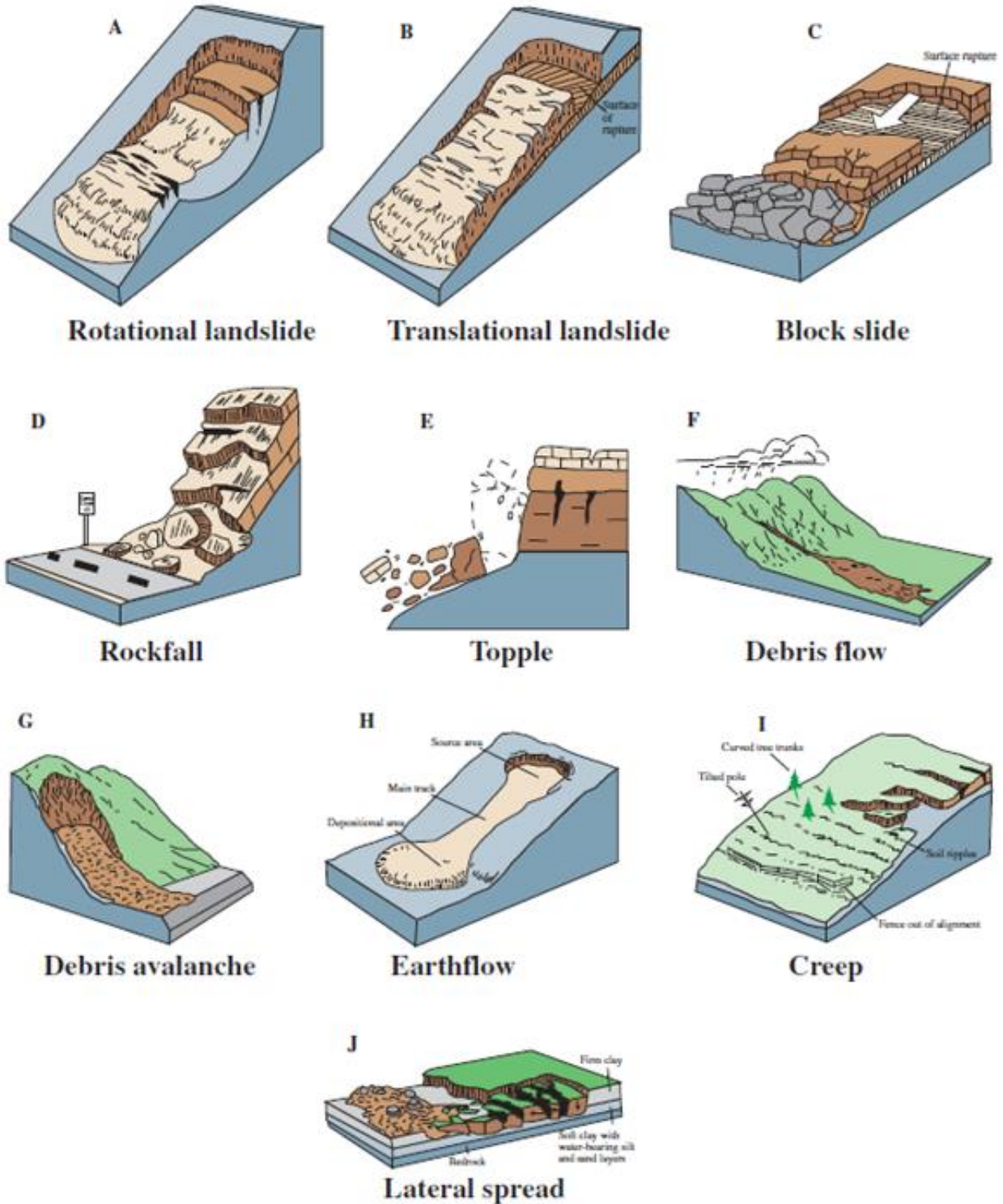


Figure 8) Classification of landslide types and processes⁵⁶

⁵⁶ United States Geological Survey: <https://pubs.usgs.gov/fs/2004/3072/fs-2004-3072.html>

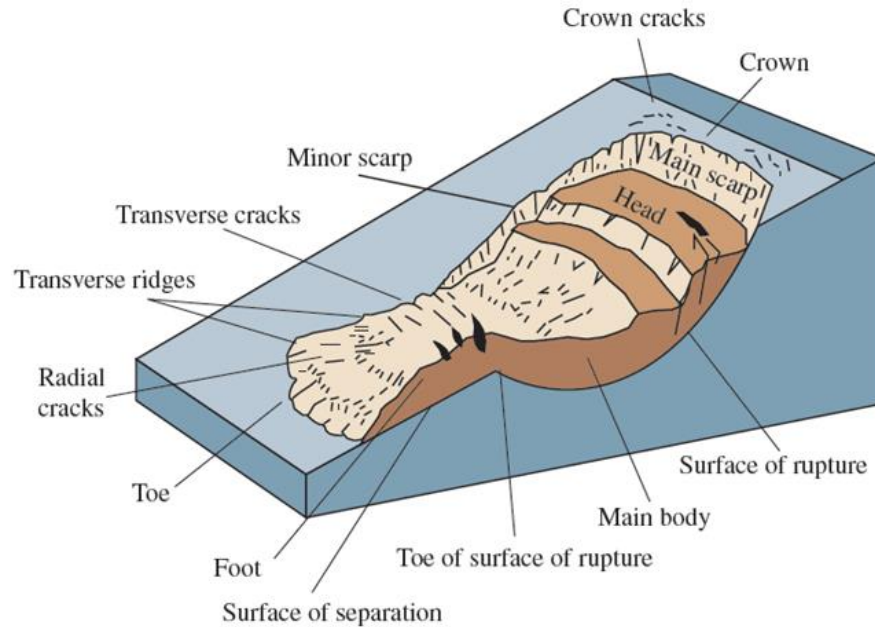


Figure 9) An idealized rotational landslide with commonly used terms for various features⁵⁷.

BACKGROUND INFORMATION

Landslide is a general term for a wide variety of down slope movements of earth materials that result in the perceptible downward and outward movement of soil, rock, and vegetation under the influence of gravity. The debris from a landslide can exhibit different types of motion as a result of subsurface geology, substrate texture and stratification, surface terrain, and the mechanism responsible for triggering the landslide. The most common landslide-types are *slides*, *flows*, *falls*, and *topples* which can vary in size and impact. Some landslides are rapid, occurring in seconds, whereas others may take hours, weeks, or even longer to develop. Although landslides usually occur on steep slopes, they also can occur in areas of low relief.

Landslides can occur naturally or be triggered by human-related activities. Naturally occurring landslides can occur on any terrain, given the right condition of soil, moisture, and the slope's angle. They are caused from an inherent weakness or instability in the rock or soil combined with one or more triggering events, such as heavy rain, rapid snow melt, flooding, earthquakes, vibrations and other natural causes. Other natural triggers include the removal of lateral support through the erosive power of streams, glaciers, waves, and longshore and tidal currents; through weathering, and wetting, drying and freeze-thaw cycles in surficial materials; or through land subsidence or faulting that creates new slopes. Long-term climate change can influence landslide occurrences through increased precipitation, ground saturation, and a rise in groundwater level, which reduces the strength and increases the weight of the soil.

⁵⁷ United States Geological Survey: <https://pubs.usgs.gov/fs/2004/3072/fs-2004-3072.html>

Landslides can also be induced, accelerated, or mitigated by human actions. Human-related causes of landslides can include grading, terrain/slope cutting and filling, quarrying, removal of retaining walls, lowering of reservoirs, vibrations from explosions, machinery, road and air traffic, and excessive development. Normally stable slopes can fail if disturbed by development activities. Often, a slope can also become unstable by earthmoving, landscaping, or vegetation clearing activities. Changing drainage patterns, groundwater level, slope and surface water through agricultural or landscape irrigation, roof downspouts, septic-tank effluent or broken water or sewer lines can also generate landslides. Due to the geophysical or human factors that can induce a landslide event; they can occur in developed areas, undeveloped areas, or any areas where the terrain was altered for roads, houses, utilities, buildings, and even for lawns in one's backyard.

LANDSLIDE HAZARDS

Washington State has six landslide provinces, each with its own characteristics (Figure 10). Okanogan County is part of the Okanogan Highlands province which “extends from the slopes of the North Cascades in the west to the Selkirk Mountains in the northeast corner of the state. The primary slope stability problem in this province is in the sediments within and along the boundary of the highlands. Thick sections of sediments along the valleys of the Columbia, Spokane, and Sanpoil Rivers are the result of repeated damming of the Columbia River by lobes of the continental ice sheet and repeated catastrophic floods from breached ice dams.

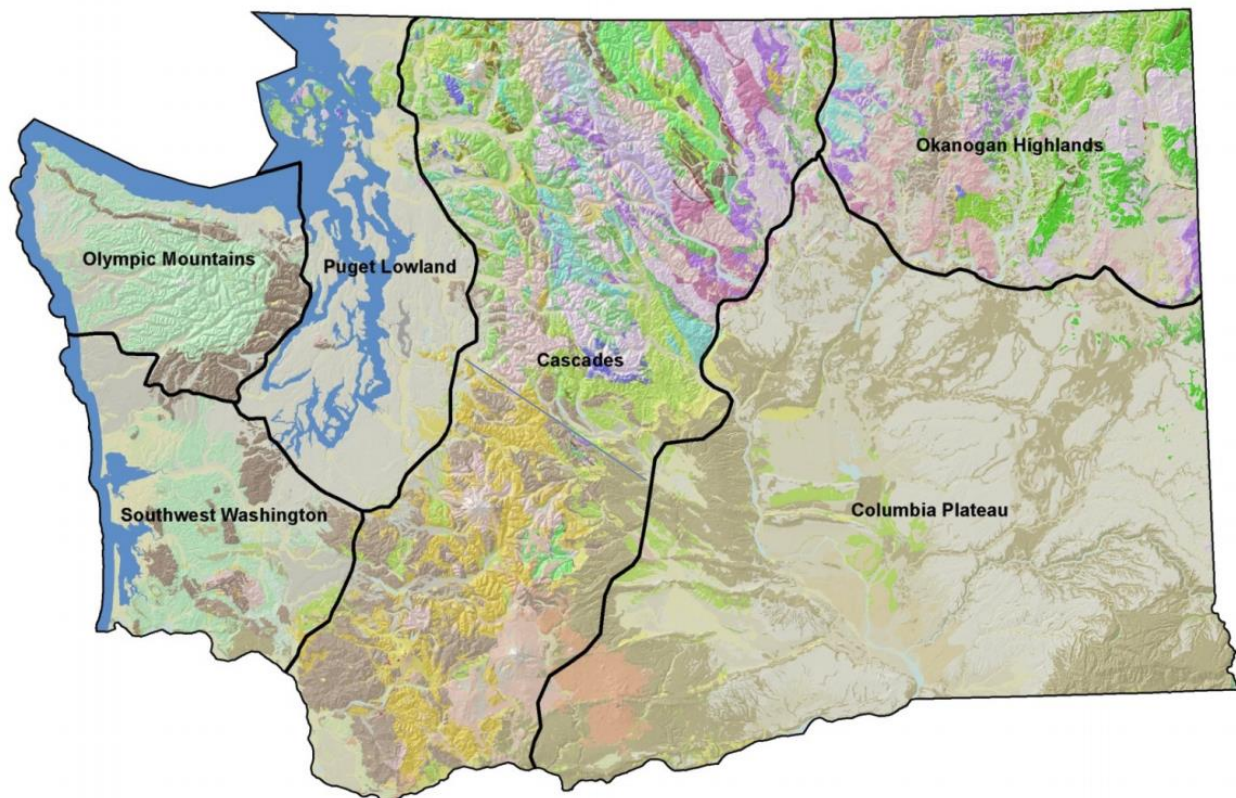


Figure 10) Geological provinces of Washington State. Okanogan County is in the Okanogan Highlands Province.

Okanogan County, WA Natural Hazard Mitigation Plan 2022

The occurrence of new landslides and the reactivation of old landslides increased dramatically with the filling of reservoirs behind the Grand Coulee and Chief Joseph dams. Drawdowns for flood control and power generation also trigger new landslides and/or reactivate and extend old ones. Some of the landslide complexes extend for thousands of feet along the lakeshores, have head scarps in terraces 300 feet or more above reservoir level and extend well below its surface. With landslide activity common along hundreds of miles of shoreline, one hazard in such a setting is water waves generated by fast-moving landslide masses.”

Landslides range from shallow debris flows to deep-seated slumps. They destroy homes, businesses, and public buildings, undermine bridges, derail railroad cars, interrupt transportation infrastructure, damage utilities, and take lives. Sinkholes affect roads and utilities. Losses often go unrecorded because insurance claims are not filed, no report is made to emergency management, there is no media coverage, or the transportation damages are recorded as regular maintenance. Figure 11 shows the locations of historic landslides in the greater Washington State area.

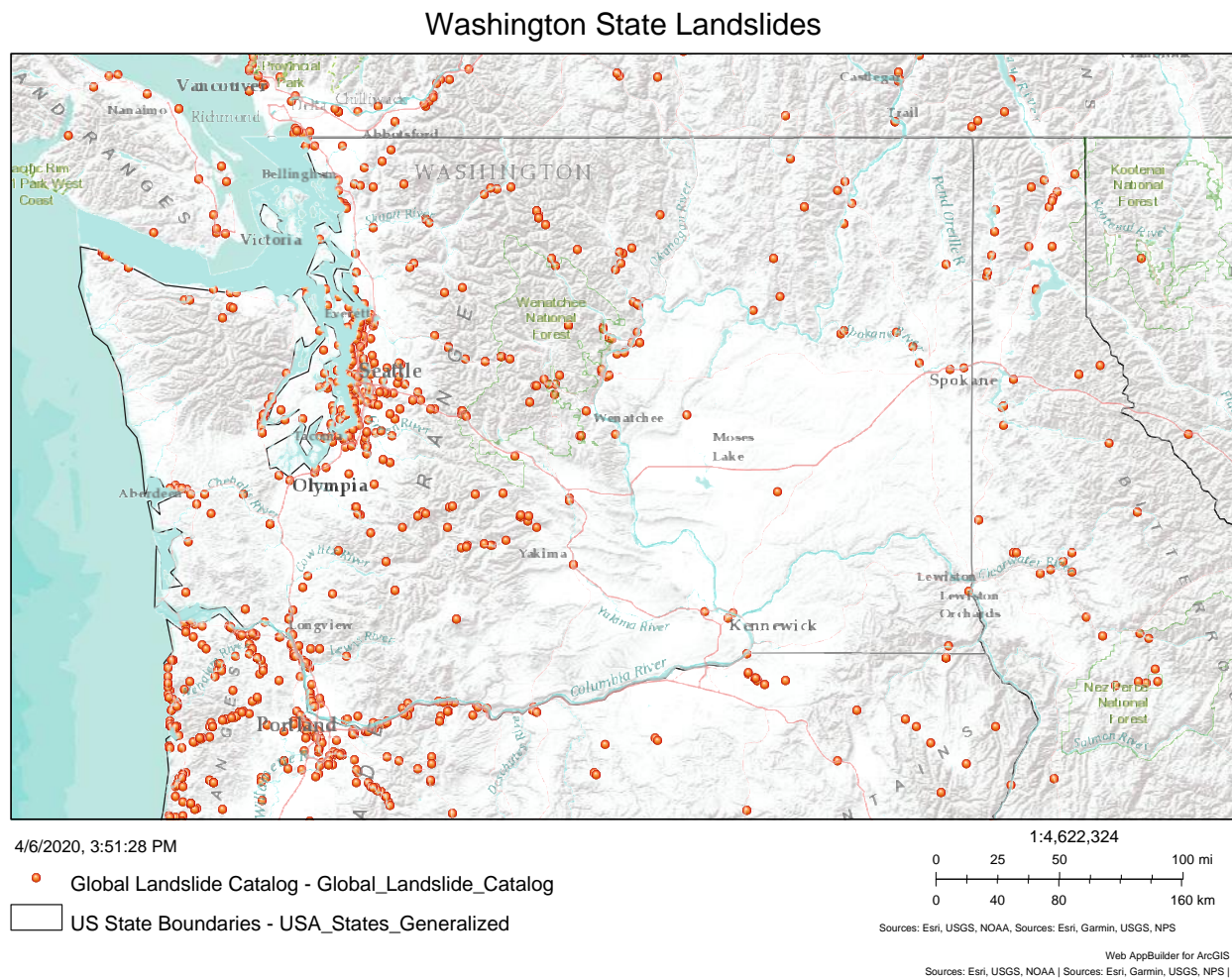


Figure 11) Historic landslides points in the Pacific Northwest (Washington State) from the Global Landslide Catalog.

Significant landslide events (those resulting in disasters) are rarer, but several have been recorded in the State. Since the last time this plan was updated (2014), major events had a significant impact on transportation, communities, and natural resources in 2016 (x2), 2017, and 2019.

DETECTION OF HAZARD AREAS

Land stability cannot be absolutely predicted with current technology. The best design and construction measures are still vulnerable to slope failure. The amount of protection, usually correlated to cost, is proportional to the level of risk reduction. Debris and vegetation management is integral to prevent landslide damages. Corrective measures help but can often leave the property vulnerable to risk.

These are characteristics that may be indicative of a landside hazard area:

- Bluff retreat caused by sloughing of bluff sediments, resulting in a vertical bluff face with little vegetation.
- Pre-existing landside area.
- Tension or ground cracks along or near the edge of the top of a bluff.
- Structural damage caused by settling and cracking of building foundations and separation of steps from the main structure.
- Toppling bowed or jack sawed trees.
- Gullying and surface erosion.
- Mid-slope ground water seepage from a bluff face.

By studying the effects of landslides in slide prone areas we can plan for the future. More needs to be done to educate the public and to prevent development in vulnerable areas. WAC 365-190-080 states that geologically hazardous areas pose a threat to the health and safety of citizens when incompatible development is sited in areas of significant hazard. Some hazards can be mitigated by engineering, design, or construction so that risks are acceptable. When technology cannot reduce the risk to acceptable levels, building in hazardous areas should be avoided.

Stream and riverbank erosion, road building or other excavation can remove the toe or lateral slope and exacerbate landslides. Seismic or volcanic activity often triggers landslides as well. Urban and rural living with excavations, roads, drainage ways, landscape watering, logging, and agricultural irrigation may also disturb the solidity of landforms, triggering landslides. In general, any land use changes that affects drainage patterns or that increase erosion or change ground-water levels can augment the potential for landslide activity.

Landslides are a persistent threat to waterways and highways and a threat to homes, schools, businesses, and other facilities. The unimpeded movement over roads—whether for commerce, public utilities, school, emergencies, police, recreation, or tourism—is essential to the normal functioning of Okanogan County. The disruption and dislocation of these or any other routes caused by landslides can quickly jeopardize travel and vital services. Although small slumps on cut and fill slopes along roads and highways is relatively common, nearly all of the landslide risk in Okanogan County is associated with the steeper slopes along the major rivers in the central portion of the County and in the Cascade Mountains in the

western third of the County. The majority of new development within the County is occurring along these slopes; thus, there are increasingly more structures and infrastructure at risk in this landslide prone area.

SECOND-ORDER HAZARD EVENTS

Landslide events are often caused by other types of hazard events, but the costs of cleaning up after a landslide including road and other infrastructure repairs can often dwarf the damages of the initial hazard. The following chart outlines the interconnection between landslides and other types of hazard events.

Table 68) Second-order hazards related to landslide events.

Related Causal Events	Related Effects
Flood	Transportation Systems
Earthquake	Evacuations
Wildland Fire	Power Outage

SEVERE WEATHER HAZARD PROFILE

DEFINITIONS

High Winds: Sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration, not caused by thunderstorms. In Washington State, extreme sustained wind velocities can be expected to reach 50 mph at least once in two years; 60 to 70 mph once in 50 years; and 80 mph once in 100 years. The National Climatic Data Center (NCDC) has recorded 82 high or strong wind events with wind speeds greater than 30 knots since 1950.

Severe Thunderstorm: A thunderstorm that produces a tornado, winds of at least 58 mph (50 knots), and/or hail at least 1 inch in diameter. A thunderstorm with wind equal to or greater than 40 mph (35 knots) and/or hail at least ½ inch in diameter is defined as approaching severe. Thunderstorms with lightning, heavy rain, hail, and high winds are frequent occurrences in Okanogan County and its neighboring counties from late April through September. The spring storms are generally the result of local convection. They develop quickly, dissipate rapidly, and generally cause small amounts of localized damage, if any.

Tornado: A violently rotating column of air, usually pendant to a cumulonimbus (type of cloud), with circulation reaching the ground. It nearly always starts as a funnel cloud and may be accompanied by a loud rotating noise. On a local scale, it is the most destructive of all atmospheric phenomena.

Heavy Snow: This generally means: a snowfall accumulating to 4" or more in depth in 12 hours or less or snowfall accumulating to 6" or more in depth in 24 hours or less.

Lightning: A visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground or between the ground and a cloud. Lightning strikes are fairly common during summer storms and are known to start fires and damage property.

Hail: Showery precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter, falling from a cumulonimbus cloud.

Winter storm: A storm with significant snowfall, ice, and/or freezing rain; the quantity of precipitation varies by elevation. Heavy snowfall is 4 inches or more in a 12-hour period, or 6 or more inches in a 24-hour period in non-mountainous areas; and 12 inches or more in a 12-hour period or 18 inches or more in a 24-hour period in mountainous areas.

BACKGROUND INFORMATION

The overall weather patterns that affect Okanogan County are prevalent throughout central Washington. This section of the State is part of the large inland basin between the Cascade and Rocky Mountains. In an easterly and northerly direction, the Rocky Mountains shield the inland basin from the winter season's cold air masses traveling southward across Canada. In a westerly direction, the Cascade Range forms a

barrier to the easterly movement of moist and comparatively mild air in winter and cool air in summer. Some of the air from each of these source regions reaches this section of the State and produces a climate which has some of the characteristics of both continental and marine types. Most of the air masses and weather systems crossing central Washington are traveling under the influence of the prevailing westerly winds. Infrequently, dry continental air masses enter the inland basin from the north or east. Since this plan was last updated (2014), major disaster declarations related to severe storms in Washington were declared in 2016, 2017, and 2019.

TEMPERATURE AND PRECIPITATION

Okanogan County has a semi-arid continental type of climate which is hot and dry in the summer and cold and moderately humid in the winter. Temperatures can vary significantly over most of the county because of the wide range of elevations within the county. In January, the average maximum temperature is near 30° F and the minimum temperature is 15° F. Minimum temperatures from -10° to -20°F are recorded almost every winter and temperatures ranging from -25° to -42° F have been recorded in the colder valleys. In July, the average maximum temperature is 85° to 90° and the minimum temperature 45° to 50° F. Maximum temperatures reach 100° F on a few afternoons each summer and temperatures between 105° and 117° F, which was a record high set on June 29, 2021, have been recorded.

Precipitation varies from a semi-arid condition in the central and eastern part of the county to the moist conditions of the Cascade Mountains in the west. Annual precipitation totals range from seven to nine inches near the confluence of the Snake and Columbia Rivers, 15 to 30 inches along the eastern border and 75 to 90 inches near the summit of the Cascade Mountains (Figure 12). In general, the majority of the precipitation occurs during the winter months while the summer season of June through September is dry, characterized by occasional local showers or hailstorms. The winter is cloudy and moderately humid with most precipitation received as snowfall.

During the coldest months, a loss of heat by radiation at night and moist air crossing the Cascades and mixing with the colder air in the inland basin results in cloudiness and occasional freezing drizzle. A “chinook” wind which produces a rapid rise in temperature occurs a few times each winter. Frost penetration in the soil depends to some extent on the vegetative cover, snow cover and the duration of low temperatures. In an average winter, frost in the soil can be expected to reach a depth of 10 to 20 inches. During a few of the colder winters, with little or no snow cover, frost has reached a depth of 25 to 35 inches.

Cold continental air moving southward through Canada will occasionally cross the higher mountains and follow the north-south valleys into the Columbia Basin. On clear, calm winter nights, the loss of heat by radiation from over a snow cover produces ideal conditions for low temperatures. The lowest temperature in the State, -48° F, was recorded December 30, 1965, at Mazama and Winthrop.⁵⁸

⁵⁸ WRCC. “Historical Climate Information: Climate Extremes by State”. Western Regional Climate Center. Available online at <http://www.wrcc.dri.edu/>. Accessed March 2011.

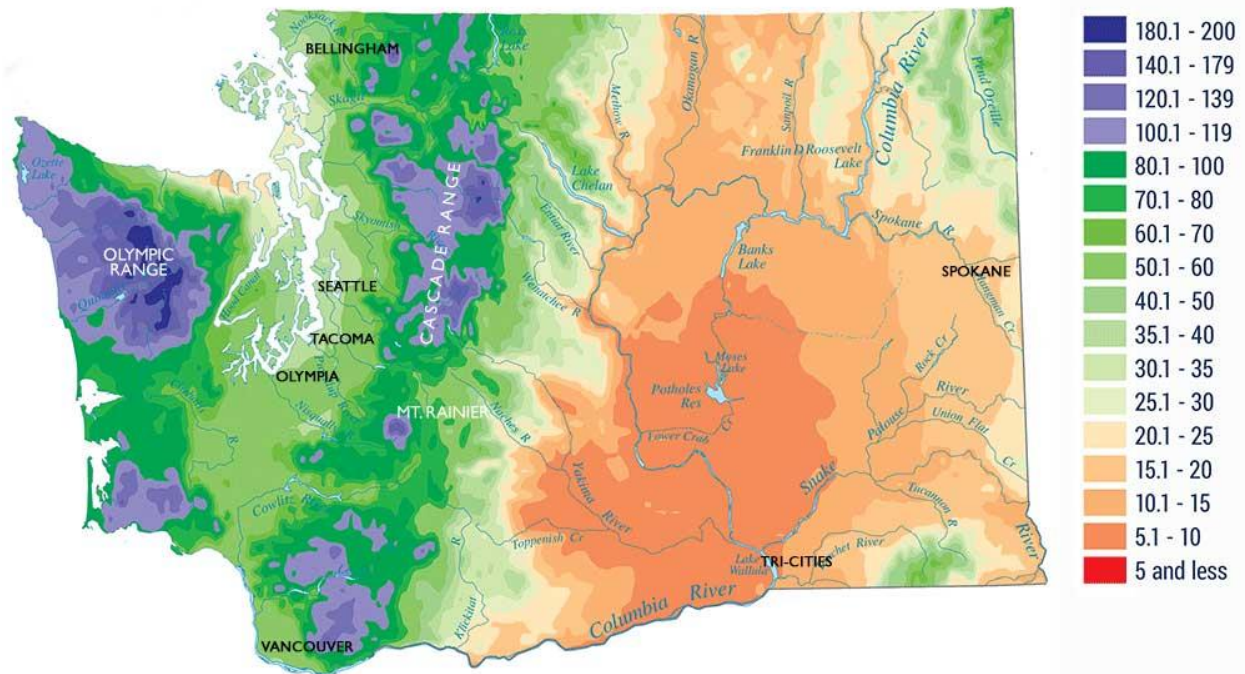


Figure 12) Annual precipitation map for Washington State. This figure is an adaptation of a map that was originally produced by the nationalatlas.gov program. This figure can be found at choosewashington.com⁵⁹

EFFECTS ON COMMUNITIES

AGRICULTURE

Winter rains and snow melt have important implications for agriculture in the county. Precipitation is absorbed by loam soils, which are largely characteristic in the region, where it becomes available for crops during the growing season. However, precipitation in the north central Washington region is unreliable for agricultural operations. Fluctuations in snow fall and rainfall, creating topsoil moisture deficiencies, have caused failures or low yields of grain crops in the past.

STORMS

Storms are naturally occurring atmospheric disturbances manifested in strong winds accompanied by rain, snow, or other precipitation, and often by thunder or lightning. All areas within this region are vulnerable to severe local storms. The affects are generally transportation problems and loss of utilities. When transportation accidents occur, motorists are stranded and schools and businesses close. The affects vary with the intensity of the storm, the level of preparation by local jurisdictions and residents, and the equipment and staff available to perform tasks to lessen the effects of severe local storms.

⁵⁹ Choose Washington. Washington State Department of Commerce. <http://choosewashingtonstate.com/research-resources/about-washington/climate-geography/>

EXCESSIVE HEAT

In recent years, Okanogan County has been subjected to excessive heat during summer months. As stated previously, a record high temperature of 117° F was set for the county on June 29, 2021. These conditions present significant health risks to vulnerable populations and exacerbate drought conditions. As drought conditions persist, wildfire risk increases, and it is more likely that wildfires will exhibit extreme behavior. In 2020 and 2021, wildland fires forced numerous evacuations in Okanogan County and caused widespread damage. With climate change, it is expected that periods of excessive heat will become more common during summer months.

SECOND-ORDER HAZARD EVENTS

Severe weather is often the causal factor in damages from other types of hazard incidents such as flood or wildland fire. The following chart outlines the interconnection between severe weather and other types of hazard events.

Table 69) Second-order hazards related to severe weather events.

Related Causal Events	Related Effects
None	Drought
	Crop Loss
	Tornado
	Wildland Fire
	Flood
	Landslides
	Power Outage

WILDLAND FIRE HAZARD PROFILE

DEFINITIONS⁶⁰

Structure Fire: Fire originating in and burning any part or all of any building, shelter, or other structure.

Wildland Fire: A wildland fire originating from an unplanned ignition, such as lightning, volcanos, unauthorized and accidental human caused fires, and prescribed fires that are declared wildfires.

Wildland-Urban Interface: The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetation fuels.

BACKGROUND INFORMATION

In general, wildland fire behavior describes how fire reacts to available fuels, local topography, and current weather conditions. The relationships between these three components are dynamic; changing one condition can often exacerbate the affects that the other conditions have on fire behavior. As such, fire behavior is often modeled as a triangle with fuels, topography, and weather serving as the three sides (Figure 14)⁶¹. Understanding the relationships between the fire behavior components has important implications for not only managing an active wildfire but also mitigating wildfire risk. Since fuel is the only component that can be managed directly, management decisions regarding fuel-types and fuel loading across the landscape need to be made based on characteristics that are inherent of the region; climate and topography. Strategic fuel breaks, conservation and restoration of native species, and prescribed burns are examples of management activities that can reduce wildfire risk and simplify the process of assessing potential wildfire behavior. A brief description of each of the fire behavior elements follows in order to illustrate their effect on fire behavior.

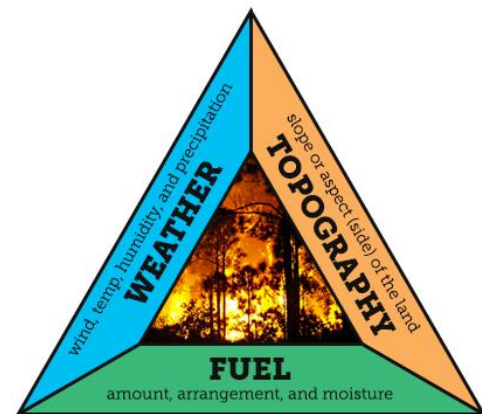


Figure 13) The fire triangle demonstrates how energy, oxygen, and fuel combine to create fire.

WEATHER

Fire behavior is largely influenced by weather conditions. Wind, moisture levels, temperature, and relative humidity are all factors that determine the rates at which fuels dry and vegetation cures. The ignition potential of fuels is also determined by these factors; weather patterns and trends can be analyzed to determine how likely or easily a certain fuel type will ignite and if a fire will be sustained. Once started,

⁶⁰ National Wildfire Coordinating Group. NWCG Glossary of Wildland Fire. August 2021. Available online at: <https://www.nwccg.gov/glossary/a-z/sort/6?combine=>

⁶¹ Fire Science core curriculum-Module 2. Oregon State University Extension Service. August 2017. <https://catalog.extension.oregonstate.edu/em9172module2/html>

the behavior of a wildfire is further determined by atmospheric stability and local and regional weather. As temperature, wind speed, wind direction, precipitation, storm systems, and prevailing winds all influence fire behavior, weather is the most difficult component of the fire triangle to predict and interpret. As observed in the Yarnell Hill fire in Arizona that killed 19 firefighters, a storm cell can cause a flaming front to change direction abruptly, 90 degrees in the case of the Yarnell Hill fire, and rapidly accelerate.

TOPOGRAPHY

Fires burning in similar fuel-types will burn differently under varying topographic conditions. Topography alters heat transfer and localized weather conditions, which in turn influences vegetative growth and resulting fuels. Changes in slope and aspect can have significant influences on how fires burn. In general, north slopes tend to be cooler, wetter, more productive sites. This typically results in heavy fuel accumulations, high fuel moistures, lower rates of curing for fuels, and lower rates of spread. In contrast, south and west slopes tend to receive more direct sun and therefore have the highest temperatures, lowest soil and fuel moistures, and lightest fuels. The combination of light fuels and dry sites leads to fires that typically display the highest rates of spread. These slopes also tend to be on the windward side of mountains which means they tend to be “available to burn” for a greater portion of the year. Slope also plays a significant role in the rate of spread of a fire as fuels upslope from the flaming front are subjected to preheating which means that they readily combust as the fire draws closer. The preheating process is exacerbated as slope increases which results in greater rates of spread and increased flame lengths. Therefore, steep slopes with a south–southwest aspect generally promote intense fire behavior due to dry fuels and the likelihood of predominant, westerly winds.⁶²

FUELS

In the context of wildfire, fuels describe any organic material, dead or alive, found in the fire environment. Grasses, brush, branches, logs, logging slash, forest-floor litter, conifer needles, and buildings are all examples of fuel-types. The physical properties and characteristics of fuels govern how fires burn. Fuel loading, size and shape, moisture content, and continuity and arrangement all have an effect on fire behavior. In general, the smaller and finer the fuels, the faster the potential rate of fire spread. Small fuels such as grass, needle litter and other fuels less than a quarter inch in diameter are most responsible for fire spread. Fine fuels, those with high surface to volume ratios, are considered the primary carriers of surface fire. As fuel size increases, the rate of spread tends to decrease due to a decrease in the surface to volume ratio. Fires in large fuels generally burn at a slower rate but release much more energy and burn with much greater intensity. This increased energy release, or intensity, makes these fires more difficult to control.⁶³

⁶² Topography’s effect on Fire Behavior. Auburn University.

http://www.auburn.edu/academic/forestry_wildlife/fire/topos_effect.htm. Accessed December 2016.

⁶³ Gorte, R. 2009. Congressional Research Service, Wildfire Fuels and Fuel Reduction.

Fuels are classified by diameter as that has important implications for fuel moisture retention. The smaller the diameter, the more quickly the moisture content of a given fuel type changes while larger diameter fuels take longer to change. In terms of fire potential on the landscape and fire suppression, the amount of time that is required for a fuel type to become volatile is critical which is why instead of referring to fuels by size, they are referred to as either one hour, ten-hour, 100 hour, or 1000 hour fuels. This method of classifying fuels describes the amount of time required for a fuel's status to change from non-combustible to combustible as a result of altered moisture levels in the surrounding environment.

WILDFIRE EXTENT PROFILE

The National Interagency Fire Center and the National Incident Coordination Center maintains records of fire costs, extent, and related data for the entire nation. The number of wildland fire starts, total acreage burned, and annual cost to control figures were created using data from end-of-year reports compiled by all wildland fire agencies after each fire season. The agencies include the Bureau of Land Management, Bureau of Indian Affairs, National Park Service, US Fish and Wildlife Service, Forest Service, and all state agencies.

Across the west, wildfires have been increasing in extent and cost of control (Figure 14). Even though the number of fires that occur annually has decreased since 1990 (Figure 16), the total number of acres burned has increased (Figure 15). Over the last few decades summers have become warmer and drier; this trend has had significant implications for the severity of recent fire seasons, particularly in areas where decades of fire suppression have resulted in overstocked stands and heavy fuel loading. However, the inverse relationship between total number of fires and total acres burned can likely be attributed to a few other factors as well. Fire awareness programs have likely reduced the number of fire starts per season by making the public more cognizant of the impacts of wildfire and therefore more diligent when recreating or working in high risk areas. While in addition to recent climate trends, the increase in acreage burned each year can partially be attributed to changes in wildland firefighting tactics and emphasis on safety. In some situations, fire management teams are electing to intentionally burn additional acreage with back-burn operations or let the fire burn itself out or burn to a point where it can be contained with a greater level of assurance and under safer conditions.

The trends displayed in these figures are likely to continue into future fire seasons. Particularly as fire seasons extend earlier and later into the year and conditions become more volatile at the hottest and driest times of the year. As populations continue to increase and the WUI expands, more people, structures, and infrastructure will be exposed to wildfire risks which continues to increase the value of fire planning and fire mitigation work.

The fire suppression agencies in Okanogan County respond to numerous wildland fires each year, but few of those fires grow to a significant size. According to national statistics, only 2% of all wildland fires escape initial attack. However, that 2% accounts for most fire suppression expenditures and threatens lives, properties, and natural resources. These large fires are characterized by a size and complexity that require special management organizations drawing suppression resources from across the nation. These fires create unique challenges to local communities by their quick development and the scale of their footprint.

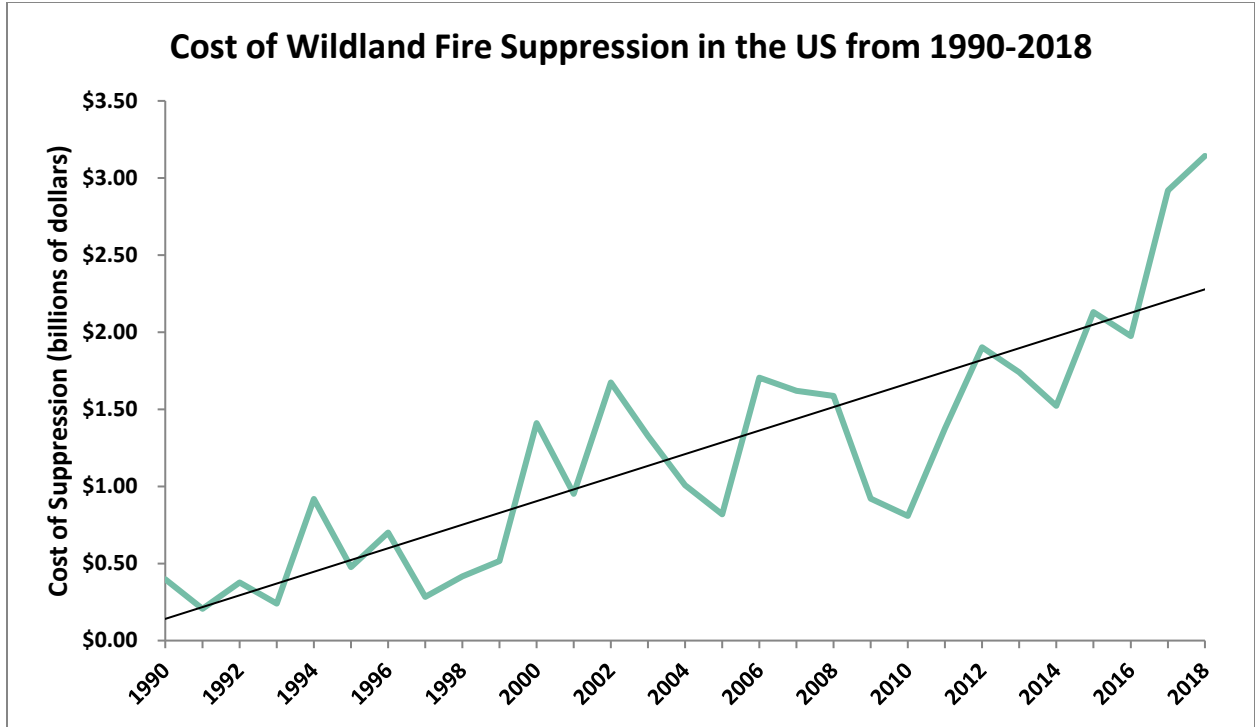


Figure 14) Annual cost of wildland fire suppression in the United States from 1990 to 2018. Values were not adjusted for inflation.

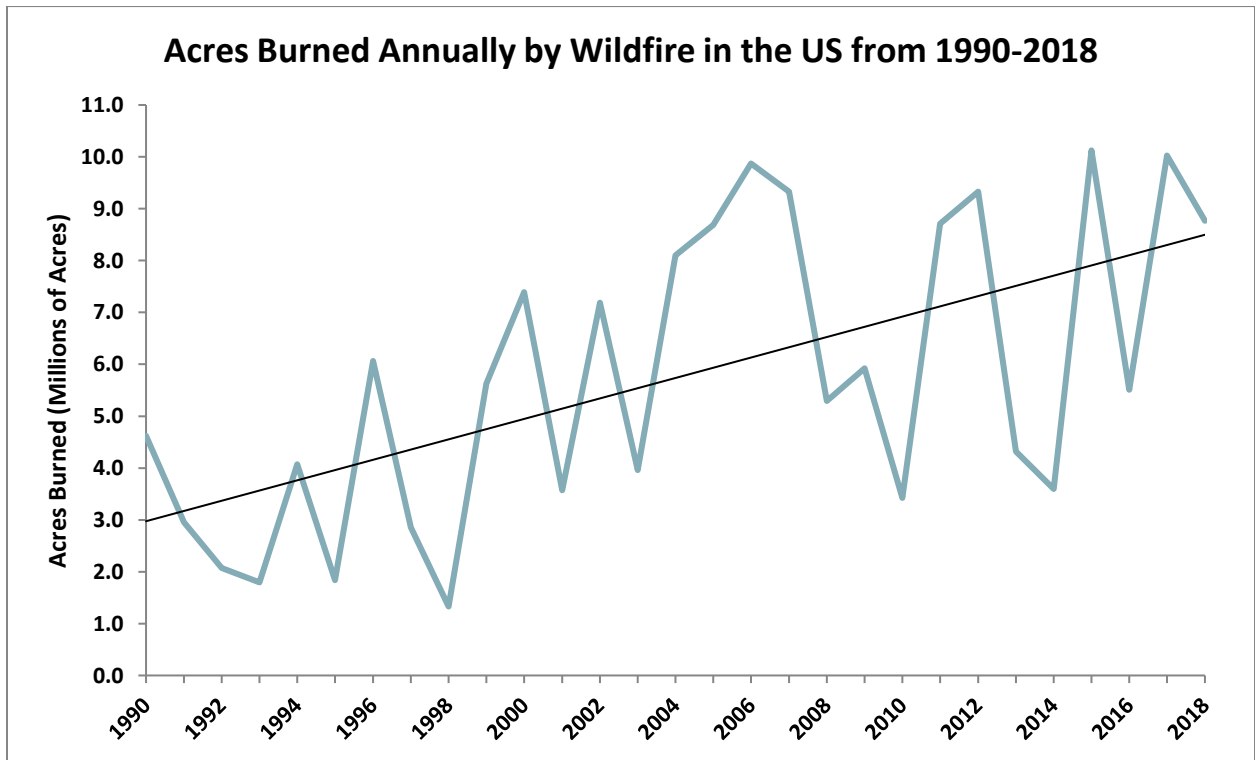


Figure 15) Annual acreage burned as a result of wildfire in the United States from 1990 to 2018.

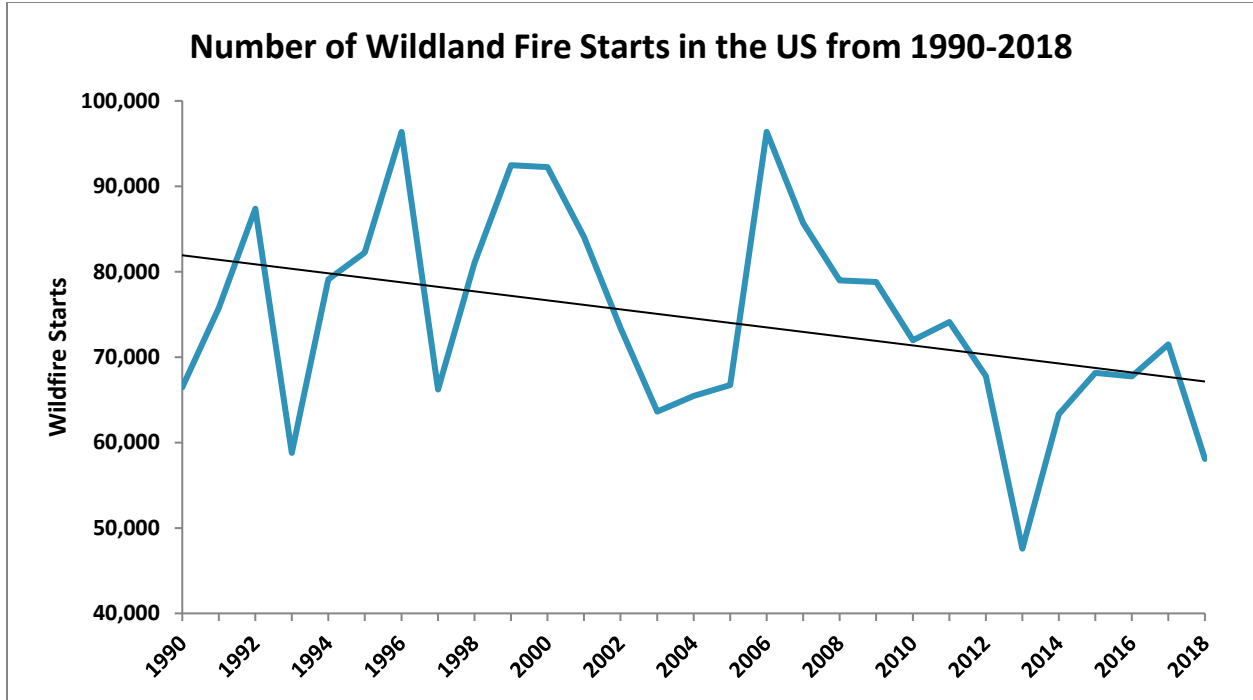


Figure 16) Annual number of wildland fire starts in the United States from 1990 to 2018.

SECOND-ORDER HAZARD EVENTS

Wildland fires can be caused naturally by lightning or by various technological sources. Wildland fire can also be a secondary effect of another type of hazard. The following chart outlines the interconnection between wildland fire and other types of hazard events.

Table 70) Second-order hazards related to wildland fire events.

Related Causal Events	Related Effects
Severe Weather	Structural/Urban Fire
Drought	Civil Unrest
Earthquake	Landslide
Transportation Systems	Transportation Systems
Hazardous Materials	Power Outage
Structural/Urban Fire	

VOLCANO HAZARD PROFILE

DEFINITIONS

Active Volcano: A volcano that has erupted within the past 10,000 years and is considered to have the potential to erupt again. Active volcanoes may be erupting, restless (about to erupt soon), or dormant (unlikely to erupt soon).

Debris Avalanche: Moving masses of rock, soil and snow that occur when the flank of a mountain or volcano collapses and slides downslope. As the moving debris rushes down a volcano and into river valleys, it incorporates water, snow, trees, bridges, buildings, and anything else in the way.

Lahar: A viscous, high-density “flash flood” of water, mud, and rock fragments that can flow down the sides of volcanoes during eruptions or at other times. Lahars typically resemble soupy wet concrete, flow rapidly (up to about 80 mph), and can travel long distances down river valleys (more than 100 miles). Lahars can be triggered by various causes or events.

Magma: Molten rock produced miles to tens of miles beneath Earth’s surface. The name for molten rock changes from *magma* to *lava* after it has erupted.

Stratovolcano/ Composite Volcano: A steep-sided, often symmetrical cone constructed of alternating layers of lava flows, ash, and other volcanic debris, typically over the course of hundreds of eruptions and over hundreds of thousands of years. Composite volcanoes can erupt explosively but do not always do so. These are sometimes also referred to as stratovolcanoes.

Tephra: Any type and size of rock fragment that is forcibly ejected from the volcano and travels an airborne path during an eruption (including ash, bombs, and scoria).

Volcano: A vent in the earth's crust through which magma, rock fragments, and gases are ejected from the earth's interior. Over time, accumulation of the erupted solid products on the earth's surface commonly creates a cone-shaped volcanic mountain.

Volcanic Ash: Small fragments (sand-size or finer) of solidified lava, typically rich in sharp broken shards of volcanic glass and pumice. It is produced by the forceful, high-velocity ejection of gas-rich magma through a volcanic vent.

Volcanic Hazard: A natural geologic or hydrologic process associated with a volcano, which has the potential to inflict harm to people or property. Volcanic hazards commonly occur during eruptions, but some may occur when the volcano is quiet.

BACKGROUND INFORMATION

Steep, conical volcanoes built by the eruption of viscous lava flows, tephra, and pyroclastic flows, are called stratovolcanoes. Usually constructed over a period of tens to hundreds of thousands of years, stratovolcanoes may erupt a variety of magma types, including basalt, andesite, dacite, and rhyolite. All

but basalt commonly generate highly explosive eruptions. A stratovolcano typically consists of many separate vents, some of which may have erupted cinder cones and domes on the volcano's flanks. A synonym is composite volcano⁶⁴. An explosive eruption from a stratovolcano blasts solid and molten rock fragments (tephra) and volcanic gases into the air with tremendous force. The largest rock fragments (bombs) usually fall back to the ground within 2 miles of the vent. Small fragments (less than about 0.1 inch across) of volcanic glass, minerals, and rock (ash) rise high into the air, forming a huge, billowing eruption column. Figure 17 is a diagram of volcano anatomy and volcanic hazards.

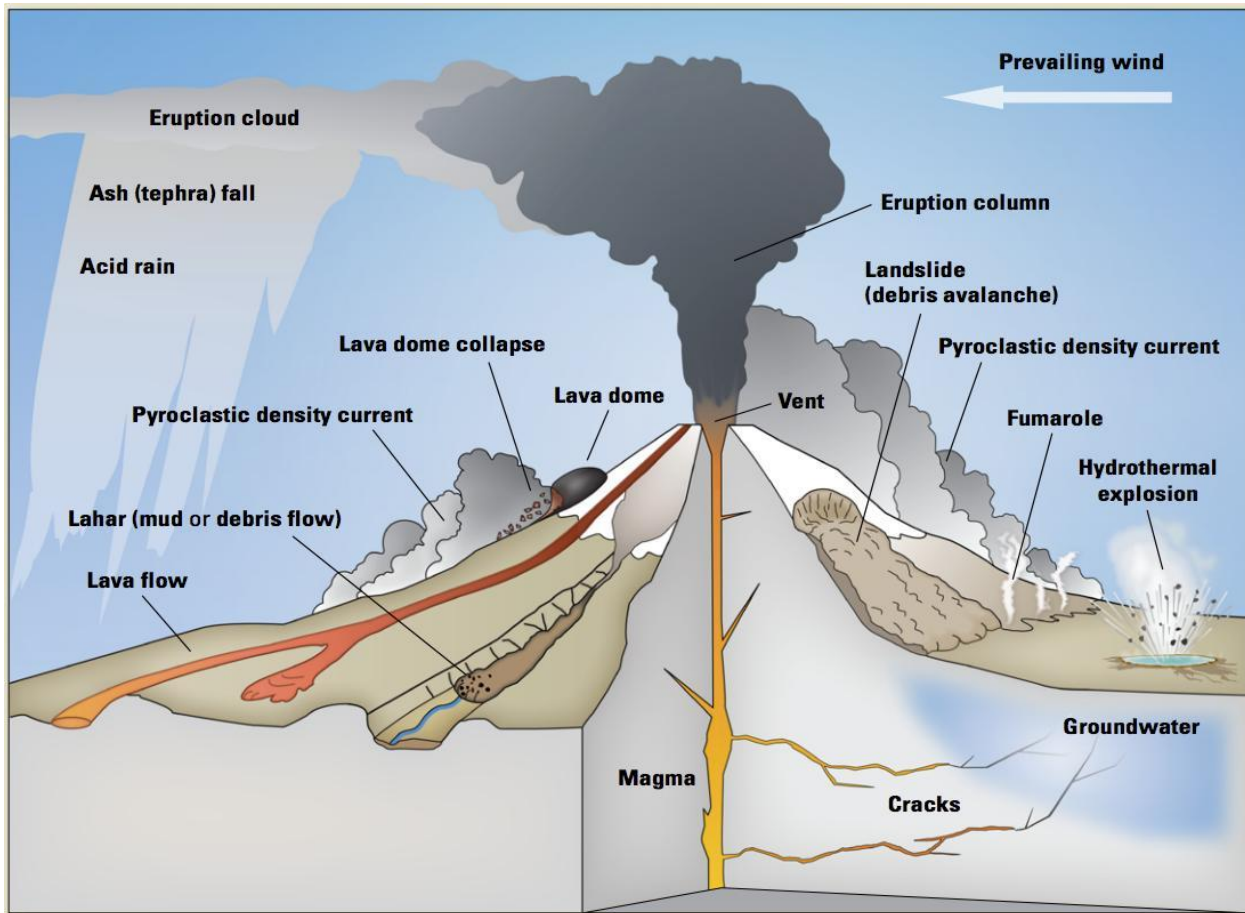


Figure 17) Geologic Hazards at Volcanos (United States Geological Survey).

Eruption columns can grow rapidly and reach more than 12 miles above a volcano in less than 30 minutes, forming an eruption cloud. The volcanic ash in the cloud can pose a serious hazard to aviation. Ash related engine failures have led to restriction on travel through ash clouds. Following the eruption of Eyjafjallajökull in 2010, which disrupted one of the busiest airways in the world, over 100,000 flights were

⁶⁴ United States Geological Survey. Stratovolcano. <https://volcanoes.usgs.gov/vsc/glossary/stratovolcano.html>

cancelled, leading to billions in economic losses.⁶⁵ From 1953 to 2009 there were 94 occasions when aircraft encountered ash, with 79 of those incidents causing some degree of engine damage and 26 resulting in significant engine damage.⁶⁶

Large eruption clouds can extend hundreds of miles downwind, resulting in ash fall over enormous areas; the wind carries the smallest ash particles the farthest. Ash from the May 18, 1980 eruption of Mount St. Helens, WA fell over an area of 22,000 square miles in the Western United States. The impacts in Okanogan County were primarily from the ash fallout. In Eastern Washington, crop losses were estimated to be \$100 million and some dairy farmers had to dump their milk. Transportation was disrupted and some motorists were stranded.

Volcanoes emit gases during eruptions. Even when a volcano is not erupting, cracks in the ground allow gases to reach the surface through small openings called fumaroles. More than ninety percent of all gas emitted by volcanoes is water vapor (steam), most of which is heated ground water. Other common volcanic gases are carbon dioxide, sulfur dioxide, hydrogen sulfide, hydrogen, and fluorine. Sulfur dioxide gas can react with water droplets in the atmosphere to create acid rain, which causes corrosion and harms vegetation. Carbon dioxide is heavier than air and can be trapped in low areas in concentrations that are deadly to people and animals. Fluorine, which in high concentrations is toxic, can be adsorbed onto volcanic ash particles that later fall to the ground. The fluorine on the particles can poison livestock grazing on ash-coated grass and contaminate domestic water supplies.⁶⁷

While there are numerous volcanos of concern in the U.S. (Table 71), the volcanoes of the Cascade Range, which stretches from northern California into British Columbia, have produced more than 100 eruptions, most of them explosive, in just the past few thousand years. However, individual Cascade volcanoes can lie dormant for many centuries between eruptions, and the great risk posed by volcanic activity in the region is therefore not always apparent. Eruptions of Cascade volcanos can produce pyroclastic flows (hot, often incandescent mixtures of volcanic fragments and gases that sweep along close to the ground at speeds up to 450 mph), lava flows, and landslides can devastate areas 10 or more miles away; and lahars (huge mudflows of volcanic ash and debris) can inundate valleys more than 50 miles downstream. Falling ash from explosive eruptions can disrupt human activities hundreds of miles downwind, and drifting clouds of fine ash can cause severe damage to jet aircraft thousands of miles away.

Because the population of the Pacific Northwest is rapidly expanding, the volcanoes of the Cascade Range in Washington, Oregon, and northern California are some of the most dangerous in the United States. Although Cascade eruptions occur infrequently (there are, on average, two eruptions each century) they

⁶⁵ Morton, M.C., 2017. "Of airplanes and ash clouds: What we've learned since Eyjafjallajökull." Earth. Available online at: <https://www.earthmagazine.org/article/airplanes-and-ash-clouds-what-weve-learned-eyjafjallai%C3%B6kull>

⁶⁶ Guffanti, M., et al., 2010. "Encounters of Aircraft with Volcanic Ash Clouds: A Compilation of Known Incidents, 1953—2009." USGS Data Series 545, ver. 1.0, 12 p., Available online at: <http://pubs.usgs.gov/ds/545>

⁶⁷ Myers, Bobbie, et al. "What are Volcano Hazards?" U.S. Geological Survey. Vancouver, Washington. July 2004.

can be dangerous because of their violently explosive behavior, permanent snow and ice cover that can fuel lahars, and their proximity to various critical infrastructure, air routes, and populated areas.⁶⁸

Table 71) List of active volcanos of Highest Priority and High Priority within the U.S., Source: USGS.

Region	Highest Priority	High Priority
Alaska	Akutan, Amak, Amukta, Bogoslof, Cleveland, Fourpeaked, Kasatochi, Kiska, Makushin, Recheshnoi, Redoubt, Seguam, Vsevidof, Yantarni, Yunaska	Black Peak, Chignagak, Churchill, Dana, Douglas, Dutton, Edgecumbe, Hayes, Kaguyak, Kupreanof, Spurr, Wrangell
Washington	Glacier Peak, Mount Baker, Mount Rainier, Mount St. Helens	Mount Adams
Oregon	Crater Lake, Mount Hood, Newberry, Three Sisters	
California	Lassen Volcanic Center, Mount Shasta	Clear Lake, Mono-Inyo Craters, Mono Lake Volcanic Field, Medicine Lake
Wyoming		Yellowstone

VOLCANOS IN WASHINGTON

Washington State has five major volcanoes (composite volcanoes) that are active and hundreds of smaller non-active volcanoes. Most of the smaller ones erupted only once or several times and have shut down. All are in the Cascade Range. The five major active systems are, from north to south, Mount Baker, Glacier Peak, Mount Rainier, Mount Adams, and Mount St. Helens.

Mount Baker is located about 30 miles due east of Bellingham, Washington. The U.S. Geological Survey (USGS) says Mount Baker is active and its last eruption occurred in 1843, consisting of a steam-driven blast and a “widely dispersed tephra fall”. In 1975 Mount Baker began to see renewed signs of volcanic activity including increased steam and heat. Activity gradually declined in subsequent years with no real signs of eruption. The area surrounding it is largely unpopulated but downstream and downwind communities and recreation sites could be affected if it erupted.⁶⁹

Glacier Peak is closest in proximity to Okanogan County but is remotely located in the Glacier Peak Wilderness (Figure 18). According to the USGS, “Glacier Peak tends to erupt explosively, and when the volcano reawakens the most serious hazards will impact population centers located relatively far away from the volcano.” It and its hazards are often overlooked because of its remote location but since the end of the most recent ice age, Glacier Peak has produced some of the largest and most explosive eruptions.⁷⁰

⁶⁸ Dzurisim, Dan, et al. “Living with Volcanic Risk in the Cascades.” U.S. Geological Survey – Reducing the Risk from Volcano Hazards. USGS. Vancouver, Washington. 1997.

⁶⁹ USGS Volcano Hazards Program. “Mount Baker”. <https://volcanoes.usgs.gov/volcanoes/baker/>

⁷⁰ USGS Volcano Hazards Program. “Glacier Peak”. https://volcanoes.usgs.gov/volcanoes/glacier_peak/.



Figure 18) Glacier Peak volcano, Washington, viewed from the east. (Vallance, Jim).⁷¹

Mount Rainier is located southeast of Tacoma and is the tallest peak in the Cascade Range. According to the USGS, Rainier is the most threatening volcano in the Cascades due to its “elevation, relief, hydrothermal alteration, icecap, glacier-fed radial valleys, and proximity to encroaching suburbs of the Seattle-Tacoma metropolis”.⁷² Most of this threat comes in the form of lahars because of the large amount of ice, loose volcanic rock, and surface water on Mount Rainier, and because of the large populations living downstream.⁷³ Future eruptions of Mount Rainier could be explosive and distribute ash and tephra downwind, primarily toward central and eastern Washington. The volume and composition of the ash and tephra has a strong potential to be disruptive though not significantly life-threatening.⁷⁴

⁷¹ USGS Volcano Hazards Program. “Glacier Peak”. https://volcanoes.usgs.gov/vsc/images/image_mgr/1100-1199/img1130.jpg.

⁷² USGS Volcano Hazards Program. “Volcanic Hazards at Mount Rainier”. https://volcanoes.usgs.gov/volcanoes/mount_rainier/hazard_summary.html

⁷³ USGS Volcano Hazards Program. “Lahars and Debris Flows at Mount Rainier”. https://volcanoes.usgs.gov/volcanoes/mount_rainier/hazard_lahars.html

⁷⁴ USGS Volcano Hazards Program. “Ash and Tephra Hazards from Mount Rainier”. https://volcanoes.usgs.gov/volcanoes/mount_rainier/hazard_ash_tephra_fall.html

Mount Adams is the largest active volcano in Washington and among all the Cascade Range stratovolcanoes it has produced the second most volume of eruptive material during the past million years.⁷⁵ Throughout most of its history, Mount Adams' eruptions have had a relatively low level of "explosivity" and instead the dominate type of eruption produces lava flows. The greatest hazards associated with Mountain Adams are from landslides, lahars, and debris avalanches.⁷⁶

Mount St. Helens is the most active volcano in the Cascade Range. A cataclysmic eruption occurred on May 18, 1980, followed by smaller explosive episodes and dome growth over the next decade. Volcanic events, including seismicity, steam and ash emission, and explosions, resumed in 2004 and continued through 2008. Mount St. Helens is a typically explosive system that commonly produces significant amounts of volcanic ash during eruptions. Given its high frequency of eruptions in the recent geologic past, and considering the volcano has produced large and explosive eruptions, the USGS maintains a "robust monitoring program" of Mount St. Helens.⁷⁷

SECOND-ORDER HAZARD EVENTS

Volcanic events can result in other types of hazard incidents as well. In a disaster event, the first hazard event may not be the primary cause of damages or losses within the community. Historical volcanic events have often resulted in flash flooding, landslides, wildfires, etc. The following chart outlines the interconnection between volcanic hazards and other types of hazard events.

Table 72) Second-order hazards related to volcanic events

Related Causal Events	Related Effects
	Transportation System
	Power Outage
	Wildland Fire
	Flash Flooding/Flooding
	Lahar
	Earthquake
	Avalanche
	Landslide

⁷⁵ USGS Volcano Hazards Program. "Mount Adams". <https://volcanoes.usgs.gov/volcanoes/adams/>

⁷⁶ USGS Volcano Hazards Program. "Volcanic Hazards at Mount Adams". https://volcanoes.usgs.gov/volcanoes/adams/adams_hazard_92.html

⁷⁷ USGS Volcano Hazards Program. "Mount St. Helens". https://volcanoes.usgs.gov/volcanoes/st_helens/

HAZARDOUS MATERIALS HAZARD PROFILE

Much of the information below was excerpted or derived from the Washington Military Department's 2018 Washington State Enhanced Hazard Mitigation Plan (EHMP).

Hazardous materials are substances that are considered severely harmful to human and environmental health. Many hazardous materials are commonly used substances, which may be harmless in their intended uses, but are quite dangerous if released into the environment. Misuse or release of hazardous materials can cause death, serious injury, long-lasting adverse health effects, structure damage, property damage, and environmental degradation.

Washington State considers hazardous materials as three categories:

1. Spills either at fixed facilities or on transportation routes which include water, land and pipeline;
2. Methamphetamine labs; and
3. Washington cleanup sites for leaking underground storage tanks, brownfields, and superfund sites.

DEFINITIONS

Hazardous material (HazMat), as defined by the US Department of Transportation (DOT), as a substance or material that is capable of posing an unreasonable risk to health safety, and property when transported in commerce, and has been designated as hazardous under the federal hazardous materials transportation law (49 U.S.C. 5103).

There are, however, various definitions and descriptive names used to further classify the term "hazardous material", depending on the nature of the problem being addressed. There lacks a comprehensive list of definitions that covers everything, as Federal, state, and local governments have diverse circumstances and purposes for regulating hazardous materials.

Environmental Protection Agency Definitions:

Hazardous Substance: any material which when discharged into or upon the navigable water of the United States or adjoining shorelines may be harmful to the public health or welfare of the United States, including, but not limited to fish, shellfish, wildlife, and public or private property, shorelines and beaches. EPA uses the term hazardous substance for chemicals which, if released into the environment above a certain amount, must be reported and, depending on the threat to the environment, federal involvement in handling the incident can be authorized. A list of the hazardous substances is published in 40 CFR § 302, Table 302.4.

Hazardous Waste: any material that may pose an unreasonable risk to health, safety or property when transported in commerce for the purposes of treatment, storage or disposal as waste. EPA uses the term hazardous wastes for chemicals that are regulated under the Resource, Conservation and Recovery Act (40 CFR § 261.33). Hazardous wastes in transportation are regulated by DOT (49 CFR § 171-177).

Extremely Hazardous Substances: the chemicals which must be reported to the appropriate authorities if released above the threshold reporting quantity. Each substance has a threshold reporting quantity. The list of extremely hazardous substances is identified in Title III of Superfund Amendments and Reauthorization Act (SARA) of 1986 (40 CFR § 355). Extremely hazardous substances, while also generally toxic materials, represent acute health hazards that, when released, are immediately dangerous to the lives of humans and animals and cause serious damage to the environment. When facilities have these materials in quantities at or above the threshold planning quantity (TPQ), they must submit “Tier II” information to appropriate State and/or local agencies to facilitate emergency planning.

Toxic Chemicals: chemicals whose total emissions or releases must be reported annually by owners and operators of certain facilities that manufacture, process, or otherwise use a listed toxic chemical. The list of toxic chemicals is identified in Title III of SARA.

Occupational Safety and Health Administration (OSHA) Definitions

Hazardous Chemical: any chemical that would be a risk to employees if exposed in the workplace. Hazardous chemicals cover a broader group of chemicals than the other chemical lists.

Hazardous Substances: OSHA uses the term hazardous substance in 29 CFR § 1910.120, which resulted from Title I of SARA and covers emergency response. OSHA uses the term differently than EPA. Hazardous substances, as used by OSHA, cover every chemical regulated by both DOT and EPA.

When a substance meets the DOT definition of a hazardous material, it must be transported in accordance with safety regulations providing for appropriate packaging, communication of hazards, and proper shipping controls.

In addition to EPA and DOT regulations, the National Fire Protection Association (NFPA) develops codes and standards for the safe storage and use of hazardous materials. These codes and standards are generally adopted locally and include the use of the NFPA 704 standard for communication of chemical hazards in terms of health, fire, instability (previously called “reactivity”), and other special hazards (such as water reactivity and oxidizer characteristics). Diamond-shaped NFPA 704 signs ranking the health, fire and instability hazards on a numerical scale from zero (least) to four (greatest) along with any special hazards, are usually required to be posted on chemical storage buildings, tanks, and other facilities. Similar NFPA 704 labels may also be required for individual containers stored and/or used inside facilities.

While it is defined somewhat differently by various organizations, the term “hazardous material” may be generally understood to encompass substances that have the capability to harm humans and other living organisms, property, and/or the environment. No universally accepted, objective definition of the term “hazardous material release incident” has been developed either. A useful working definition, however, might be framed as: any actual or threatened uncontrolled release of a hazardous material, its hazardous reaction products, or the energy released by its reactions that poses a significant risk to human life and health, property and/or the environment.

BACKGROUND INFORMATION

Much of the information in this section is a direct excerpt from the Washington Military Department's 2018 Washington State Enhanced Hazard Mitigation Plan (EHMP).

Hazardous materials are defined as such because of their chemical, physical or biological nature which can pose a potential risk to human health, property or the environment when released. A release may occur by spilling, leaking, emitting toxic vapors or any other process that enables the material to escape its container, enter the environment and create a potential hazard. Potential sources of hazardous material releases include, but are not limited to, superfund sites, storage facilities, residences, manufacturers, transportation carriers, hospitals/medical facilities, veterinary hospitals/clinics and brownfield sites. The hazard can be explosive, flammable, combustible, corrosive, reactive, poisonous, toxic or radioactive, and can exhibit qualities of a biological agent. There are also naturally occurring hazardous materials releases. These naturally occurring hazardous material releases may produce the same potential risk to human health as the manufactured chemicals or agents.

In addition to the standard definition of hazardous materials, there are other agents which also fall into this category. Etiologic agents are those microorganisms and microbial toxins that cause disease in humans and include bacteria, bacterial toxins, viruses, fungi, rickettsia, protozoans and parasites. These disease-causing microorganisms may also be referred to as infectious agents. Arthropods and other organisms that transmit pathogens to animals (including humans) are called vectors. Etiologic agents, vectors and materials containing etiologic agents are recognized as hazardous materials.

Hazardous materials incidents can occur naturally and during the manufacture, transportation, storage and use of hazardous materials. These incidents can occur as a result of human error, natural hazards, deliberate deed or a breakdown in equipment or monitoring systems. The impact depends upon the quantity and physical properties of the hazardous material, environmental and weather factors at the point of release, the type of release and its proximity to human and wildlife populations and valuable ecosystems.

In 1986 Congress enacted the Emergency Planning and Community Right to Know Act (EPCRA) as part of the Superfund Amendments and Reauthorization Act (SARA) due to public concern regarding the environmental and safety hazards posed by the storage and handling of toxic chemicals. This act, known as SARA Title III, established requirements for federal, state, tribal and local governments as well as industry regarding emergency response planning and the public's right to know about hazardous chemicals stored and released in their community. These provisions helped increase the public's knowledge and access to information on chemicals at individual facilities, their uses and releases into the environment.

In 1987, Washington adopted the Federal SARA Title III regulations in Chapter 118-40 of the Washington Administrative Code and established the Washington State Emergency Response Commission (SERC) to oversee implementation of requirements imposed by SARA Title III, including the creation of planning districts, designation of the Local Emergency Planning Committees (LEPC), and the development of a statewide master plan for hazardous materials incident response. The Washington SERC is comprised of

a broad-based membership including representatives from private industry, state, tribal and local governments. In addition, the Washington State Patrol, the Washington State Military Department's Emergency Management Division, and the Department of Ecology have specific responsibilities under the state regulation. The LEPC's representation consists of state and local elected officials, law enforcement, emergency management, firefighting, health professionals, hospital, transportation, environmental, media, community groups and owners and operators of facilities subject to the requirements of Section 302(b) of EPCRA. LEPCs are required to develop a local hazardous materials emergency plan for their district and to collect EPCRA information submitted by industry. Each local committee shall establish procedures for receiving and processing requests from the general public for information under Section 324 (including Tier II information under Section 312) EPCRA. Such procedures shall include the designation of an official to serve as committee coordinator for all information requests.

According to the Department of Ecology and Washington Emergency Management Division, in 2018 Washington has 42 LEPCs, one for each of Washington's 39 counties as well as for the Emergency Services Coordinating Agency, the Southwest Snohomish Emergency Services Coordinating Agency and the Fort Lewis military installation/reservation.

HAZARDOUS MATERIALS PLANS

The Washington SERC requires that all facilities or businesses that have reportable quantities of certain chemicals must complete a Tier Two – Emergency and Hazardous Chemical Inventory report annually for each hazardous or extremely hazardous substance present in excess of its threshold at any one time. The Washington Department of Ecology receives all EPCRA reports and manages EPCRA data on behalf of the Washington SERC. Most EPCRA reports must also be submitted to the LEPC, the local fire department or, when appropriate, to tribal nations or tribal emergency response commissions, their designated LEPC's and fire departments.

There are thousands of facilities across the state that contain hazardous materials. Table 73 provides a summary of hazardous materials that are commonly associated with certain types of business and industries. The list is not specific to any jurisdiction in the State of Washington, but it demonstrates the danger to emergency responders who may be entering a facility containing hazardous materials. For example, firefighters are at high risk of exposure to hazardous materials when responding to fire or other emergency at a facility where hazardous materials are stored. Reports on such materials and quantities can help protect emergency responders when they need to enter a building or property.

Table 73) Types of hazardous materials typically associated with certain businesses and industrial operations (Idaho State Hazard Mitigation Plan 2018).

Type of Business	Types of Chemicals Used
Airport and marine fuel depots	gasolines and fuel oils
Breweries and distilleries	alcohols
Chemical manufacturers	acids/bases, cyanide wastes, heavy metals/inorganics, ignitable wastes, reactives, solvents
Cleaning agents and cosmetics	acids/bases, heavy metals/inorganics, ignitable wastes, reactives, solvents, pesticides

Compressed gas suppliers	medical and industrial gases
Dry cleaners and laundries	cleaning solvents, perchloroethylene, dry cleaning filtration residues, solvents
Educational and vocational shops	acids/bases, ignitable wastes, pesticides, reactives, solvents
Electronic circuit makers	acids/bases
Embalming supply houses and funeral services	formaldehyde, solvents
Equipment repair	acids/bases, ignitable wastes, solvents
Farm/garden supply shows, lawn fertilizer companies, pesticide end users and application services	pesticides, fertilizers, herbicides, heavy metal/inorganics, solvents
Fireworks manufacturers	explosives, pyrotechnics
Food stores or warehouses	ammonia (in refrigeration systems), combustible dusts
Foundries	resins, other chemicals
Formulators	acids/bases, cyanide wastes, heavy metals/inorganics, ignitable wastes, reactives, pesticides, solvents
Fuel oil companies	fuel oils
Furniture/wood manufacturing and refinishing	solvents, ignitable wastes
Gasoline stations	various fuels
Gun and ammo shops	ammunition, explosives
Hazardous waste disposal facilities	virtually anything
Hospitals	compressed gases, medicines, radioactive materials, etiologic agents
Laboratories, research, chemical and biological	acids/bases, cyanide wastes, heavy metals/inorganics, ignitable wastes, reactives, solvents, various chemical and etiologic agents
Leather tanners	various chemicals
LP-gas or propane suppliers	liquefied/flammable gases
Metal manufacturing	acids/bases, cyanide wastes, heavy metals/inorganics, ignitable wastes, reactives, solvents, spent plating wastes
Motor freight terminals and railroad transportation	acids/bases, heavy metals/inorganics, ignitable wastes, lead-acid batteries, solvents, fuels
Paint, varnish, and lacquer makers and wholesalers	resins, solvents, chemical pigments and additives
pest control companies	pesticides, poisons
Plastic and rubber makers	solvents, additives, bulk chemicals
Plating shops	acids/bases, cyanides
Printing and allied industries	acids/bases, heavy metals/inorganics, ink sludges, spent plating wastes, solvents
Pulp and paper mills	bleaches, caustics, acids, sulfur compounds, and others
School and university chemical laboratories	various chemicals
Swimming pools and supply houses	liquefied chlorine, oxidizers, acids/bases, algacides
Steel mills	acids, degreasers
Textile and fiber manufacturers	solvents, dyes, resins, various other bulk chemicals
Vehicle maintenance	acids/bases, heavy metals/inorganics, ignitable wastes, lead-acid batteries, solvents, compressed gases, paints
Water treatment facilities	liquefied chlorine, acids
Welding shops and supply shops	compressed gases
Wood preserving	preserving agents

HAZARDOUS MATERIALS SPILLS

In addition to transportation by vessel, there are 10,000's of miles of pipeline infrastructure and railroad in Washington State that transport approximately 20 billion gallons of crude oil every year. In general, all three means of transportation are safe, reliable, and operate with few incidents. However, when leaks and spills do occur, they can happen on a large scale and have significant impacts on local populations and the environment. To address concerns related to oil spills, Washington passed legislature in 2005 that set a goal of zero-spills. Since then, other legislation has been passed to help protect against future spills and give Washington one of the lowest spill-rates in the nation. More information about the transportation of crude oil and hazardous materials in the state can be found on the State of Washington Department of Ecology website : <https://ecology.wa.gov/Spills-Cleanup/Spills/Oil-spill-prevention/Oil-transportation-in-Washington>

SPILLS IN WASHINGTON STATE

Hazardous material spills are one of the most common forms of hazardous material release in Washington. Between July 21, 2015 and March 31, 2019 there were 2,362 recorded oil and chemical spills in the state (Figure 19). Most spills (1808 spills; 76% of the total) were less than 10 gallons and only 12 spills were larger than 1,000 gallons. Only one spill release more than 10,000 gallons of hazardous materials; approximately 50,000 gallons were released from a commercial/industrial facility because of an equipment/material failure.

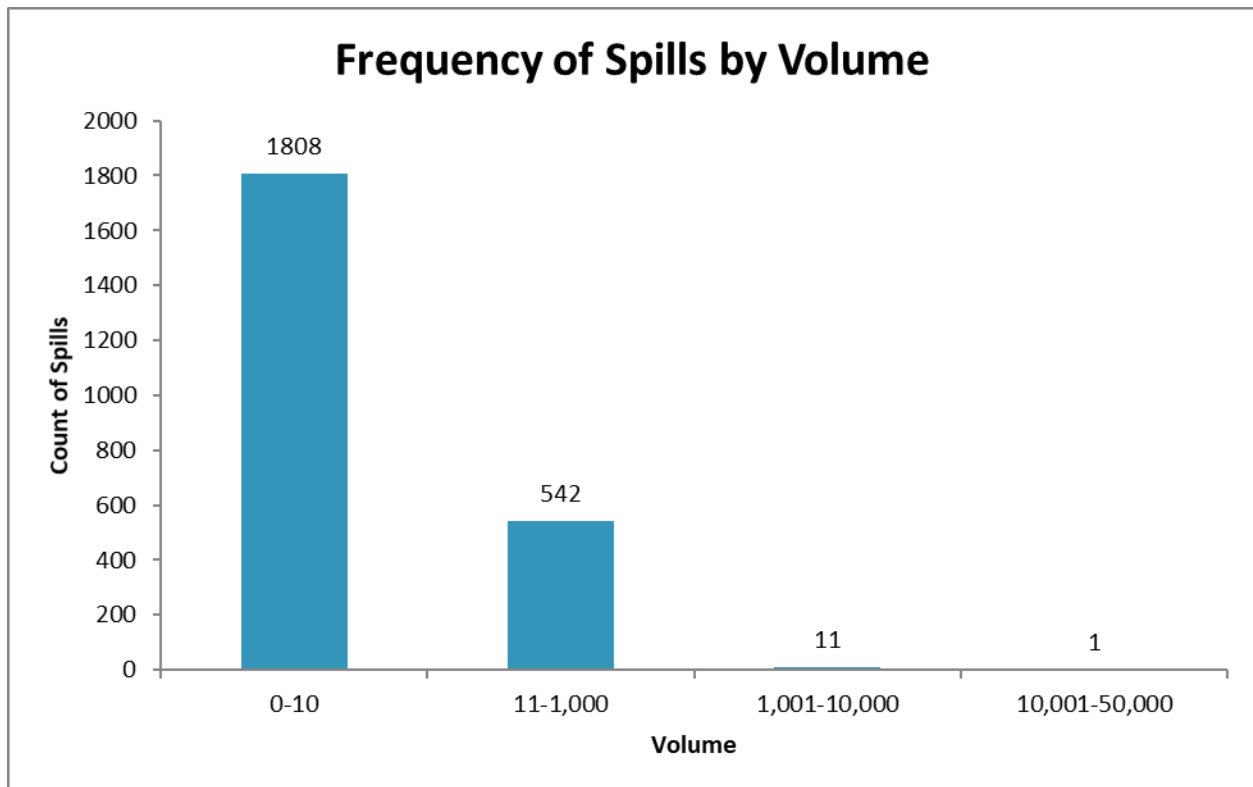


Figure 19) Frequency of oil and chemical spills by volume in Washington State; data includes spills that occurred between July 21, 2015 and March 31, 2019 (Washington State Department of Ecology Spills Map).

Hazardous materials spills were classified by the type of incident that produced the spill. During that same period, 94% of the total spills (2,220) were classified as oil spills that were produced by various sources. Approximately 4.7% of spills (111) resulted from vehicular accidents and the remaining 1.3% of spills were from various other sources, such as aircraft and train accidents, explosions, chemical releases, or issues related to equipment/machinery fitness for service. A summary of incidents resulting in a chemical or oil spill can be found on the left side of Table 74.

Because so many spills (94% of all spills) were classified as “Oil Spill”, the Oil Spill category was further broken down by spill-source. Of all oil spills, most were either produced by a vehicle (25.5%), vessel (25.3%), or a facility (21.9%). The remaining spills were from an unknown source, operations on public lands, or activities on private property. A summary of oil spill sources can be found on the right side of Table 74.

Table 74) A summary of oil and chemical spills by incident-type as well as a summary of oil spill sources (“Oil Spills”, as an incident type, is highlighted in gray on the left side of the table. A summary of the sources that produced those spills, highlighted in the same color gray, can be found on the right side of the table). Data is from the Washington State Department of Ecology, July 21, 2015 through March 31, 2019.

Incidents Resulting in Spills	# of Incidents	Oil Spill Source	# of Incidents
Aircraft Accident	2	Facility	486
Chemical Release	1	Military	4
Fire/Explosion	24	NULL	3
Fitness for Service	1	Pipeline	3
Oil Spill	2,220	Private Property	66
Other Non-Oil, Fire/explosion	1	Public Lands	156
Other Non-Oil	1	Unknown	199
Train Accident-Oil Spill	1	Vehicle	568
Vehicular Accident	111	Vessel	563
Total	2,362	Other	172
		Grand Total	2,220

Hazardous material spills almost always have a direct impact on the environment and, consequently, a secondary indirect impact on human health, recreation, the economy, etc. Depending on the source of the leak, a spill may result in one or several types of environmental pollution. Of the 2,362 spills included in the Washington State Department of Ecology dataset, approximately 77% of spills resulted in water pollution while another 12.2% results in contaminated roadways and parking lots (oil on these surfaces can then end up in storm water systems, river systems, soil, and ground water). Approximately 5.8% of spills resulted in various types of pollution (such as air pollution, ground water contamination, soil contamination, shoreline degradation, natural resource damage, or fish kills) while the remaining 5% of spills resulted in either no pollution or the impacts of the spill are unknown. Refer to Table 75 for a summary of environmental pollution resulting from oil spills in the State of Washington.

Table 75) A summary of pollution incidents resulting from hazardous material spills in Washington State. Data is from the Washington State Department of Ecology, July 21, 2015 through March 31, 2019.

Pollution Resulting from Spills	# of Incidents
Air Pollution	7
Beach/Shoreline Degradation/Pollution	20
Contaminated Roadway/Parking Lot	288
Fish Kill	2
Ground Water Contamination	4
Natural Resource Damage	4
None	8
Null	23
Other	3
Potential Pollution Only-No Release	104
Soil Contamination	85
Unknown	7
Water Pollution	1,807
Total	2,362

DRUG LABS AND DUMPS

The information in this section was excerpted from the 2018 Washington Enhanced Hazard Mitigation Plan and the Washington State Department of Health.

Illegal drug labs encountered by state and local agencies increased dramatically from 38 in 1990 to 1,890 in 2001 when the number of labs peaked. By 2010 the number of reported drug labs decreased to 92. Ecology is responsible for handling and disposing of hazardous substances found at illegal drug lab sites. Nearly all of Washington's clandestine drug labs manufacture methamphetamine – also called meth, crystal, crank or speed. Law enforcement intelligence indicates the recent decline may correspond with inexpensive drugs manufactured in Mexico and entering the United States. The number of labs reported in each county from 1999 to 2011 can be seen in Figure 20.

A meth lab can be set up using common household equipment and chemicals. The different ways of making meth can involve explosives, solvents, metals, salts, and corrosives. Meth labs have been found in homes, sheds, barns, motel and hotel rooms, outside in the woods, and in car trunks. Manufacturing or "cooking" meth can leave behind large amounts of toxic waste.

Over-the-counter cold and allergy medications can be used as an ingredient to make meth. To prevent meth cooks from buying large amounts of these medications, Washington joined the National Precursor Log Exchange (NPLEx). The NPLEx system, used by pharmacies and law enforcement, tracks the sales of over-the-counter medications that contain ingredients which could be used to make meth.

Toxic chemical fumes, spills, explosions, and fires make meth labs dangerous places. Meth cooks, their family members, and first responders are often the ones who are injured (or worse) in illegal drug labs. Waste dumped from meth labs can expose people to toxic chemicals. People picking up litter on the side of a road have been injured from meth lab waste dumps.

Exposures to high levels of contaminants found in meth labs can cause shortness of breath, cough, chest pain, dizziness, lack of coordination, chemical irritation, and burns to the skin, eyes, mouth and nose, and in severe cases, death. Symptoms such as headache, nausea, dizziness, and fatigue have occurred in people who entered a meth lab after the bust was completed, but before the property was properly cleaned and ventilated. If you experience any of these symptoms, contact your health care provider.

Not much is known about the long-term health effects from these labs. Long-term exposure to meth labs is a big concern, especially for children living in a very contaminated environment. However, there is scientific evidence from animal and human toxicity studies that shows the chemicals used in the manufacture of meth can cause a range of health effects. These include cancer, damage to the brain, liver and kidneys, birth defects, and reproductive problems, such as miscarriages.

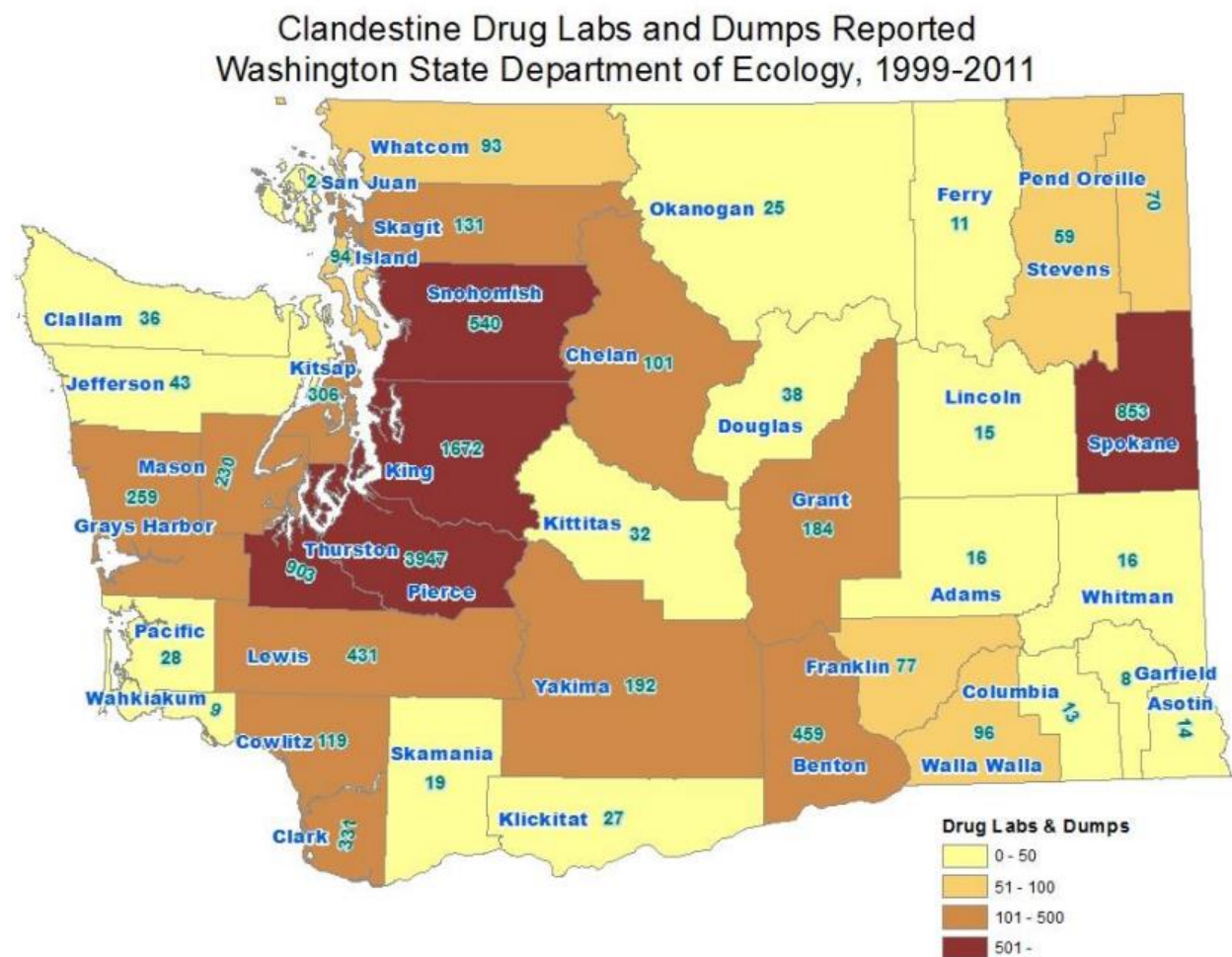


Figure 20) Number of clandestine drug labs and dumps reported by county in Washington State from 1999 to 2011.

SECOND-ORDER HAZARD EVENTS

Most natural hazards included in this plan could cause or exacerbate conditions that are conducive to a hazardous materials spill. Spills are produced when vehicles or infrastructure transporting hazardous materials or facilities that process hazardous materials are damaged, fail, or malfunction due to human error; all of these scenarios can be caused by the natural hazards listed in Table 76. The most common impacts produced by a hazardous materials spill include adverse effects to human health and wildlife, environmental damage, and economic losses.

Table 76) Second-Order Hazards Related to Hazardous Materials Spills.

Related Causal Events	Related Effects
Flood	Health Impacts
Earthquake	Environmental Damage
Landslide	Economic Impacts
Severe Weather	
Wildland Fire	
Volcano	

PANDEMIC HAZARD PROFILE

DEFINITIONS

Cluster: An aggregation of cases grouped in place and time that are suspected to be greater than the number expected, even though the expected number may not be known.

Common-Source Outbreak: An outbreak in which a group of persons are all exposed to an infectious agent or a toxin from the same source. In some common-source outbreaks, case-patients may have been exposed over a period of days, weeks, or longer.

Coronavirus: A type of common virus that infects humans, typically leading to an upper respiratory infection (URI.) Coronaviruses are named for the crown-like spikes on their surface. Seven different types of human coronavirus have been identified. Most people will be infected with at least one type of coronavirus in their lifetime.

COVID-19: On February 11, 2020 the World Health Organization announced an official name for the disease that is causing the 2019 novel coronavirus outbreak, first identified in Wuhan China. The new name of this disease is coronavirus disease 2019, abbreviated as COVID-19. In COVID-19, 'CO' stands for 'corona,' 'VI' for 'virus,' and 'D' for disease. Formerly, this disease was referred to as "2019 novel coronavirus" or "2019-nCoV".

There are many types of human coronaviruses including some that commonly cause mild upper-respiratory tract illnesses. COVID-19 is a new disease, caused by a novel (or new) coronavirus that has not previously been seen in humans.

Endemic: The amount of a particular disease that is usually present in a community (referred to as the baseline). This level is not necessarily the desired level, which may in fact be zero, but rather is the observed level. In the absence of intervention and assuming that the level is not high enough to deplete the pool of susceptible persons, the disease may continue to occur at this level indefinitely. Thus, the baseline level is often regarded as the expected level of the disease.

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

Hyperendemic: Refers to persistent, high levels of disease occurrence in a population.

Incubation Period: The time from exposure to the causative agent until the first symptoms develop and is characteristic for each disease agent. To determine the most likely period of exposure for an outbreak, you need to know the average incubation period for the disease and the range of incubation periods, which are the minimum and maximum reported incubation periods.

Mixed Epidemics: Some epidemics have features of both common-source epidemics and propagated epidemics. The pattern of a common-source outbreak followed by secondary person-to-person spread is not uncommon.

Novel Coronavirus: A new coronavirus that has not been previously identified. The virus causing coronavirus disease 2019 (COVID-19), is not the same as the coronaviruses that commonly circulate among humans and cause mild illness, like the common cold.

Outbreak: Carries the same definition of “epidemic” (when the amount of disease in a community rises above the expected level) but is often used for a more limited geographic area.

Pandemic: Refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people.

Point-Source Outbreak: A more specific classification of common-source outbreak. It describes a group that is exposed over a relatively brief period; everyone who becomes ill does so within one incubation period.

Propagated Outbreak: An outbreak results from transmission from one person to another. Usually, transmission is by direct person-to-person contact, as with syphilis. Transmission may also be vehicleborne (e.g., transmission of hepatitis B or HIV by sharing needles) or vectorborne (e.g., transmission of yellow fever by mosquitoes).

Sporadic: A disease that occurs infrequently and irregularly. While some diseases are so rare in a given population that a single case warrants an epidemiologic investigation (e.g., rabies, plague, polio).

Virus: A virus is a small parasite that cannot reproduce by itself. Once it infects a susceptible cell, however, a virus can direct the cell machinery to produce more viruses.

BACKGROUND INFORMATION

This section provides some general information about disease and disease outbreak with a focus on viral outbreaks and COVID-19. Additional information about other diseases should be added to this section during future updates if a need is identified by the planning team.

LEVEL OF DISEASE⁷⁸

The amount of a particular disease that is usually present in a community is referred to as the baseline or endemic level of the disease. This level is not necessarily the desired level, which may in fact be zero, but rather is the observed level. In the absence of intervention and assuming that the level is not high enough to deplete the pool of susceptible persons, the disease may continue to occur at this level indefinitely. Thus, the baseline level is often regarded as the expected level of the disease.

While some diseases are so rare in a given population that a single case warrants an epidemiologic investigation (e.g., rabies, plague, polio), other diseases occur more commonly so that only deviations from the norm warrant investigation. Sporadic refers to a disease that occurs infrequently and irregularly.

⁷⁸ Principles of Epidemiology in Public Health Practice, Lesson 1: Introduction to Epidemiology. Centers for Disease Control and Prevention. <https://www.cdc.gov/csels/dsepd/ss1978/lesson1/section11.html>. Accessed August 2020.

Endemic refers to the constant presence and/or usual prevalence of a disease or infectious agent in a population within a geographic area. Hyperendemic refers to persistent, high levels of disease occurrence.

Occasionally, the amount of disease in a community rises above the expected level. Epidemic refers to an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area. Outbreak carries the same definition of epidemic, but is often used for a more limited geographic area. Cluster refers to an aggregation of cases grouped in place and time that are suspected to be greater than the number expected, even though the expected number may not be known. Pandemic refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people.

Epidemics occur when an agent and susceptible hosts are present in adequate numbers, and the agent can be effectively conveyed from a source to the susceptible hosts. More specifically, an epidemic may result from:

- A recent increase in amount or virulence of the agent,
- The recent introduction of the agent into a setting where it has not been before,
- An enhanced mode of transmission so that more susceptible persons are exposed,
- A change in the susceptibility of the host response to the agent, and/or
- Factors that increase host exposure or involve introduction through new portals of entry⁷⁹.

The previous description of epidemics presumes only infectious agents, but non-infectious diseases such as diabetes and obesity exist in epidemic proportion in the U.S.^{80, 81}.

EPIDEMIC PATTERNS⁸²

A common-source outbreak is one in which a group of persons are all exposed to an infectious agent or a toxin from the same source.

If the group is exposed over a relatively brief period, so that everyone who becomes ill does so within one incubation period, then the common-source outbreak is further classified as a point-source outbreak. The epidemic of leukemia cases in Hiroshima following the atomic bomb blast and the epidemic of hepatitis A among patrons of the Pennsylvania restaurant who ate green onions each had a point source of

⁷⁹ Kelsey JL, Thompson WD, Evans AS. *Methods in observational epidemiology*. New York: Oxford University Press; 1986. p. 216.

⁸⁰ Centers for Disease Control and Prevention. Prevalence of overweight and obesity among adults with diagnosed diabetes — United States, 1988–1994 and 1999–2002. *MMWR* 2004;53(45):1066–8.

⁸¹ National Center for Health Statistics [Internet]. Atlanta: Centers for Disease Control and Prevention [updated 2005 Feb 8]. Available from: <https://www.cdc.gov/nchs/products/pubs/pubd/hestats/overwght99.htm>.

⁸² Principles of Epidemiology in Public Health Practice, Lesson 1: Introduction to Epidemiology. Centers for Disease Control and Prevention. <https://www.cdc.gov/csels/dsepd/ss1978/lesson1/section11.html>. Accessed August 2020.

exposure^{83, 84}. If the number of cases during an epidemic were plotted over time, the resulting graph, called an epidemic curve, would typically have a steep upslope and a more gradual downslope (a so-called “log-normal distribution”).

In some common-source outbreaks, case-patients may have been exposed over a period of days, weeks, or longer. In a continuous common-source outbreak, the range of exposures and range of incubation periods tend to flatten and widen the peaks of the epidemic curve (Figure 1.22). The epidemic curve of an intermittent common-source outbreak often has a pattern reflecting the intermittent nature of the exposure.

A propagated outbreak results from transmission from one person to another. Usually, transmission is by direct person-to-person contact, as with syphilis. Transmission may also be vehicleborne (e.g., transmission of hepatitis B or HIV by sharing needles) or vectorborne (e.g., transmission of yellow fever by mosquitoes). In propagated outbreaks, cases occur over more than one incubation period. In Figure 1.23, note the peaks occurring about 11 days apart, consistent with the incubation period for measles. The epidemic usually wanes after a few generations, either because the number of susceptible persons falls below some critical level required to sustain transmission, or because intervention measures become effective.

Some epidemics have features of both common-source epidemics and propagated epidemics. The pattern of a common-source outbreak followed by secondary person-to-person spread is not uncommon. These are called mixed epidemics. For example, a common-source epidemic of shigellosis occurred among a group of 3,000 women attending a national music festival (Figure 1.24). Many developed symptoms after returning home. Over the next few weeks, several state health departments detected subsequent generations of *Shigella* cases propagated by person-to-person transmission from festival attendees⁸⁵.

Finally, some epidemics are neither common-source in its usual sense nor propagated from person to person. Outbreaks of zoonotic or vectorborne disease may result from sufficient prevalence of infection in host species, sufficient presence of vectors, and sufficient human-vector interaction. Examples (Figures 1.25 and 1.26) include the epidemic of Lyme disease that emerged in the northeastern United States in

⁸³ Centers for Disease Control and Prevention. Hepatitis A outbreak associated with green onions at a restaurant—Monaca, Pennsylvania, 2003. *MMWR* 2003; 52(47):1155–7.

⁸⁴ Cobb S, Miller M, Wald N. On the estimation of the incubation period in malignant disease. *J Chron Dis* 1959;9:385–93.

⁸⁵ Lee LA, Ostroff SM, McGee HB, Jonson DR, Downes FP, Cameron DN, et al. A outbreak of shigellosis at an outdoor music festival. *Am J Epidemiol* 1991. 133:608–15.

the late 1980s (spread from deer to human by deer ticks) and the outbreak of West Nile encephalitis in the Queens section of New York City in 1999 (spread from birds to humans by mosquitoes)^{86,87}.

OUTBREAK OF COVID-19

VIRUSES⁸⁸

Viruses are very tiny germs. They are made of genetic material inside of a protein coating. Viruses cause familiar infectious diseases such as the common cold, flu and warts. They also cause severe illnesses such as HIV/AIDS, Ebola, and COVID-19.

Viruses are like hijackers. They invade living, normal cells and use those cells to multiply and produce other viruses like themselves. This can kill, damage, or change the cells and make you sick. Different viruses attack certain cells in your body such as your liver, respiratory system, or blood.

When you get a virus, you may not always get sick from it. Your immune system may be able to fight it off.

CORONAVIRUSES⁸⁹

Coronaviruses are a large family of viruses that usually cause mild to moderate upper-respiratory tract illnesses, like the common cold. However, three new coronaviruses have emerged from animal reservoirs over the past two decades to cause serious and widespread illness and death.

There are hundreds of coronaviruses, most of which circulate among such animals as pigs, camels, bats and cats. Sometimes those viruses jump to humans—called a spillover event—and can cause disease. Four of the seven known coronaviruses that sicken people cause only mild to moderate disease. Three can cause more serious, even fatal, disease. SARS coronavirus (SARS-CoV) emerged in November 2002 and caused severe acute respiratory syndrome (SARS). That virus disappeared by 2004. Middle East respiratory syndrome (MERS) is caused by the MERS coronavirus (MERS-CoV). Transmitted from an animal reservoir in camels, MERS was identified in September 2012 and continues to cause sporadic and localized outbreaks. The third novel coronavirus to emerge in this century is called SARS-CoV-2. It causes

⁸⁶ White DJ, Chang H-G, Benach JL, Bosler EM, Meldrum SC. Means RG, et al. Geographic spread and temporal increase of the Lyme diseases. *epidemic. JAMA* 1991;266:1230–6.

⁸⁷ Centers for Disease Control and Prevention. Outbreak of West Nile-Like Viral Encephalitis—New York, 1999. *MMWR* 1999;48(38):845–9.

⁸⁸ Viral Infections. National Institute of Health. U.S. National Library of Medicine. Medline Plus. <https://medlineplus.gov/viralinfections.html>. Accessed August 2020.

⁸⁹ Coronaviruses. Diseases and Conditions. National Institute of Allergy and Infectious Diseases. <https://www.niaid.nih.gov/diseases-conditions/coronaviruses>. Accessed September 2020.

coronavirus disease 2019 (COVID-19), which emerged from China in December 2019 and was declared a global pandemic by the World Health Organization on March 11, 2020.

Building on previous research on SARS and MERS, NIAID scientists and grantees are well positioned to rapidly develop COVID-19 diagnostics, therapeutics and vaccines. These projects include conducting basic research to understand how the virus infects cells and causes disease, and what interventions can prevent and stop the spread of disease.

In fact, within two weeks of the discovery of COVID-19, NIAID researchers had determined how the virus enters cells. And within two months sites had begun Phase 1 trials of a treatment (remdesivir) and a vaccine (mRNA-1273).

SYMPTOMS OF COVID-19⁹⁰:

Anyone with COVID-19 can have mild to severe symptoms (with some individuals actually being asymptomatic). Older adults and people who have severe underlying medical conditions like heart or lung disease or diabetes seem to be at higher risk for developing more serious complications from COVID-19 illness.

People with COVID-19 have had a wide range of symptoms reported – ranging from mild symptoms to severe illness. Symptoms may appear 2-14 days after exposure to the virus. People with these symptoms may have COVID-19:

- Fever or chills
- Cough
- Shortness of breath or difficulty breathing
- Fatigue
- Muscle or body aches
- Headache
- New loss of taste or smell
- Sore throat
- Congestion or runny nose
- Nausea or vomiting
- Diarrhea

This list does not include all possible symptoms. CDC will continue to update this list as we learn more about COVID-19.

CDC Recommendation for when to seek emergency medical attention*

Look for emergency warning signs* for COVID-19. If someone is showing any of these signs, seek emergency medical care immediately:

- Trouble breathing
- Persistent pain or pressure in the chest
- New Confusion
- Inability to wake or stay awake
- Bluish lips or face

⁹⁰ Symptoms of Coronavirus. Centers for Disease Control and Prevention. <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>. Accessed September 2020.

*This list is not all possible symptoms. Please call your medical provider for any other symptoms that are severe or concerning to you.

Call 911 or call ahead to your local emergency facility: Notify the operator that you are seeking care for someone who has or may have COVID-19.

LONG-TERM HEALTH AFFECTS

The following information is a direct excerpt from a section of the Mayo Clinic website titled, *COVID-19 (coronavirus): Long-term effects*⁹¹.

Organ damage caused by COVID-19

Organs that may be affected by COVID-19 include:

- **Heart:** Imaging tests taken months after recovery from COVID-19 have shown lasting damage to the heart muscle, even in people who experienced only mild COVID-19 symptoms. This may increase the risk of heart failure or other heart complications in the future.
- **Lungs:** The type of pneumonia often associated with COVID-19 can cause long-standing damage to the tiny air sacs (alveoli) in the lungs. The resulting scar tissue can lead to long-term breathing problems.
- **Brain:** Even in young people, COVID-19 can cause strokes, seizures and Guillain-Barre syndrome - a condition that causes temporary paralysis. COVID-19 may also increase the risk of developing Parkinson's disease and Alzheimer's disease.

Blood clots and blood vessel problems

COVID-19 can make blood cells more likely to clump up and form clots. While large clots can cause heart attacks and strokes, much of the heart damage caused by COVID-19 is believed to stem from very small clots that block tiny blood vessels (capillaries) in the heart muscle.

Other organs affected by blood clots include the lungs, legs, liver and kidneys. COVID-19 can also weaken blood vessels, which contributes to potentially long-lasting problems with the liver and kidneys.

Problems with mood and fatigue

People who have severe symptoms of COVID-19 often have to be treated in a hospital's intensive care unit, with mechanical assistance such as ventilators to breathe. Simply surviving this experience can make a person more likely to later develop post-traumatic stress syndrome, depression and anxiety.

Because it's difficult to predict long-term outcomes from the new COVID-19 virus, scientists are looking at the long-term effects seen in related viruses, such as severe acute respiratory syndrome (SARS).

⁹¹Covid-19 (coronavirus): Long-term effects. Mayo Clinic. Available online at <https://www.mayoclinic.org/diseases-conditions/coronavirus/in-depth/coronavirus-long-term-effects/art-20490351>. Accessed September 2020.

Many people who have recovered from SARS have gone on to develop chronic fatigue syndrome, a complex disorder characterized by extreme fatigue that worsens with physical or mental activity, but doesn't improve with rest. The same may be true for people who have had COVID-19.

Many long-term COVID-19 effects still unknown

Much is still unknown about how COVID-19 will affect people over time. However, researchers recommend that doctors closely monitor people who have had COVID-19 to see how their organs are functioning after recovery.

It's important to remember that most people who have COVID-19 recover quickly. But the potentially long-lasting problems from COVID-19 make it even more important to reduce the spread of the disease by following precautions such as wearing masks, avoiding crowds and keeping hands clean.

SPREAD

The following is a timeline of the COVID-19 outbreak that started in late 2019. The information included in this section is a direct excerpt from an article published by ABC News on July 28, 2020 called *Timeline: How coronavirus got started*⁹².

Dec. 31, 2019: WHO says mysterious pneumonia sickening dozens in China

Health authorities in China confirm that dozens of people in Wuhan, China, are being treated for pneumonia from an unknown source. Many of those sickened had visited a live animal market in Wuhan, but authorities say there is no evidence of the virus spreading from person to person.

Jan. 11, 2020: China reports 1st novel coronavirus death

Chinese state media reports the first death from novel coronavirus, a 61-year-old man who had visited the live animal market in Wuhan.

Jan. 21, 2020: 1st confirmed case in the United States

A man in his 30s from Washington state, who traveled to Wuhan, is diagnosed with novel coronavirus. Japan, South Korea and Thailand also report their first cases one day prior.

Jan. 23, 2020: China imposes strict lockdown in Wuhan

China imposes aggressive containment measures in Wuhan, the epicenter of the outbreak, suspending flights and trains and shutting down subways, buses and ferries in an attempt to stem the spread of the virus.

⁹² *Timeline: How Coronavirus got started*. Erin Schumaker. ABC News. July 28, 2020. Accessed online at: <https://abcnews.go.com/Health/timeline-coronavirus-started/story?id=69435165>

Jan. 30, 2020: WHO declares global health emergency

For the sixth time in history, the World Health Organization declares a "public health emergency of international concern," a designation reserved for extraordinary events that threaten to spread internationally.

Feb. 11, 2020: Novel coronavirus renamed COVID-19

The WHO announces that novel coronavirus' formal new name is COVID-19. "Co" stands for coronavirus, "Vi" is for virus and "D" is for disease. Health officials purposely avoid naming COVID-19 after a geographical location, animal or group of people, so as not to stigmatize people or places.

Feb. 26, 2020: 1st case of suspected local transmission in United States

The Centers for Disease Control and Prevention (CDC) confirms the first case of COVID-19 in a patient in California with no travel history to an outbreak area nor contact with anyone diagnosed with the virus. It's suspected to be the first instance of local transmission in the United States. Oregon, Washington and New York soon report their own cases of possible community transmission.

Feb. 29, 2020: 1st death reported in United States

The first COVID-19 death is reported in Washington state, after a man with no travel history to China dies on Feb. 28 at Evergreen Health Medical Center in Kirkland, Washington.

Two deaths that occurred Feb. 26 at a nearby nursing home would later be recorded as the first COVID-19 deaths to occur in the United States. Later still, a death in Santa Clara, California, on Feb. 6 would be deemed the country's first COVID-19 fatality after an April autopsy.

March 3, 2020: CDC lifts restrictions for virus testing

The CDC issues new guidance that allows anyone to be tested for the virus without restriction. Previously, only those who had traveled to an outbreak area, who had close contact with people diagnosed with COVID-19, or those with severe symptoms, could get tested.

March 13, 2020: Trump declares national emergency

President Donald Trump declares a U.S. national emergency, which he says will open up \$50 billion in federal funding to fight COVID-19.

March 15, 2020: CDC warns against large gatherings

The CDC warns against holding or attending gatherings larger than 50 people, including conferences, festivals, parades, concerts, sporting events and weddings for eight weeks, recommending that individuals cancel or postpone those events to avoid spreading the virus or introducing it into new communities.

March 17, 2020: Coronavirus now present in all 50 states

West Virginia reports its first COVID-19 case, meaning the disease is present in all 50 states.

April 2, 2020: Global cases hit 1 million

More than 1 million people around the world have been diagnosed with COVID-19. Given testing shortages, undiagnosed cases and suspicions about governments obscuring the scope of their respective outbreaks, the actual number of people sickened is believed to be much higher.

April 4, 2020: New York sets single-day record for new COVID-19 cases

New York State logs a record 12,000 new COVID-19 cases in a single day.

April 9, 2020: Evidence that first COVID-19 cases in NYC came from Europe

A new study finds evidence that the first COVID-19 cases in New York City originated in Europe and occurred as early as February. Researchers traced the origin of New York City's outbreak and found it was primarily linked to untracked transmission between the U.S. and Europe, with limited evidence showing direct introductions from China or other countries in Asia.

April 21, 2020: Autopsy reveals 1st US COVID-19 death was earlier than previously thought

The CDC confirms that tissue from an individual in Santa County, California, who died Feb. 6 tested positive for COVID-19. That death occurred weeks earlier than the COVID-19 deaths in the Seattle area on Feb. 26 that were previously believed to be the nation's first.

May 27, 2020: US reaches 100,000 deaths

The pandemic has now killed more than 355,000 people worldwide and more than 100,000 people in the United States.

July 12, 2020: Florida breaks single-day record for new COVID-19 cases

Florida logs 15,000 new COVID-19 cases in a single day, surpassing New York's one-day record of 12,000 in April.

SECOND-ORDER HAZARD EVENTS

A pandemic will not trigger the other hazards addressed in this plan, but natural disasters could contribute to the spread of a disease. The most likely scenario includes the displacement of residents from their homes which could contribute to the spread of a disease as those people move in with friends and family or relocate to an emergency shelter. Other than widespread illness and increased rates of mortality, Pandemics are most likely to have economic impacts on affected communities.

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CHAPTER 5:

JURISDICTIONAL VULNERABILITY ASSESSMENTS

IN THIS SECTION:

- Okanogan County Annex
- Okanogan Conservation District Annex
- City of Omak Annex
- City of Tonasket Annex
- City of Okanogan Annex
- Town of Twisp Annex
- Town of Winthrop Annex
- Town of Riverside Annex
- Town of Conconully Annex
- City of Oroville Annex
- City of Brewster Annex
- City of Pateros Annex
- Town of Nespelem Annex
- Town of Elmer City
- Town of Coulee Dam Annex
- Local Fire Department & District Annexes

CHAPTER 5 – JURISDICTIONAL VULNERABILITY ASSESSMENTS

NATURAL HAZARDS AND CLIMATE CHANGE

The following section is composed of direct excerpts taken from the Washington Department of Ecology publication, “Preparing for a Changing Climate: Washington State’s Integrated Climate Response Strategy”⁹³. This section offers an overview of Washington State’s understanding of and position on the projected impacts of climate change on human populations, development, and the natural environment.

Overview: Rising levels of carbon dioxide and other heat-trapping gases have warmed the earth and are already causing wide-ranging impacts, from rising sea levels, to melting snow and ice, to more drought and extreme rainfall. Scientists project that these trends will continue and in some cases accelerate, posing significant risks to human health, our forests, agriculture, freshwater supplies, coastlines, and other natural resources that are vital to Washington State’s economy, environment, and our way of life.

Climate impacts will likely be experienced through incremental changes in temperature and precipitation and through more frequent and destructive disaster events, such as catastrophic floods, wildfires, or coastal storms. In many cases, climate-related impacts will combine with existing stressors to increase harm to people, communities, infrastructure, economic activity, and natural resources. Both incremental changes and catastrophic events will be costly and will have direct implications for the health and welfare of our state.

Washington’s Changing Climate and Risks: While Washingtonians have experience dealing with natural weather variability, climate change is moving us beyond a range where past experience can provide a reliable guide for what we might expect in the future.

- Climate change could have severe consequences to human health and will likely increase the number of people exposed to illness and injuries due to declining air quality and more frequent and severe heat waves, drought, wildfires, and flooding.
- Our communities and transportation, energy, and other infrastructure could face increased damage costs and disruptions from more frequent and severe flooding, wildfires, changes in energy supply and demand, and other climate impacts.
- Coastal communities and ecosystems could face increased risks from sea level rise and storm surge. Increasing ocean acidity poses risks to our shellfish industry and could alter the marine food web.
- The quantity and quality of water available for communities, irrigation, fish, hydropower generation, recreation, and other uses will be affected by declining snowpack, changes in seasonal streamflow, and increases in summer demand for water.

⁹³ <https://apps.ecology.wa.gov/publications/publications/1201004.pdf>

- Fish, wildlife, and natural systems will face increased stress. Climate change will more likely damage and destroy certain types of habitats, increase threats to certain species such as coldwater fish, alter natural patterns such as animal migrations or flower blooms, and alter the presence of pests and invasive species.
- Washington’s farms and forests will be threatened by increased disease, pests, weeds, and fire, along with reduced summer water supplies. Climate change impacts could affect crop yields and benefit or damage different crops.

Observed Trends and Future Projections: Climate change is pushing temperature and many climate-influenced conditions and events beyond their historical ranges. In Washington State, we are already experiencing trends that are consistent with a warming climate, from warmer temperatures to rising sea levels to melting snow and ice to more drought and extreme rainfall. Scientists project that these trends will continue and in some cases accelerate, posing significant risks to human health, our forests, agriculture, freshwater supplies, coastlines, and other natural resources that are vital for our economy and the environment. Nine key indicators and projections of climate change affecting Washington State are as followed:

- Increasing carbon dioxide levels
- Warmer air temperatures
- Drier summers and reduced snowfall
- More frequent and severe extreme weather events
- Rising sea levels
- More acidic marine waters
- Warmer water temperatures
- Increasing frequency and severity of wildfires
- Increasing frequency and severity of flooding

Climate Change is addressed in the Flood, Earthquake, Landslide, Severe Weather, Wildland Fire, and Volcano Hazards sections in the Okanogan County Annex in Chapter 5: Jurisdictional Vulnerability Assessments. A brief overview of how climate change is expected to affect each of those hazards can be found at the end of the “Impacts of Events” sub-heading in each hazard section within the Okanogan County Annex. Climate change was only addressed in the Okanogan County Annex as it is assumed that each adopting jurisdiction will be affected in a similar manner by climate change. For more information about climate change, refer to the following documents:

- **Washington State Enhanced Hazard Mitigation Plan: Risk and Vulnerability Assessment**
 - Available online at: <https://mil.wa.gov/asset/5f233441409d0>
- **Preparing for a Changing Climate: Washington State’s Integrated Climate Response Strategy**
 - Available online at: <https://apps.ecology.wa.gov/publications/publications/1201004.pdf>

HAZARD ASSESSMENTS

When the Okanogan Multi-Hazard Mitigation Plan (MHMP) was first written, the committee agreed that the natural hazards identified in the Washington State Enhance Hazard Mitigation Plan presented the greatest potential risk in Okanogan County; therefore, the plan addressed flood, earthquake, landslide, severe weather, and wildland fire hazards in the risk assessment for each jurisdiction. In addition to the natural hazards covered in the state plan, the planning team also identified terrorism and civil unrest for inclusion in the county plan. For the 2022 update, the Okanogan County MHMP planning team reviewed the hazards included in the previous version of the plan and decided to add several more. The new hazards included in the 2022 update include dam failure, hazardous materials, pandemic, and volcano.

During the 2014 update, representatives from each adopting jurisdiction were asked to fill out a critical infrastructure worksheet identifying and locating all structures, infrastructure, and culturally significant sites that the loss or damage of which would have a significant impact on the community. This exercise also included all communication, hazardous materials storage, transportation, and emergency response infrastructure. This information served as the “baseline” for the 2022 update; maps and tables produced using this data were then reviewed by the Planning Team and updated or modified where appropriate.

Furthermore, Okanogan County’s existing parcel master listing has been converted to an accessible GIS database. This database allowed the planning committee to map every parcel within the County and city jurisdictions as well as assign an accurate assessed value of both land and improvements for each parcel. This data was combined with the hazard vulnerability models to develop the risk assessments and loss estimations for each jurisdiction.

The most current state and federal datasets were also used to update the values and hazard information included in the 2022 MHMP update. Any new, relevant hazard data sourced from state and federal agencies were also used to identify and describe any new hazard areas or changes to hazard areas that were described in previous updates. The spatial relationship between development and hazard areas was then analyzed to describe risk. Sources are cited in footnotes or captions throughout the document.

Flood Hazards

In order to be eligible for project funds under the Flood Mitigation Assistance (FMA) program authorized by the National Flood Insurance Act of 1968, as amended, communities are required under 44 CFR 79.6(d)(1) to have a mitigation plan that addresses flood hazards. On October 31, 2007, FEMA published amendments to the 44 CFR Part 201 at 72 Federal Register 61720 to incorporate mitigation planning requirements for the FMA program, which combined the Local Mitigation Plan requirement for all hazard mitigation assistances programs under 44 CFR 201.6 to include the FMA as well as the HMGP, PDM, and SRL programs thus eliminating duplicative mitigation planning regulations. The purpose of the flood sections in the following annexes is to fulfill the requirements for both the FMA program and the Local Hazard Mitigation Plan.

HAZARD RATING SUMMARY

The Multi-Hazard Mitigation Plan is developed in accordance with the Federal Emergency Management Agency's (FEMA) and Washington Military Department, Emergency Management Division requirements for a county level pre-disaster mitigation plan. The hazards addressed in this Plan are:

- | | | |
|---------------|-----------------------------|------------------------|
| 1) Flood | 4) Severe Weather | 7) Dam Failure |
| 2) Earthquake | 5) Wildland Fire | 8) Hazardous Materials |
| 3) Landslide | 6) Terrorism & Civil Unrest | 9) Volcano |
| | | 10) Pandemic |

Hazards 1-6 were addressed in the last (2014) update of the plan. *Volcano, Dam Failure, Hazardous Materials, and Pandemic* were added for the 2022 plan update. An initial assessment of the hazards was conducted by the planning team at the beginning of this project. The planning team was asked to complete a hazard summary worksheet to rate the hazards and their impacts county-wide. This worksheet is an adaptation of FEMA Worksheet 5.1 "Hazard Summary Worksheet". A copy of the worksheet and instructions are in the appendices.

Using the descriptions in FEMA worksheet 5.1 (TABLE) the planning team selected ratings for each hazard based on their knowledge of and experience with the location, impacts, and extent of natural hazard events in the county; this was done for each adopting jurisdiction. The classifications were then given a numerical value and then totaled to show the overall significance ranking for each hazard.⁹⁴ Table 78 summarizes the results of the Hazard Summary exercise for Okanogan County.

The Hazard Summary exercise was completed for each adopting jurisdiction by representatives of those jurisdictions. The final ratings are included at the beginning of each Hazards section in each adopting jurisdiction's annex (for example, the flood hazard ratings for Okanogan County can be found at the beginning of the Flood Hazards section of the Okanogan County Annex).

Table 77) Modified version of FEMA Hazard Summary Worksheet (FEMA worksheet 5.1).

Location (Geographic Area Affected)	
1) Negligible	Less than 10% of planning area or isolated single-point occurrences
2) Limited	10 to 25% of the planning area or limited single-point occurrences
3) Significant	25 to 75% of the planning area or frequent single-point occurrences
4) Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Impact (Magnitude/Strength based on historic events or future probability)	
1) Weak	Limited classification on scientific scale, moderate speed of onset or moderate duration, resulting in little to no damage

⁹⁴ Hazard Summary Worksheet. Local Mitigation Planning Handbook. 2013. Pp A-29, A-30.

2) Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
3) Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
4) Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events (Occurrence in the next 50 years)	
1) Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
2) Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
3) Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
4) Highly Likely	90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year
Overall Significance	
3-5) Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.
6-8) Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating
9-12) High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

Table 78) Hazard Rating Summary for Okanogan County, WA. Refer to Table 77 for definitions for the ranking values in this table.

Hazard	Location (Geographic Area Affected)	Max Probable Impact	Probability of Future Events	Overall Significance Ranking
Flood	Limited (2)	Severe (3)	Likely (3)	Medium (8)
Dam Failure	Limited (2)	Extreme (4)	Unlikely (1)	Medium (7)
Earthquake	Extensive (4)	Severe (3)	Unlikely (1)	Medium (8)
Landslide	Significant (3)	Severe (3)	Likely (3)	High (9)
Severe Weather	Extensive (4)	Moderate (2)	Highly Likely (4)	High (10)
Wildland Fire	Extensive (4)	Extensive (4)	Highly Likely (4)	High (12)
Volcano	Extensive (4)	Moderate (2)	Unlikely (1)	Medium (7)
HazMat	Limited (2)	Extreme (3)	Occasional (2)	Medium (9)
Pandemic	Extensive (4)	Severe (3)	Likely (3)	High (10)
Ranking Value	1 – Negligible 2 – Limited 3 – Significant 4 – Extensive	1 – Weak 2 – Moderate 3 – Severe 4 – Extreme	1 - Unlikely 2 – Occasional 3 – Likely 4 – Highly Likely	3 to 5 – Low 6 to 8 – Medium 9 to 12 – High

OKANOGAN COUNTY ANNEX

FLOOD HAZARDS

Historically, flooding has been one of the most frequently occurring natural hazards in Okanogan County. The most notable historical floods occurred in 1894, 1948, and 1972, with the flood of 1894 being a “90-year flood”. In more recent years, significant flooding has occurred each year from 2016 to 2018. A state of emergency was declared for Okanogan County because of the 2018 flooding which is considered the worst flooding event to impact the county since 1972.

Determined by representatives of the county, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for Okanogan County, WA.

Riverine flooding hazard ratings for Okanogan County.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

Dam failure hazard ratings for Okanogan County.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	4 – Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating



Figure 21) Watersheds in Okanogan County (Okanogan County Office of Planning and Development).

RIVERINE FLOODING

Riverine floods along the Okanogan, Similkameen, Nespelem, Chewuch, Twisp, and Methow Rivers have the most prolonged impact on Okanogan County. These and other perennial streams throughout the County follow an annual cycle with peak streamflow in April and May and low streamflow in August and September. Locally, flash flooding has resulted in fatalities and is a threat to populated areas due to the topographical makeup of the County. Recently, severe flash flooding occurred each year from 2014 to 2016; most flash floods that happened during this period were caused by heavy rainfall on large fire scars and resulted in damage to infrastructure and private property. The Benson Creek/Fraser Creek flash flooding that followed the Carlton Complex fires in 2014 resulted in significant damage to roadway infrastructure and private property.

Erosion and transported sediment are major secondary hazards of flooding. The intense runoff can strip away topsoil and deposit it elsewhere, usually where the flow is impeded, such as bridge abutments. Sediment deposits have been a major effect of flooding in several Okanogan County communities. The

erosion can deposit sediment in river and creek beds, decreasing their capacity to transport water. Severe flooding can also contaminate water sources and spread disease.

A high level of sediment is prevalent in Okanogan County drainages during periods of runoff primarily from the abundance of high elevation washouts and agricultural fields in the lowlands. This sediment tends to cause a deteriorating condition in channel beds through erosion and deposition. Natural obstructions to flood waters include trees, brush, and other vegetation along the stream banks in the floodplain areas. Debris can plug culverts and accumulate on bridge abutments at several locations. Many secondary routes are not paved, which results in gravel washing downslope potentially clogging drainage systems or directing water to places that were not intended. Sedimentation and accumulated debris and vegetation are significantly increasing the flood risk throughout Okanogan County. Debris jams during high water events have caused considerable flood damage to adjacent properties.

DAM FAILURE

According to the Association of State Dam Safety Officials, “Hundreds of dam failures have occurred throughout U.S. history. These failures have caused immense property and environmental damages and have taken thousands of lives. As the nation’s dams age and population increases, the potential for deadly dam failures grows.

No one knows precisely how many dam failures have occurred in the U.S., but they have been documented in every state. From January 2005 through June 2013, state dam safety programs reported 173 dam failures and 587 "incidents" - episodes that, without intervention, would likely have resulted in dam failure.”

Although rare, dam failures have occurred and will continue to occur for various reasons. In May 2020, two dams in central Michigan failed because of a severe rainfall event and failure to perform maintenance on and update the two dams. As a result, nearly 2,500 homes and businesses were damaged or destroyed, and the total damage was estimated at more than \$175 million. As of August 2020, the owner of the dams filed for Chapter 11 bankruptcy protection. When designed and maintained properly, dams can be a valuable resource, but if they are neglected or constructed without consulting the appropriate authorities they can fail, threatening lives, property, and infrastructure. The following are descriptions of the different ways that dams can fail⁹⁵:

1. **Overtopping** caused by water spilling over the top of a dam. Overtopping of a dam is often a precursor of dam failure. National statistics show that overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest account for approximately 34% of all U.S. dam failures.
2. **Foundation** Defects, including settlement and slope instability, cause about 30% of all dam failures.
3. **Cracking** caused by movements like the natural settling of a dam.
4. **Inadequate maintenance and upkeep.**

⁹⁵ Association of State Dam Safety Officials. Dam Failures and Incidents. Accessed online at: <https://www.damsafety.org/dam-failures#The%20Causes%20of%20Dam%20Failures>

5. **Piping** is when seepage through a dam is not properly filtered and soil particles continue to progress and form sink holes in the dam. Another 20% of U.S. dam failures have been caused by piping (internal erosion caused by seepage). Seepage often occurs around hydraulic structures, such as pipes and spillways; through animal burrows; around roots of woody vegetation; and through cracks in dams, dam appurtenances, and dam foundations.

There are 148 dams in Okanogan County (Figure 22), 45 of which are included in the Washington Department of Ecology Inventory of Dams Report. Of these, approximately 12 dams, including two major dams that are considered to be in neighboring counties, have been labeled “high risk” due to the number of lives that could be threatened by a failure/collapse (most high-risk dams are located upstream from towns or communities and are associated with a reservoir or impoundment). As described later in the Local Event History section, there have been three significant dam failures in the county; two failures resulted from the undercutting of the dam spillways and the third resulted from seepage that was exacerbated by burrowing animals.

LOCAL EVENT HISTORY

Historical flooding events in the county have been separated into two categories: riverine flooding and dam failure. The following events are specific to Okanogan County:

RIVERINE FLOODING

Much of the following information is from the FEMA flood events and disaster declarations database or from the NOAA Storm Events Database.

Spring 1894 Flood: The flood of 1894 was probably the largest flood event in Okanogan County’s recorded history; however, there is limited information available. It is known that the town of Conconully was completely destroyed, which included 1 life lost, 42 buildings destroyed, and approximately \$100,000 in property damages. This flood also affected the Okanogan, Methow, and Similkameen River systems causing damage to many of the settlements in the area at the time. Eyewitness accounts claim that the present site of Oroville was covered with water 10 to 15 feet deep as the Similkameen emptied so much water into the Okanogan River that Lake Osoyoos backed up into Canada. It should be noted that, with the exception of ranches along the Similkameen and Okanogan Rivers, and damage to a few of the small towns, the flood of 1894 did less damage in the County than subsequent runoffs in 1948 and 1972. This was due to most of the development at the time being in the hills rather than in towns along the rivers as they are now.

May 1948 Flood: Snowmelt flooding broke lake and river records in Eastern Washington and along the Columbia River to the Pacific Ocean. New flood records were set at the Columbia River below Priest Rapids, WA (458.65 feet; flood stage 432.0 feet) and the Methow River at Pateros, WA (12.30 feet; flood stage 10.0 feet). The flood lasted 45 days. This flood is most notable for wiping out the community of Vanport in North Portland in less than one hour as dikes along the Columbia River failed. Vanport, America's largest wartime housing project, was not rebuilt.

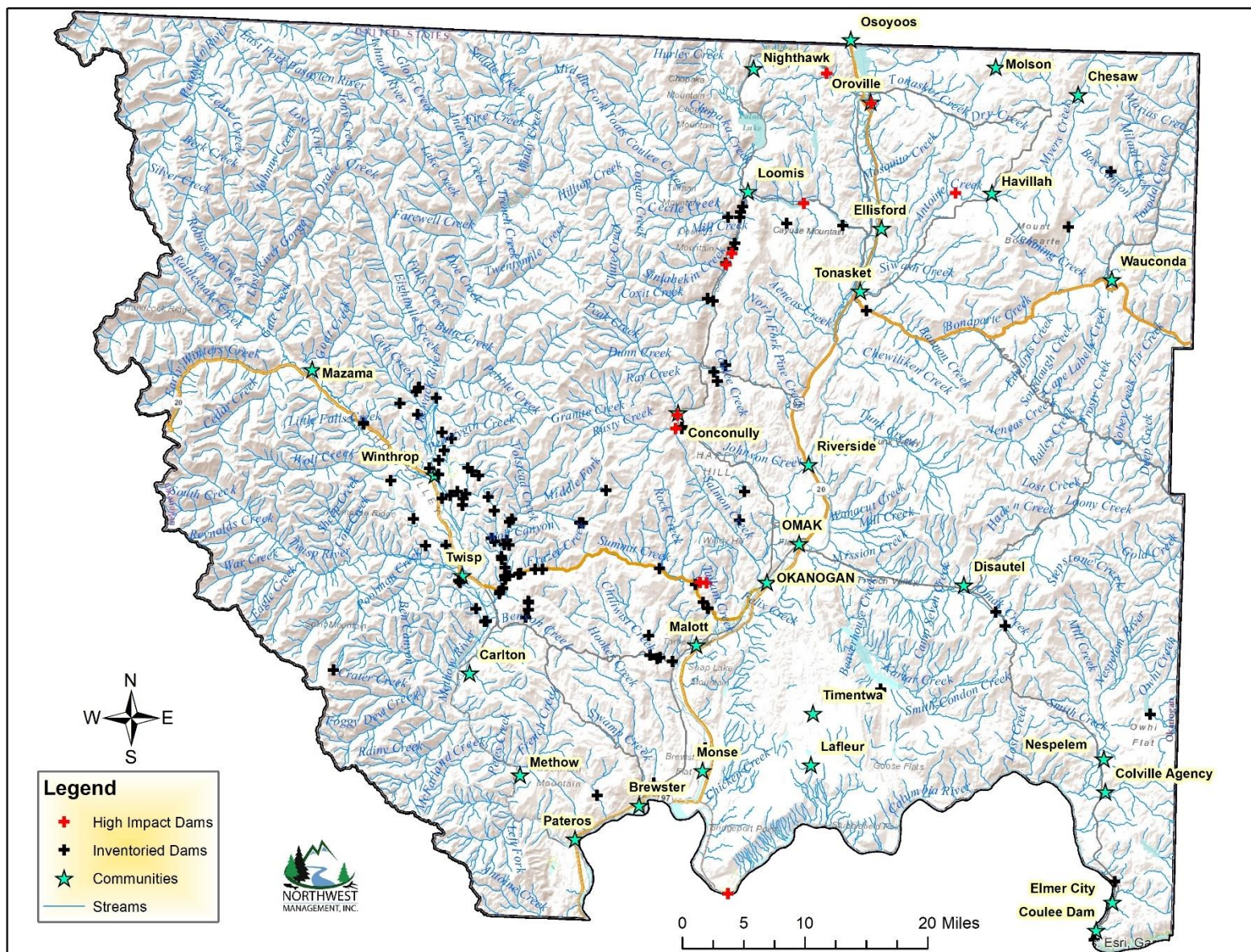


Figure 22) Locations of known/inventoried dams in Okanogan County, WA.

The recurrence interval of this type of Columbia River flooding is projected at 30 years. Several hydroelectric dams constructed on the Columbia after this event help to control flooding, reducing the probability of flooding along much of the length of the river in Washington.

May 1972 Flooding (Federal Disaster #334): Combined with heavy rains, snow melt in north-central Washington produced major flooding on the Okanogan and Methow Rivers in Okanogan County and the Entiat River in Chelan County. All three rivers reached record flood stages.

May 1989 Flood (Federal Disaster #822): Flooding and heavy rainfall affected utilities and caused significant damage to roadways in Douglas, Okanogan, Stevens, and Whitman Counties. Mud from flooding impaired the city of Bridgeport's sewage treatment facility for months. Overall, flooding caused \$2.0 million in damage to public facilities; Stafford Act disaster assistance provided \$3.8 million.

December 1996 – January 1997 Flood (Federal Disaster #1159): Saturated ground combined with snow, freezing rain, rain, rapid warming, and high winds within a five-day period resulted in severe flooding that affected 39 Washington counties, including Okanogan County. Across the region there were 24 deaths, \$140 million (est.) in insured losses, and 250,000 people without power. More than 130 landslides occurred between Seattle and Everett, primarily along shorelines, and Interstate 90 at Snoqualmie pass closed due to avalanche.

Stafford Act disaster assistance provided – \$83 million. Small Business Administration loans approved – \$31.7 million.

October 2003 Flood (Federal Disaster #1499): Heavy rainfall caused severe flooding in Chelan, Clallam, Grays Harbor, Island, Jefferson, King, Kitsap, Mason, Okanogan, Pierce, San Juan, Skagit, Snohomish, Thurston, and Whatcom counties. Record flood levels were set on the Skagit River at Concrete, Sauk River, and Stehekin River; the most severe flooding took place along the Skagit River.

In total, more than 3,400 people were evacuated, 33 homes were destroyed, and 112 homes had major damage. Property damage was estimated at \$30 million. Numerous federal, state and county roads were damaged by landslides and floodwaters.

July 2012 Flood (Federal Disaster #4083): Severe hail, winds, and flash flooding were observed with storms during the early afternoon of July 20th, but the threat transitioned to severe winds by mid to late afternoon as storms moved into the Northeastern Mountains. Storms blew down hundreds of trees causing one fatality. Ferry and Okanogan Counties were the hardest-hit counties with some remote communities losing power for longer than a week.

Consequently, both state and federal assistance was necessary. In Okanogan County, estimations of \$82,000 in debris removal, \$36,000 in emergency protective measures, \$180,000 for road and bridge repair, \$419,000 to building and equipment, \$364,000 for utility repair, and \$25,000 for parks and recreation. Cumulative figures indicated a total of \$8.4 million for Ferry and \$1.1 million for Okanogan. Some reports stated that private weather instruments at residents' houses recorded winds between 80 and 100 mph. Total Public Assistance Grants Dollars Obligated: \$2,850,166.24.

May 2018 Flood (Federal Disaster #4083): Warm temperatures caused rapid snowmelt resulting in the worst flood in Okanogan County since 1972. Numerous homes and businesses along and near the Okanogan River suffered basement and first floor flooding in addition to massive inundation of crop lands and orchards in the river valley, with associated irrigation and farming support infrastructure damage and loss. County and state officials mobilized emergency response crews to shore up levees protecting towns along the river and filled and placed over 200,000 sandbags. Many of the towns along the river were protected by levees, and while there were no major levee failures, minor flooding of homes and buildings behind these dikes did occur through seepage and a few minor breaches. Most of the flooding of homes occurred near the river between the towns.

Flooding also occurred on properties along the shore of Lake Osoyoos during the second and third weeks of May as the water level peaked and stabilized. Both Salmon Creek near Conconully and the Chewuch River near Winthrop rose out of their banks causing minor flooding in both towns. Okanogan County was included in a State of Emergency Declaration.

DAM FAILURE

Much of the following information was taken from a list of Washington State Notable Dam Failures and Incidents prepared by the Washington Department of Ecology⁹⁶.

April 19, 1938: Loup Loup Dam, a 50-foot high hydraulic fill dam on the Okanogan River near Malott, Washington, failed when the emergency spillway was undercut during a flood. The floodwaters destroyed at least 25 homes and businesses and left 75 people homeless; floodwaters also destroyed ½ mile of state highway. Zero lives were lost.

“Residents, with barely a half-hour warning of the breaking dam, fled homes and businesses. The state highway was washed out for a quarter mile. Telephone communication was severed,” the Seattle Times reported after the incident⁹⁷.

May 1971: Sid White Dam, an earthen dam near Omak, failed due to seepage through animal burrows. The failure of the Sid White Dam caused a second dam to fail and dumped debris into the town of Riverside. Zero lives were lost.

August 2014: Hawkins Dam failed due to spillway erosion. Large areas burned as a result of 2014 wildfires and were then hit with heavy rains. Erosion in spillway over about 2 ½ hours scoured a channel 360 ft long with est. volume of 6,600 cu. yds. Spillway was repaired in 2017. See Ecology Publications 14-11-011:

⁹⁶ Washington Department of Ecology. Washington State Notable Dam Failures and Incidents. <https://apps.wa.gov/ecology/docs/WaterRights/wrwebpdf/damfailure-ws.pdf>

⁹⁷ The Seattle Times. When dams failed and wiped out a Washington state town – Twice in 15 years. <https://www.seattletimes.com/seattle-news/northwest/when-a-dam-failed-and-wiped-out-a-washington-state-town-twice-in-15-years/#:~:text=April%2019%2C%201938%20%E2%80%94%20At%20least,out%20for%20a%20quarter%20mile.>

“Benson Creek Flood, August 2014”, 15-11-019: “Benson Creek Rainfall-Runoff Model Results” and 15-11-002: “Computerized Rainfall-Runoff Model for Benson Creek”. Zero lives were lost.

PROBABILITY OF FUTURE OCCURRENCE

RIVERINE FLOODING

The risk rating for flood events in Okanogan County is high. Low magnitude flood events can be expected several times each year. However, due to the flat topography and drainage infrastructure, the impacts of these events are slight and usually amount to minor and temporary traffic issues throughout the County. Larger magnitude and high impact flood events have occurred but are not likely in any given year. These types of flood events have the highest probability of occurrence in the winter or early spring. Minor flash flood events are expected annually in the county because of summer thunderstorms or rain-on-snow events.

Okanogan County is not included in the top-20 at-risk counties to flooding according to the 2018 Washington State Enhanced Hazard Mitigation Plan. It is also not in the top percentage of Washington counties having a high frequency of floods causing damage. The Washington State Plan also reports that Okanogan County has **six repetitive loss properties**. Properties receiving two or more claim payments of more than \$1,000 from the National Flood Insurance Program within any rolling 10-year period are considered repetitive loss properties by FEMA.⁹⁸ Okanogan County strictly regulates new construction within the known floodplains throughout the county. Over the past century, much of the land within the floodplain has been converted to agriculture and therefore limits this landscape to other development types. Therefore, no major development has occurred since the previous version of this plan.

DAM FAILURE

The probability of a dam failure occurring in the county is low. A dam failure would likely require exceptional weather that produces more runoff into drainage systems and reservoirs than what the dams can discharge. Even then it is more likely that a dam will overtop or partially fail before it completely fails because of the specifications to which dams are built, the performance of routine inspections, and the performance of maintenance as it is needed.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

There are numerous large, swift bodies of water in Okanogan County, however the probability of a flood-related fatality is low. Nevertheless, flash flood events or accidents could result in a death or injury. First responders or other persons could be pinned under debris and drowned or receive trauma from debris being carried along the waterway. Once flood waters recede, mold can grow in wet material causing a public health hazard. Flood waters may contain sewage and hazardous chemicals that could be left on

⁹⁸ Washington Military Department Emergency Management Division. 2018 Washington State Enhanced Hazard Mitigation Plan. Available online at <https://mil.wa.gov/enhanced-hazard-mitigation-plan>. Accessed: April 2020.

people's property following a flood event. Furthermore, water and food may be contaminated, and heat and electricity may be inoperable for a period. Although the probability of these types of impacts occurring at a moderate to large scale is very low, all of these factors could contribute to a decline in current and long-term health of Okanogan County residents.

The continuity of operations for Okanogan County and most other jurisdictions within the county will not be compromised due to a flood event. The delivery of some services may be hindered by localized flooding in certain areas; however, due to the availability of alternative routes, this is not a significant concern. Damage to facilities, equipment, or files could impact certain organizations or public services depending on the extent of damage and duration of the event.

Flood events in Okanogan County are most likely to affect private property by damaging homes, businesses, barns, equipment, livestock, and vehicles. Both water and contaminants can damage or permanently ruin equipment. Flood waters can also erode land. This is particularly an issue when lands supporting roads, power lines, pipelines, sewage control facilities, levees, bridges, and other infrastructure are damaged by erosion.

In Okanogan County, it is unlikely that flood events would cause any long-term environmental impacts. Some environmental impacts that may be realized by localized flooding could include erosion of stream banks, loss of riparian plant life, or contamination by chemicals or sewage. Flooding in some areas may have some environmental benefits such as establishing meanders that slow the streamflow, replenishing wetland areas, and replenishing the soil with nutrients from sediment.

Flooding in Okanogan County is not likely to have a significant or long-term effect on the local economy. Depending on the magnitude of the event, individual residents and businesses may be adversely impacted, but the economic viability of the community will not be affected. Severe damage to transportation infrastructure may have a short-term impact on certain communities due to the presence of state and U.S. highway routes, but alternative routes are available.

NFIP Flood Zones

The National Flood Insurance Program recognizes flood zones in the drainages of multiple rivers and creeks in Okanogan County. The Bonaparte Creek, Chewuch River, Methow River, Ninemile Creek, Okanogan River, Salmon Creek, Similkimeen River, and Twisp River drainages are all classified as Zones A or AE which are considered high-risk flood areas. There is one area in the county that is classified as AO which is also a high-risk zone, but only a small area near Mazama (where HWY 20 leaves the Methow River Valley and turns in the Cascades) is in this zone. All "A" zones are 100-year flood zones which have a 1% chance of flooding each year. Areas classified as X500 are at low to moderate risk of flooding and are located adjacent to Zones A and AE; most X500 areas are located near communities or other types of development. The X500 flood zones are 500-year flood zones which have a 0.2% chance of flooding every year. Refer to Table 79 for definitions of each flood zone and to Figure 23 and Figure 24 for maps of the different flood zones in the county.

Table 79) Definitions of NFIP flood zones identified in Okanogan County, WA.

ZONE	FLOOD TYPE	DESCRIPTION
A	100-Year	High Risk: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	100-Year	High Risk: Areas subject to a one percent or greater annual chance of flooding in any given year. Base flood elevations are shown as derived from detailed hydraulic analyses (Zone AE is used on new and revised maps in place of Zones A1-A30)
AO	100-Year	High Risk: River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
X500	500-Year	Low to Moderate Risk: Areas of moderate flood hazard from the principal source of flood in the area, determined to be within the limits of one percent and 0.2 percent annual chance floodplain. (Shaded Zone X is used on new and revised maps in place of Zone B.)

The following table (Table 80) summarizes the number of structures, parcels, and improvements within the 100-year and 500-year NFIP flood zones that have been identified within Okanogan County. This information, along with maps and other details regarding each flood zones, is repeated in the flood sections of each adopting jurisdiction's annex.

Table 80) The number of structures, parcels, and improvements within 100-year and 500-year flood zones within Okanogan County, WA. Values of improvements made within the flood zones are also included.

Jurisdiction	Flood Zone	No. Structures	No. Parcels	No. Improv.	Improv. Value	Avg. Improv. Value
City of Okanogan	100 Yr FZ	399	528	350	\$40,873,400	\$116,781
	500 Yr FZ	480	619	595	\$65,540,900	\$110,153
City of Omak	100 Yr FZ	114	226	107	\$16,523,000	\$154,421
	500 Yr FZ	942	1055	761	\$104,018,600	\$136,687
Town of Twisp	100 Yr FZ	210	391	190	\$28,730,900	\$151,215
	500 Yr FZ	262	428	383	\$63,154,200	\$164,893
Town of Riverside	100 Yr FZ	74	194	90	\$5,901,700	\$65,574
	500 Yr FZ	105	206	193	\$12,755,500	\$66,091
City of Tonasket	100 Yr FZ	350	449	297	\$23,630,100	\$79,563
	500 Yr FZ	389	509	476	\$42,313,500	\$88,894
Town of Winthrop	100 Yr FZ	105	313	176	\$32,796,200	\$186,342
	500 Yr FZ	154	353	205	\$37,075,900	\$180,858
Community of Malott	100 Yr FZ	62	106	64	\$3,893,400	\$60,834
	500 Yr FZ	74	117	73	\$4,629,900	\$63,423
Okanogan County Unincorporated	100 Yr FZ	2,527	5,858	2,817	\$353,432,100	\$125,464
	500 Yr FZ	4,166	7,541	4,053	\$535,930,900	\$132,230

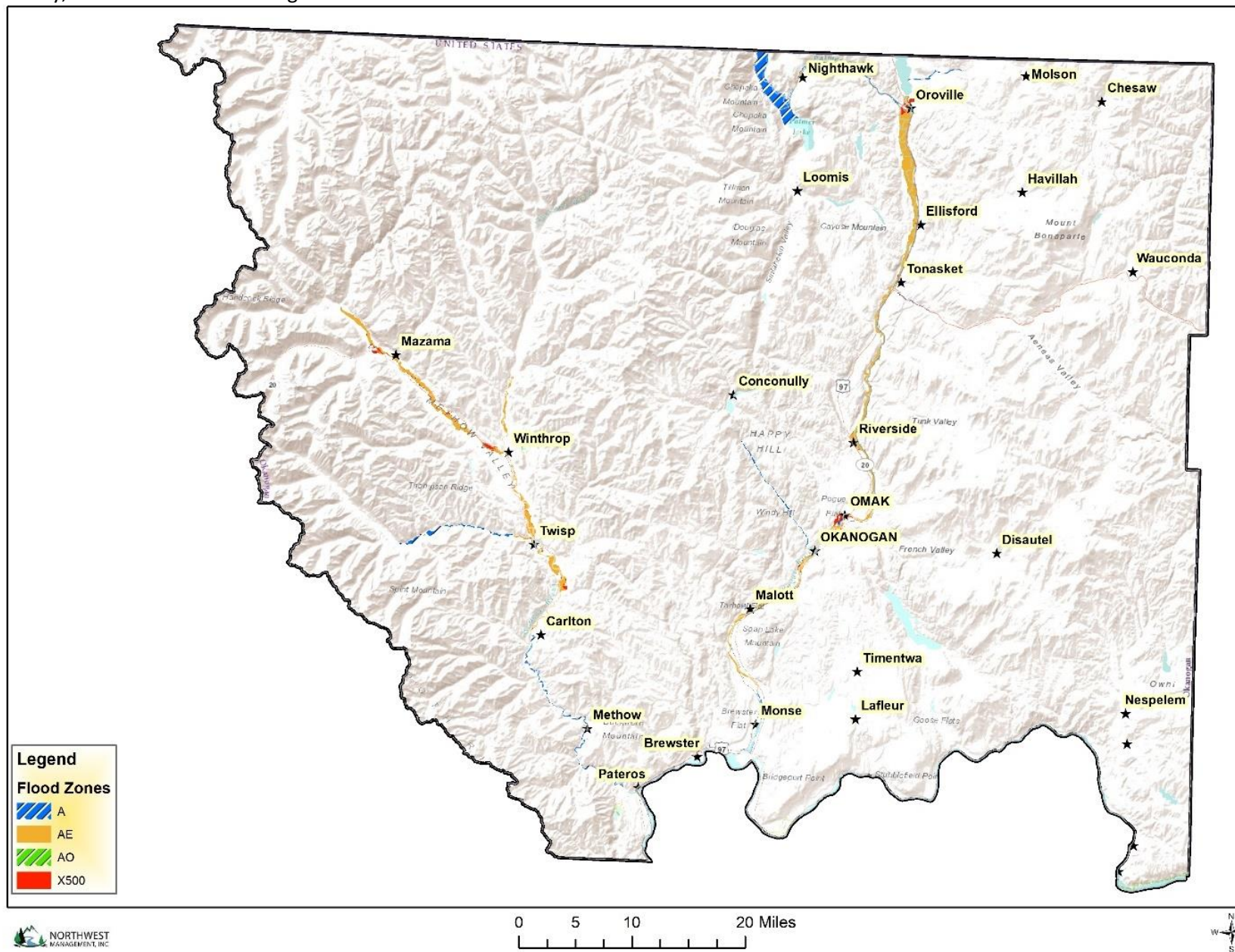


Figure 23) FEMA Floodplains in Okanogan County, Washington. Note: Okanogan County regulatory flood maps are currently being updated; the final drafts will be available by winter 2023/2024.

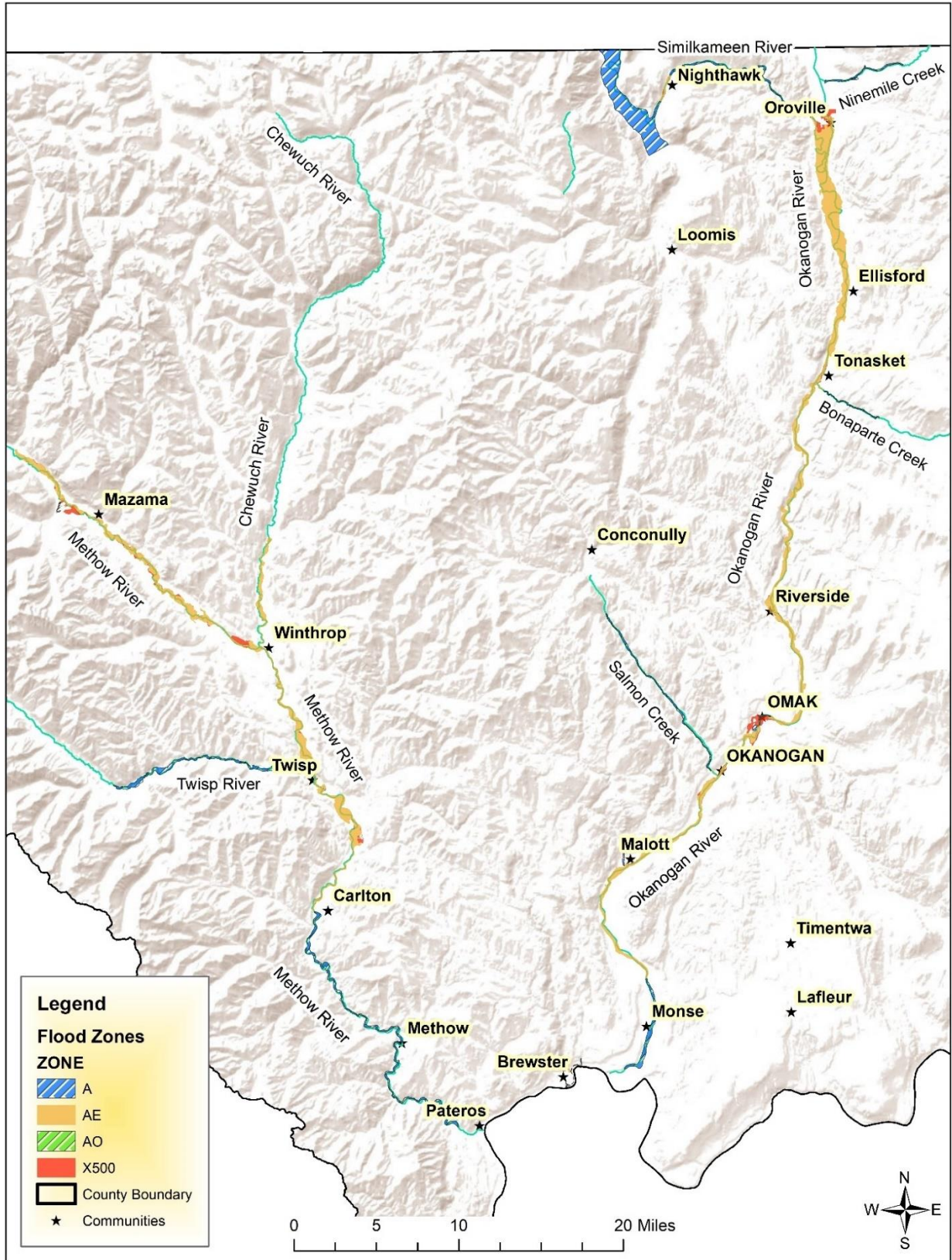


Figure 24) FEMA Floodplains in Okanogan County, Washington. Note: Okanogan County regulatory flood maps are currently being updated; the final drafts will be available by winter 2023/2024.

DAM FAILURE

Of all the dams within or bordering Okanogan County there are 12 that present a high or significant risk, should the dams fail, to people living downstream. Of the 12 dams, five are classified as 1A which means there are more than 300 lives at risk should the dams fail (Table 81). The Grand Coulee Dam, Chief Joseph Dam, and the Wells Dam, which are on the Columbia River, and the Salmon Lake Dam and Conconully Dam, which are on Salmon Creek, are all classified as 1A in the Downstream Hazard Category (Table 82 and Figure 25). *The high impact dams listed below will be addressed in greater detail in the annexes of the communities that could be or are most likely to affected by the failure of those dams.*

Table 81) Definitions for symbols used by the Washington Department of Ecology in the Inventory of Dams Report. These symbols are to be used to interpret the information contained in Table 82.

Dame Type		Dam Purpose	
CN	Concrete	C	Flood Control and Storm Water Management
PG	Concrete Gravity	F	Fish and Wildlife
RE	Earth Fill	H	Hydroelectric
VA	Concrete Single Arch	I	Irrigation
		N	Navigation
		Q	Water Quality
		R	Recreation
Downstream Hazard Category			
1A	High Risk	Greater than 300 lives at risk	
1B	High Risk	From 31 to 300 lives at risk	
1C	High Risk	From 7 to 30 lives at risk	
2*	Significant Risk	From 1 to 6 lives at risk	
2D	Significant Risk	From 1 to 6 lives at risk	
2E**	Significant Risk	No lives at risk	
3	Low Risk	No lives at risk	

*Legacy classification, parsing all 2's into 2D's and 2E's

**Significant economic or environmental risk

Columbia River Dams: The three dams on the Columbia River have the highest maximum storage capacity of all the dams in or near the county. The Columbia River starts north of Mica Creek, British Columbia and flows south across the Canadian border into the United States. It then flows west, eventually serving as the state line between Washington and Oregon, into the Pacific Ocean. The Columbia River features an extensive network of dams and dikes that regulate and control the flow of water. Since the Columbia River crosses international borders, water level and water flow are determined and agreed upon by both the United States and Canada. Given the control mechanisms and international cooperative agreements in place, flooding events on the Columbia River are rare but can occur. Given the storage capacity of the Columbia River dams, a complete failure would likely inundate and destroy communities located downstream. Flood waters could be retained and dampened by other dams in the system located downstream, but populated areas along the Columbia River between the failed dam and the next dam downriver could suffer devastating impacts.

Table 82) Major dams located on or in proximity to Okanogan County in north-central Washington. The information in the table was taken from the Inventory of Dams Report produced by the State of Washington Department of Ecology.

Dam Name (Map Number)	Grand Coulee Dam (N/A)	Chief Joseph Dam (11)	Wells Dam (N/A)	Zosel Dam (8)	Salmon Lake Dam (6)	Conconully Dam (7)
Owner Name	BOR Pacific Northwest Region	US Army COE Seattle	Douglas County T & Ls	WA Ecy	BOR Pacific Northwest Region	BOR Pacific Northwest Region
River Name	Columbia River	Columbia River	Columbia River	Okanogan River	Salmon Creek-Offstream	Salmon Creek
Impoundment Name	Franklin D. Roosevelt Lake	Rufus Woods Lake	Lake Pateros	Osoyoos Lake	Salmon Lake (Conconully Lake)	Conconully Reservoir
Dam Types	CN, PG	PG	PG, RE	PG	RE	RE
Reservoir Purposes	C, H, I, N, R	H, R	F, H, I, R	I, R	C, I, R	Q
Crest Length	5673 ft	4300 ft	4105 ft	321 ft	1250 ft	1075 ft
Dam Height	550 ft	230 ft	196 ft	40 ft	54 ft	72 ft
Surface Area	82,300.0 acres	8,400.0 acres	9,700.0 acres	5,800 acres	330.0 acres	550.0 acres
State ID	GT42-262	DO50-299	CH47-98	OK49-556	OK49-291	OK49-259
National ID	WA00262	WA00299	WA00098	WA00556	WA00291	WA00259
Year Completed	1942	1955	1967	1986	1921	1910
Hazard Category	1A	1A	1A	2D	1A	1A
Latitude	47.955981	47.995512	47.94736	48.933493	48.558204	48.538347
Longitude	-118.98355	-119.646722	-119.86423	-119.4198	-119.746178	-119.752199
Sec, T-ship, Range	T28 NR30 ES01	T29 NR25 ES24	T28 NR24 ES20	T40 NR27 ES27	T35 NR25 ES06	T35 NR25 ES18
WRIA ID	42	50	47	49	49	49
Storage Quantity	9562000 acre-ft	516000 acre-ft	300000 acre-ft	26000 acre-ft	15700 acre-ft	13000 acre-ft
Max Storage	9562000 acre-ft	593000 acre-ft	500000 acre-ft	55000 acre-ft	17280 acre-ft	16670 acre-ft
Max Discharge	953000 cfs	1200000 cfs	1180000 cfs	2500 cfs	400 cfs	16670 cfs
Drainage Area	74,100.00 sq mi	75,400.00 sq mi	85,300.00 sq mi	3,150.00 sq mi	6.00 sq mi	120.00 sq mi

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Dam Name (Map Number)	Leader Lake Dam (9)	Enloe Dam (1)	Leader Lake Saddle Dam (10)	Fanchers Dam (2)	Sinlahekin Dam No. 3 (5)	Sinlahekin Dam No. 1 (4)
Owner Name	Pleasant Valley Water Users Assoc	Okanogan County PUD	Pleasant Valley Water Users Assoc	Antoine Valley Ranch LP	WA DFW	WA DFW
River Name	Tr-Tallant Creek	Similkameen River	Tr-Tallant Creek	Antoine Creek	Sinlahekin Creek	Sinlahekin Creek
Impoundment Name	Leader Lake	unnamed	Leader Lake	Fanchers Dam Reservoir	Lower Sinlahekin Impoundment	Forde Lake
Dam Types	RE	CN, VA	RE	CN, RE	RE	RE
Reservoir Purposes	I, R	H	I, R	I, R	R	R
Crest Length	300 ft	316 ft	650 ft	450 ft	285 ft	180 ft
Dam Height	61 ft	63 ft	11 ft	68 ft	24 ft	14 ft
Surface Area	185.0 acres	2,400.0 acres	185.0 acres	28.0 acres	211.0 acres	83.0 acres
State ID	OK49-223	OK49-97	OK49-358	OK49-40	OK49-5	OK49-7
National ID	WA00223	WA00097	WA00358	WA00040	WA00005	WA00007
Year Completed	1910	1905	1910	1926	1950	1949
Hazard Category	1B	1C	1B	1C	1C	1C
Latitude	48.361149	48.965743	48.357572	48.8292	48.750877	48.737429
Longitude	-119.6968	-119.501937	-119.687214	-119.261627	-119.659356	-119.669733
Sec, T-ship, Range	T33 NR25 ES16	T40 NR26 ES13	T33 NR25 ES15	T39 NR28 ES35	T38 NR25 ES35	T37 NR25 ES03
WRIA ID	49	49	49	49	49	49
Storage Quantity	5900 acre-ft	2400 acre-ft	1000 acre-ft	500 acre-ft	304 acre-ft	175 acre-ft
Max Storage	7681 acre-ft	2400 acre-ft	1850 acre-ft	600 acre-ft	593 acre-ft	333 acre-ft
Max Discharge	470 cfs	46000 cfs	0 cfs	330 cfs	0 cfs	1 cfs
Drainage Area	3.10 sq mi	3,590.00 sq mi	3.10 sq mi	34.30 sq mi	70.00 sq mi	64.00 sq mi

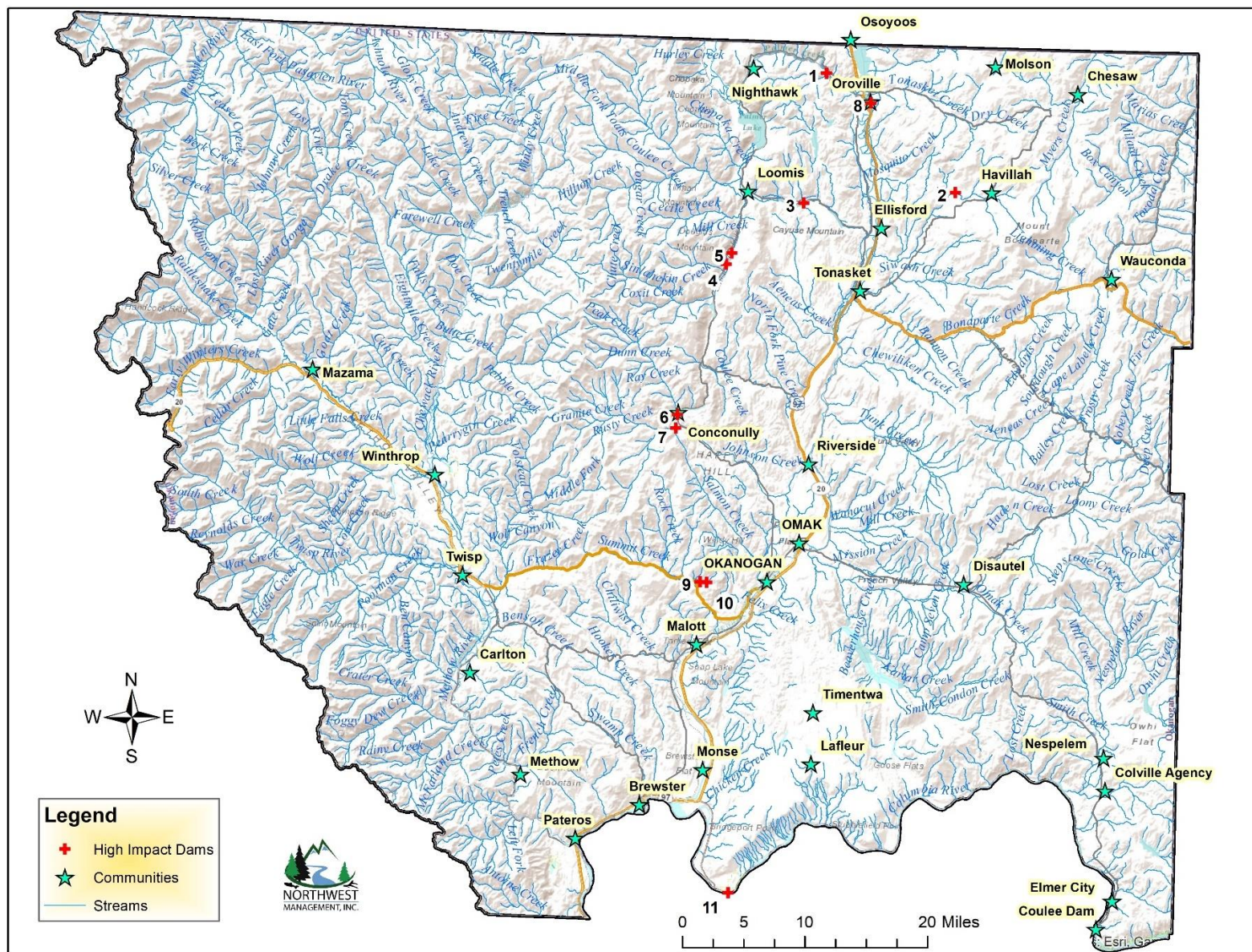


Figure 25) Locations of high impact dams in Okanogan County, WA. The numeric labels correspond to the numbers in the top row of Table 82.

Even though the complete failure of a dam on the Columbia River is highly unlikely and water storage areas behind the dams have an exceptionally large capacity, periodic flooding can still occur. The most common type of flooding that occurs is related to the release of water from dams located upriver. For example, the Tri-Cities area was affected by Columbia River flooding as recently as May 2018 because the McNary Dam, located downstream from the affected area, could not “keep up” with the water discharged from other dams upstream. It is highly unlikely that this will happen to communities in Okanogan County as Lake Roosevelt, which is behind Grand Coulee Dam, serves as the primary storage impoundment in the United States; it has up to 5 million acre-feet of space available for flood control⁹⁹.

Salmon Creek Dams: Both the Salmon Lake Dam and the Conconully Dam are located near Conconully, WA. The failure of either dam will have implications for Conconully and the City of Okanogan which is located downstream at the confluence of Salmon Creek and the Okanogan River. Because of the volume of water stored behind each dam and the proximity of homes to the dams and drainage paths, both dams have received a high-risk rating from the Washington Department of Ecology.

Other Dams: The other high impact dams in the county have been assigned Downstream Hazard ratings of 1B (Leader Lake Dam, Leader Lake Saddle Dam), 1C (Enloe Dam, Fanchers Dam, and Sinlahekin Dams 1 and 3), and 2D (Zosel dam). These seven dams are located below impoundments that could inundate populated areas downstream should the dams fail. Depending on the hazard category, between 1 and 300 lives could be at risk should one of these seven high impact dams fail.

There are close to 140 additional dams throughout the county that have not been classified as high impact dams. These dams do not fall in either the significant or high-risk Downstream Hazard categories because, in the event of a failure, there are no lives at risk. However, a failure could result in damage to property, the environment, roadways, or other types of infrastructure and result in, at the very least, the temporary loss of a water resource.

CLIMATE CHANGE

Climate change will alter how, where, and when flooding occurs within Okanogan County. Climate change is increasing the extent and the frequency of flooding, a trend that is likely to continue into future planning cycles for the county. Heavy rain events are projected to intensify, increasing flood risk to all Cascade watersheds. In snow accumulating watersheds, winter floods will increase as the snow line recedes. Summer flows will reduce, and corresponding flooding will become less likely as our Cascade drainages change from rain-snow systems to rain-dominant ones. The flood impact areas detailed earlier in this section will likely flood more often, be greater in scope, and be subjected to similar impacts but at increased severity. It is also possible that “new” areas will be subjected to flooding and flash flooding as infrastructure, which was once adequate for historic levels of precipitation, could be overwhelmed as precipitation increasingly falls as rain and at greater intensities.

⁹⁹ Lake Roosevelt Forum. Flood Control. <https://www.lrf.org/lake-roosevelt/operations/flood-control/>. Accessed September 2020.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

There are approximately 5,858 parcels and 2,817 improvements within the 100-year flood zone (1% chance of flooding in any given year) in unincorporated portions of Okanogan County, yielding a total improvement value of \$353.4 million (there are six repetitive loss properties and zero severe repetitive loss properties). The improvement value is based on County Assessor values and not market value. The damage to the contents of the structures should be estimated at half the losses to the improvements which would equate to approximately \$176.7 million. The total value of resources at risk to flood is approximately \$530.1 million in Okanogan County. In reality, the damages will most likely not be equally distributed between buildings based on building materials, building location, and flood location. However, these estimates provide a basic approximation.

DAM FAILURE

Overall, it is highly unlikely that Okanogan County will be affected by a dam failure. Many of the dams in the county are small and do not pose a threat to human lives should they fail (many small dams likely only pose a low risk to property). However, there are 12 high impact dams that pose a high or significant threat to human lives down stream should one of them fail. In the event of a dam failure lives may be lost, property will likely be damaged or destroyed, and there could be economic impacts and losses that extend beyond the inundation zone. Given the wide range of dam capacities and the variable number of people and value property located downstream, estimates for financial losses could not be made. The failure of a small dam located in a remote part of the county may damage or destroy a road or cause water damage to several homes, but it is unlikely that it will have any significant economic impacts. While the failure of a large dam, such as those on the Columbia River, may completely inundate or cover homes, communities, roadways, and other types of infrastructure with water resulting in extensive economic and financial losses that could affect other neighboring communities.

EARTHQUAKE HAZARDS

Located near the collision boundary of two major tectonic plates, Washington State is particularly vulnerable to earthquakes, ranking second in the nation after California according to a Federal Emergency Management Agency study. That study also predicts that Washington could lose an estimated \$228 million per event every year as the strongest shaking is expected to occur on the west side of the state (where the largest, most populated cities are located) and, in general, decrease to the east. Alternatively, earthquakes in Eastern Washington are typically shallow, crustal type, and are the least understood of all earthquake sources in the state.

Okanogan County features many minor faults that are inactive and not expected to produce an earthquake. Although an earthquake is not expected to occur within county boundaries, earthquake models and simulations indicate that the western edge of the county could be subjected to damaging ground shaking produced by an earthquake that occurs in western Washington. Even though the western end of Okanogan County could be subjected to strong ground shaking, the county is, overall, at low risk for damaging ground shaking relative to the rest of the state.

Determined by representatives of the county, the following table includes earthquake hazard ratings for Okanogan County, WA.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

LOCAL EVENT HISTORY

The Washington coast and the greater Puget Sound Basin are most at risk although damaging earthquakes have occurred east of the Cascades. The Puget Sound basin had damaging earthquakes in 1909, 1939, 1946, 1949, 1965, and 2001. Eastern Washington had large earthquakes in 1872 near Lake Chelan and in 1936 near Walla Walla. The 1872 earthquake near Lake Chelan was the state’s most widely felt shallow earthquake. The magnitude for this event has been estimated at 7.4. The 1936 magnitude 6.1 earthquake near Walla Walla was also a shallow event. Because the epicenters were in remote locations, damage was light from these two quakes. Ground shaking from historic earthquakes in Washington and the western U.S. has been noted in Okanogan County, and has resulted in only minor damage in several events.

The Washington State EHMP examines two significant earthquakes that occurred in the eastern part of the state since 1872:

Lake Chelan Earthquake– December 14, 1872

Likely originating northeast of Chelan, WA, and located just outside of Okanogan County, the magnitude 6.8 (est.) Chelan Earthquake was felt from British Columbia to Oregon and from the Pacific Ocean to Montana. At the time there were few man-made structures in the epicenter area near Lake Chelan so most of the regional impacts were ground affects. Observed after the earthquake were huge landslides, massive fissures in the ground, and a 27-foot high geyser. Extensive landslides occurred in the slide-prone shorelines of the Columbia River. One massive slide, at Ribbon Cliff between Entiat and Winesap, blocked the Columbia River for several hours. In addition to the Columbia River shoreline, landslides also occurred throughout the Cascade Mountains.

As of 2014 geologists had begun the process of interpreting a large amount of evidence that they suspect will indicate the exact location of the epicenter of the 1872 earthquake. As of the update of this plan, the study is still in progress, but some researchers believe the epicenter is located in Spencer Canyon, near Orondo, WA but this is yet to be confirmed. Determining the exact location of the epicenter is important as the fault could produce another large earthquake in the future. Knowing where an earthquake may occur will help researchers predict the potential impacts it could have on nearby communities and help them prepare.

Milton-Freewater Earthquake – July 15, 1936

The earthquake, magnitude 6.1, occurred at 11:05 a.m. The epicenter was about 5 miles south-southeast of Walla Walla. It was widely felt through Oregon, Washington, and northern Idaho, with the greatest shaking occurring in northeast Oregon. Property damage was estimated at \$100,000 (in 1936 dollars) in, what was at the time, a sparsely populated area.

In recent years, geologists have attempted to find the exact location of the epicenter of the Milton-Freewater earthquake. As of the update of this plan, geologists are attempting to determine exactly which fault was the source of the quake as it could either have occurred on the RAW or on the Hite fault. The location of the epicenter has implications for impacts of any future earthquakes occurring along the same fault and the way that communities prepare for such event. The results are expected to be available soon.

Based on historical records, Okanogan County has not experienced any seriously damaging earthquakes in recorded history. Several distant earthquakes produced intensities strong enough to be felt in central Washington, but no earthquake epicenters were recorded for the region.¹⁰⁰ All earthquakes east of the Cascades have been shallow and most are at depths less than 6 kilometers.

¹⁰⁰ Noson, Linda Lawrance, et al. Washington State Earthquake Hazards. Washington Division of Geology and Earth Resources Information Circular 85. Olympia, Washington. 1988.

Okanogan County, WA Natural Hazard Mitigation Plan 2022

The largest earthquake in central Washington since 1969 was a shallow, magnitude 4.6 event northwest of Omak on November 18, 2011. Some of the most active earthquake areas east of the Cascades are near Entiat, south of Lake Chelan, and in the Saddle Mountains, south of Vantage. Many of the earthquakes in eastern Washington occur in clusters near the Saddle Mountains in folded volcanic rocks, which were extruded in southeastern Washington from 16.5 to 6 million years ago.¹⁰¹

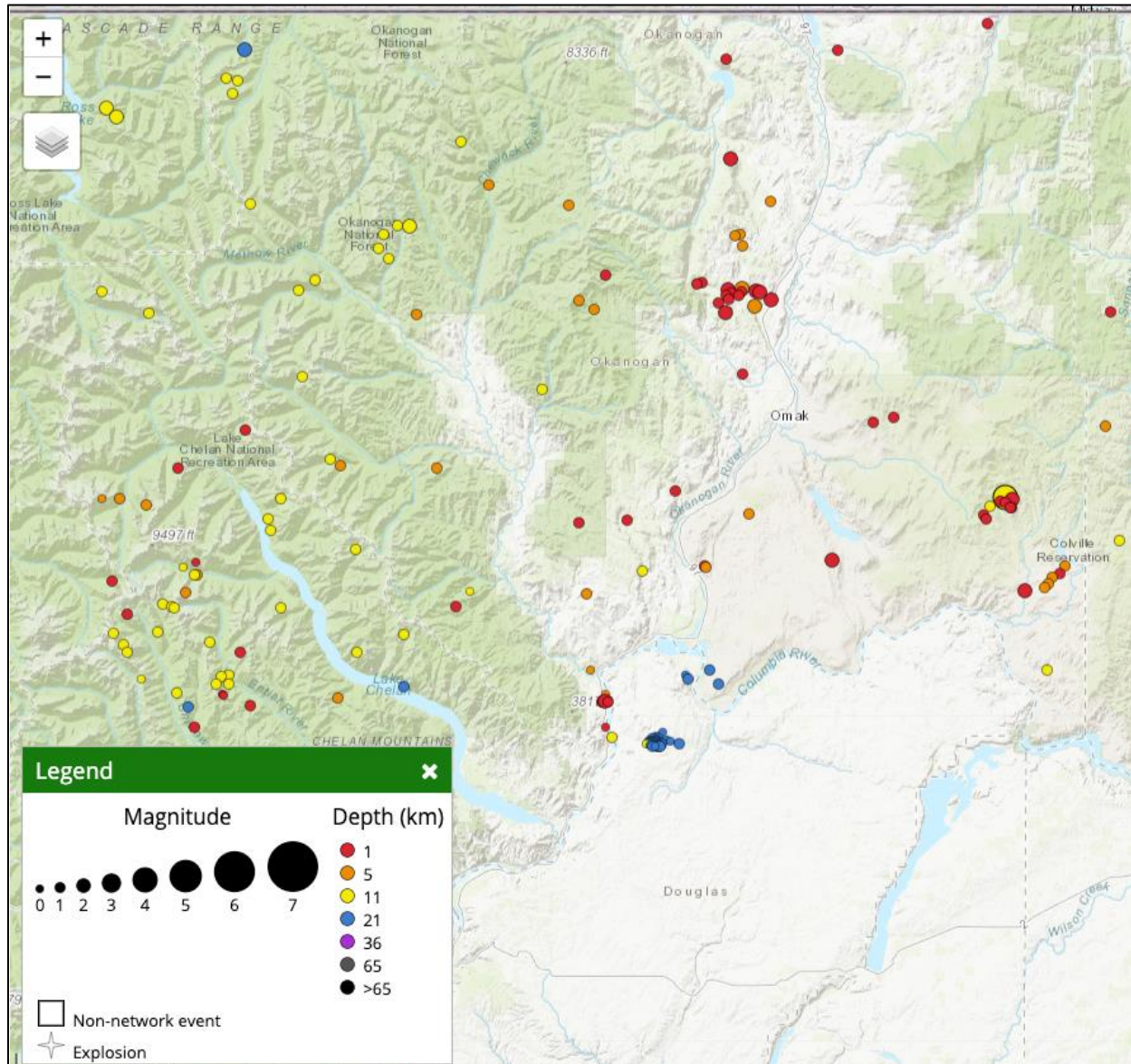


Figure 26) Earthquake epicenters recorded by the Pacific Northwest Seismic Network within the greater Okanogan County area, WA from January 1, 2014 to December 31, 2019.

¹⁰¹ Noson, Linda, et al. 1988. "Washington State Earthquake Hazards". Washington Division of Geology and Earth Resources. Olympia, Washington. Information Circular 85.

Every year numerous earthquakes affect Okanogan County, but most go unnoticed by people. From January 1, 2014 to December 31, 2019, almost 30 earthquake epicenters were recorded within or immediately adjacent to the county boundary each year (Figure 26, above). There are several locations that produced a cluster of earthquakes over the six-year period, the most notable are the Pine Creek area just north of riverside, which produced a number of shallow earthquakes of magnitude 2.0 to 2.6, and the Mill Creek Rd area that produced a 4.2 magnitude earthquake. The magnitudes of all 175 earthquakes recorded in the study area during that time ranged from 0.5 to 4.2 with most (65) earthquakes having a magnitude between 1.1 and 1.5 (Figure 27). Almost 93% of the earthquakes that occurred during that time period were magnitude 2.0 or less with only one earthquake with a magnitude greater than 4.0; the largest earthquake was magnitude 4.2 and occurred on the east side of the county on December 14, 2014.

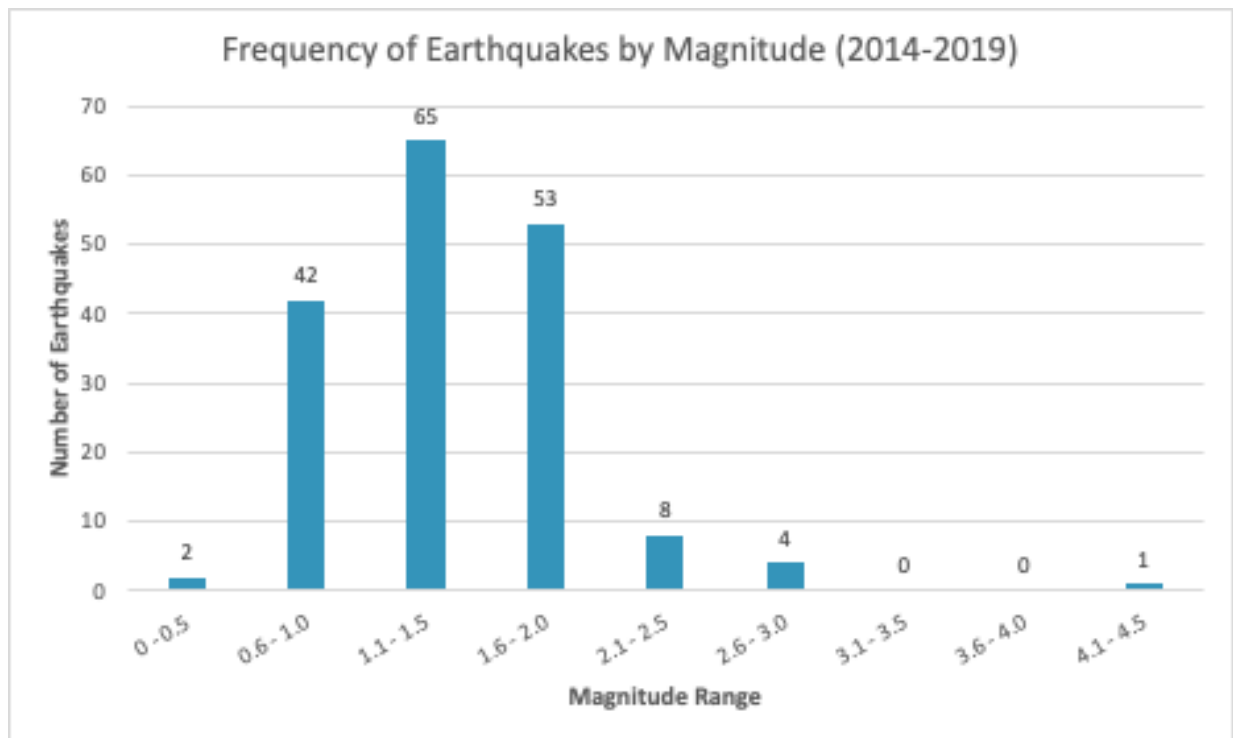


Figure 27) Frequency of earthquakes that occurred either within or immediately adjacent to Okanogan County, WA between January 1, 2014 and December 31, 2019 (refer to Figure 26 for a map of the study area). Data is from Pacific Northwest Seismic Network.

PROBABILITY OF FUTURE OCCURRENCE

The risk rating for earthquake in Okanogan County is medium. As seen in Figure 28, there are several known geologic folds in the western part of Okanogan County. These folds are mostly oriented north-south and extend all the way across the county. According to information available from the Washington DNR, all faults within the county are inactive. The probability of Okanogan County experiencing a magnitude 5.0 or higher earthquake in the next 50 years is approximately 18% to 40%. Although peak ground acceleration is expected to be the highest in the west end of the county and decrease to the east, no specific jurisdictions or special districts, including the Colville Indian Reservation, were identified as having differing issues or levels of risk associated with this hazard.

The USGS Shaking Hazard maps for the United States are based on seismicity and fault-slip rates and take into account the frequency of earthquakes of various magnitudes. Colors on the map show the levels of horizontal shaking that have a 1 in 50 chance of being exceeded in a 50-year period. Ground shaking is expressed as a percentage of “g” which is the acceleration of a falling object due to gravity. Peak ground acceleration (pga) in %g is a measure of the ground motion which decreases the further you are from the epicenter of an earthquake. Locally, earthquake hazards may be greater than that shown in the ground shaking maps because site geology may amplify ground motions. As seen in Figure 28, much of the western third of Okanogan County has a 10% chance of exceeding 10-15% pga in the next 50 years. This trends downwards to a 6-7% pga towards the northeastern corner of the County.

IMPACTS OF EARTHQUAKE EVENTS

Past events suggest that a regional earthquake would cause little to no damage in Okanogan County. Most crustal earthquakes are in the 5.0 to 5.5 magnitude range and have not, historically, occurred within the county boundary. Nonetheless, severity of damage can increase in areas that have softer soils, such as unconsolidated sediments, or are susceptible to liquefaction.

Damage to structures built to code will be negligible, but even low intensity earthquakes can cause some structural damage to older unreinforced masonry buildings. Cornices, frieze, and other heavy decorative portions of these types of structures may fail. The potential impacts of a substantial earthquake event are highly variable. Many of the structures and infrastructure throughout the county may not incur any damages at all; however, damage to roads, bridges, unreinforced masonry, chimneys, foundations, water lines, sewer lines, natural gas pipelines, and many other components are at risk. Fires can also be a secondary hazard to structures that sustain earthquake damage. The economic losses to business in the area may be high if owners are forced to stop production or close their businesses even if just for a short period. Additionally, changes to the water table or even the topography can significantly impact local municipal and private wells and could result in the loss of traditional land uses.

There are numerous places in the county where liquefaction could result from an earthquake, potentially damaging buildings, infrastructure, private property, and other structures. Liquefaction takes place when loosely packed, water-logged sediments at or near the ground surface lose their strength in response to strong ground shaking. Liquefaction occurring beneath buildings and other structures can cause major damage during earthquakes¹⁰². Most areas that are at-risk to liquefaction are in the eastern half of the county, which is largely characterized by loose soils and sedimentary rock, and in valley bottoms and drainages where loose sediment has been deposited in the flood plains (Figure 29). Communities along the Okanogan River are at the greatest risk of damage due to liquefaction.

¹⁰² USGS. What is Liquefaction? U.S. Geological Survey. U.S. Department of Interior. Available online at https://www.usgs.gov/faqs/what-liquefaction?qt-news_science_products=0#qt-news_science_products

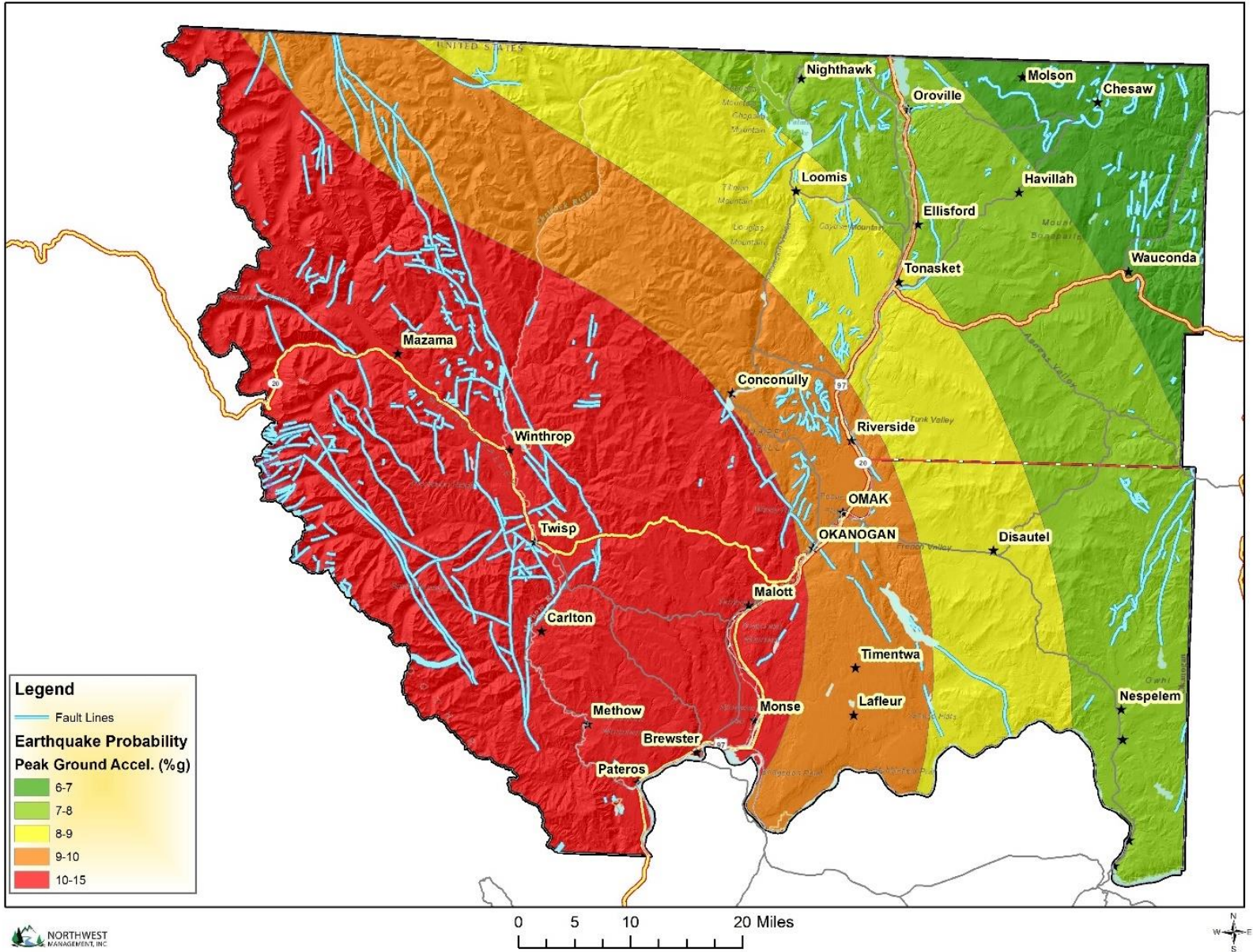


Figure 28) Earthquake Probability Map of Okanogan County, WA that shows the distribution of earthquake shaking levels that have a 2% probability of occurring during a 50-year period. Shaking is reported in %g which is the potential ground shaking caused by an earthquake divided by acceleration due to gravity. Higher %g values indicate stronger ground shaking.

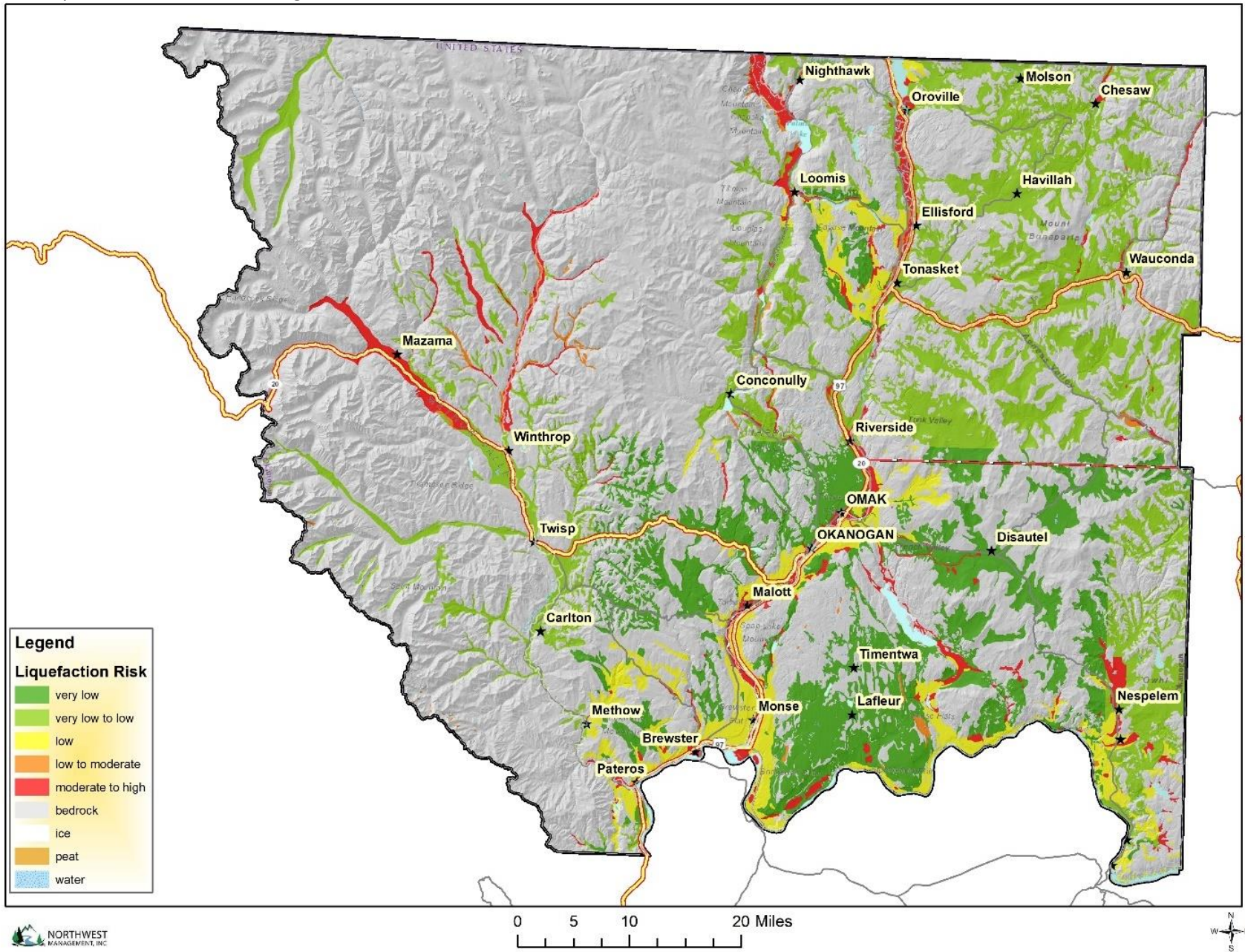


Figure 29) Susceptibility of soils to liquefaction in Okanogan County, WA.

Structural damage by earthquakes tends to be subtle cracking or settling that undermines the stability of the structure, not complete destruction. Repairs associated with this type of damage, including cracking and foundational damage, can be very costly. Albeit highly unlikely, a building that collapses can trap or bury people and result in fatalities and significant clean-up costs. Upgrading existing buildings that are at risk to significant damage or collapse to withstand earthquake forces is often more expensive than meeting code requirements with new construction. Currently, there are numerous structures in Okanogan County, particularly those built prior to seismic code requirements, that remain at high-risk to seismic activity. Many critical facilities are housed in older buildings that are not up to current seismic codes.

SCHOOL SEISMIC SAFETY PROJECT

Much of this section is a direct excerpt from the Washington State School Seismic Safety Project final report for phase 1. Refer to the Washington DNR School Seismic Safety webpage and phase 1 report for more information¹⁰³.

Beginning in 2017 and completed in 2019, seismic evaluations of public school facilities in Washington State were conducted using various evaluation tools. Using a capital budget appropriation of \$1,200,000, the study aimed to assess the seismic safety of 222 permanent, public, K–12 school buildings in Washington State. This assessment was based on local geology and the engineering and construction of the buildings.

The results of the seismic screening evaluations indicate that Washington State has many older school buildings that are vulnerable to earthquakes. Older unreinforced masonry buildings (URM) and nonductile concrete buildings are especially at risk. The average date of construction of the buildings included in the study is 1963, which was well prior to the adoption of modern earthquake-resistant building codes. These older buildings should receive top priority for further study. For buildings constructed prior to 1950, almost half of the seismic screening checklist items are identified as noncompliant. This means that there are significant numbers of seismic safety issues in these older public school buildings. The ASCE seismic screening checklist questions are designed to uncover the seismic safety flaws and weaknesses of a school building, in the form of evaluation statements describing building characteristics that are essential if the failures observed in past earthquakes are to be avoided. Compliant statements identify acceptable conditions and non-compliant statements identify conditions in need of further investigation. Refer to Table 83 for a list of Okanogan County school buildings and facilities that were included in the study.

For buildings constructed between 1950 and 1990, approximately 30 percent of seismic evaluation checklist items are identified as non-compliant, again signifying additional seismic safety issues in these relatively newer buildings. Post-benchmark buildings (generally constructed after 1975) possess far fewer non-compliant seismic items compared to older buildings. It is important to note that, due to the existence of building finishes, features, and other elements, many of the buildings evaluated were not able to have all of their seismic screening elements positively verified. This means that the estimated numbers of non-

¹⁰³ School Seismic Safety. Washington State DNR. <https://www.dnr.wa.gov/school-seismic-safety>.

compliant seismic screening features is likely to increase as these buildings are examined with more rigorous ASCE 41-17 Tier 2 and Tier 3 seismic evaluation procedures.

The EPAT data show that the median building is expected to be 43 percent damaged in a design-level earthquake. EPAT also estimates that the majority of buildings in this study are expected to receive a “Red—Unsafe” post-earthquake building safety placard following a design-level earthquake, meaning that they will be unsafe to occupy. In addition, the EPAT data show that approximately one-fourth of buildings studied will not be repairable following a design-level earthquake and will require demolition.

Table 83) School buildings and facilities in Okanogan County, WA that were included in the 2017-2019 Washington State School Seismic Safety Project.

District	School Building	Year Constructed	FEMA Building Classification	Earthquake Hazard Level
Grand Coulee Dam	Lake Roosevelt K-12, CTE Building	1955	Steel Light Frames	Moderate
Grand Coulee Dam	Lake Roosevelt K-12, CTE Building	1974	Reinforced Masonry Walls with Flexible Diaphragms	Moderate
Methow Valley	Liberty Bell Junior Senior High School, Main Building	1994	Reinforced Masonry Walls with Flexible Diaphragms	Moderate
Methow Valley	Methow Valley Elementary School, Main Building	1963	Reinforced Masonry Walls with Flexible Diaphragms	Moderate
Oroville	Oroville Elementary School, Main Building	1954	Reinforced Masonry Walls with Flexible Diaphragms	Moderate
Pateros	Pateros, Pateros K-12 School, Main Building	1948	Reinforced Masonry Walls with Flexible Diaphragms	High
Pateros	Pateros, Pateros K-12 School, Metal Shop	1962	Steel Braced Frames with Flexible Diaphragms	High
Pateros	Pateros, Pateros K-12 School, Music Building	1958	Reinforced Masonry Walls with Flexible Diaphragms	High
Pateros	Pateros, Pateros K-12 School, Wood Shop	1995	Wood Frame	High
Tonasket	Tonasket Elementary School, Greenhouse	1995	Steel Braced Frames with Flexible Diaphragms	Moderate
Tonasket	Tonasket Elementary School, Tonasket Elementary	1995	Reinforced Masonry Walls with Flexible Diaphragms	Moderate
Tonasket	Tonasket Middle-High School, High School/Middle School	1995	Reinforced Masonry Walls with Stiff Diaphragms	Moderate

FEMA 154 Rapid Visual Screening (RVS) of Buildings for Seismic Hazards were also completed for each of the 222 school buildings. The median calculated RVS building score is 1.3; a score of less than 2.0 generally indicates that a building may have an elevated earthquake risk and further evaluation is recommended. The EPAT and RVS results show general agreement with the ASCE 41 seismic screening results. These results indicate that Washington State has many school buildings with elevated seismic risk that should be further evaluated and ultimately seismically upgraded.

URM and non-ductile concrete buildings are especially vulnerable to earthquakes. Many of these school buildings in high seismic hazard areas possess damage estimate ratios in the range of 70 to 80 percent. As expected, the URM school buildings in lower seismic hazard areas (parts of eastern Washington, for example) were estimated to have lower damage estimate ratios of around 10 to 30 percent. URM buildings that display relatively low damage estimate ratios are generally not located in “high” seismic areas as defined by ASCE 41 (Eastern Washington, for example). Approximately half of the unreinforced masonry school buildings included in the study are located east of the Cascade Mountain Range. Many of the schools with the highest estimate of damage following a design-level earthquake are located in areas of highest earthquake hazard.

Prior to the first Uniform Building Code in 1927, no seismic considerations were used in the design of buildings. Starting in 1975, the State of Washington adopted a statewide building code for the first time. The adoption of a statewide standard made construction requirements more uniform across the state. This standard, in addition to significant improvements in building codes through the 1970s, 1980s, and 1990s, led to school buildings that are significantly more resilient to earthquakes compared to older school buildings. The results of the SSSP confirm that URM buildings and non-ductile concrete buildings possess the highest percentages of noncompliant seismic screening evaluation items, re-emphasizing the need for this statewide study.

HAZUS ANALYSIS

HAZUS[®]-MH MR5¹⁰⁴ is a regional earthquake loss estimation model that was developed by FEMA and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake loss estimations at a regional scale. In order to estimate potential earthquake losses in Okanogan County, HAZUS was used to model a scenario based on the parameters of the nearest historic epicenter. The 1872 North Cascades earthquake was the historic scenario selected for this HAZUS analysis. The epicenter of the modeled North Cascades earthquake is near Chelan, WA (latitude 47.90, longitude -120.3) and it was run as a 7.3 magnitude shallow crustal event; this is the closest known significant earthquake event that could affect Okanogan County. The HAZUS model estimated direct earthquake damages, induced earthquake damage, social impacts, and economic losses. This information will be presented under the headings *Injuries and Fatalities*, *Damage to Structures*, and *Damage to Infrastructure*. It should be noted that the figures have a high degree of uncertainty and should only be used for general planning purposes.

Injuries and Fatalities: Casualty estimates were provided for this scenario for three different times of day (2:00 am, 2:00 pm, and 5:00 pm). These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. Level 1 and 2 injuries are expected to occur during all three time periods, these are injuries that will require medical attention with some requiring hospitalization, with the greatest number of injuries occurring at the 2:00 PM time. The earthquake model also produced one fatality (Level 4 impact) at both the 2:00 PM and 5:00 PM times; no Level 3 impacts

¹⁰⁴ FEMA. Hazuz[®]-MH MR5. Department of Homeland Security. Federal Emergency Management Agency, Mitigation Division. Washington, D.C. November 2010.

were reported by the model. Refer to Table 84 for the complete report of injuries and fatalities produced by the HAZUS earthquake model and for definitions of impact Levels 1 through 4.

Table 84) HAZUS summary of injuries and fatalities in Okanogan County, WA resulting from a modeled 7.3 magnitude earthquake near Chelan, WA (the earthquake was modeled after the 1872 North Cascades Earthquake).

Level of Impact	Description	2:00 AM	2:00 PM	5:00 PM
Level 1	Injuries will require medical attention, but hospitalization is not needed.	7	15	11
Level 2	Injuries will require hospitalization but are not considered life-threatening.	1	3	2
Level 3	Injuries will require hospitalization and can become life threatening if not promptly treated.	0	0	0
Level 4	Victims are killed by the earthquake.	0	1	1

Damage to Infrastructure: Although HAZUS reported some loss of functionality or delays associated with transportation infrastructure, the analysis did not report any damage to highway, railway, bus, port, or airport infrastructure because of the modeled earthquake. HAZUS did report damage to some utility, pipeline infrastructure. Potable water, wastewater, and natural gas pipeline leaks and breaks resulting from the modeled earthquake are reported in Table 85.

Table 85) HAZUS summary of utility pipeline leaks and breaks in Okanogan County, WA resulting from a modeled 7.3 magnitude earthquake near Chelan, WA (the earthquake was modeled after the 1872 North Cascades Earthquake).

System	Total Pipeline Length (miles)	Number of Leaks	Number of Breaks
Potable Water	14,203	623	156
Wastewater	8,522	313	78
Natural Gas	5,681	107	27
Oil	0	0	0

Damage to Structures: For the modeled earthquake scenario, the HAZUS software reported no expected damage to essential facilities including hospitals, schools, emergency operations centers, police stations, and fire stations. There are an estimated 22,000 buildings in Okanogan County with a total building replacement value (excluding contents) of \$4.68 billion. Approximately 92% of the buildings (and 80% of the building value) are associated with residential housing. The software also reported that 1,156 residential structures (including single family) would be slightly damaged, 237 would be moderately damaged, 11 would be extensively damaged, and 3 would be completely damaged. An estimated 78 commercial buildings expected to incur slight damages, 51 with moderate damage, 16 with extensive damage, and 4 with complete damage. Most residential structures expected to be damaged are stick built and manufactured homes. Refer to Table 86 for a summary of damage to structures by severity and building use/type and to Table 87 for a summary of damage to structures by severity and construction material/method as reported by the HAZUS earthquake simulation.

Table 86) HAZUS summary of damage to structures by severity and building use/type in Okanogan County, WA resulting from a modeled 7.3 magnitude earthquake near Chelan, WA (the earthquake was modeled after the 1872 North Cascades Earthquake).

Classification of Structures	Count of Structures	None		Slight		Moderate		Extensive		Complete	
		Count	%	Count	%	Count	%	Count	%	Count	%
Agriculture	236	209	1.1%	16	0.9%	8	1.2%	2	1.5%	1	3.4%
Commercial	981	831	4.2%	78	4.4%	51	7.6%	17	12.5%	4	13.8%
Education	39	35	0.2%	3	0.2%	1	0.1%	0	0.0%	0	0.0%
Government	47	41	0.2%	3	0.2%	2	0.3%	1	0.7%	0	0.0%
Industrial	299	244	1.2%	26	1.5%	20	3.0%	7	5.1%	2	6.9%
Other Residential	4,625	3,674	18.5%	489	27.5%	347	51.7%	96	70.6%	19	65.5%
Religion	103	88	0.4%	8	0.4%	5	0.7%	2	1.5%	0	0.0%
Single Family	16,188	14,781	74.3%	1,156	65.0%	237	35.3%	11	8.1%	3	10.3%
Total	22,518	19,903	100.0%	1,779	100.0%	671	100.0%	136	100.0%	29	100.0%

Table 87) HAZUS summary of damage to structures by severity and construction material/method in Okanogan County, WA resulting from a modeled 7.3 magnitude earthquake near Chelan, WA (the earthquake was modeled after the 1872 North Cascades Earthquake).

Construction Material	Count of Structures	None		Slight		Moderate		Extensive		Complete	
		Count	%	Count	%	Count	%	Count	%	Count	%
Wood	16,611	15161	76.2%	1195	67.2%	241	35.9%	11	8.1%	3	10.3%
Steel	379	317	1.6%	30	1.7%	23	3.4%	7	5.1%	2	6.9%
Concrete	304	261	1.3%	23	1.3%	14	2.1%	5	3.7%	1	3.4%
Precast	298	247	1.2%	23	1.3%	19	2.8%	7	5.1%	2	6.9%
Reinforced Masonry	672	605	3.0%	34	1.9%	25	3.7%	7	5.1%	1	3.4%
Unreinforced Masonry	123	87	0.4%	17	1.0%	12	1.8%	5	3.7%	2	6.9%
Manufactured Housing	4,131	3,225	16.2%	457	25.7%	337	50.2%	94	69.1%	18	62.1%
Total	22,518	19903	100.0%	1779	100.0%	671	100.0%	136	100.0%	29	100.0%

CLIMATE CHANGE

NASA reports that there may be a correlation between climate change and earthquake events, particularly when considering how climate change might affect tectonic processes. Some studies support the idea that there is a correlation between changes in surface water and changes in stress loads on fault lines. However, the correlations typically occur in earthquakes with magnitudes less than zero and there is currently insufficient evidence to support any predictions about large earthquake events with regard to climate change.¹⁰⁵

VALUE OF RESOURCES AT RISK

The replacement value of the transportation systems, including highway, railway, bus, port, and airport systems, is estimated to be \$2.4 billion. Although HAZUS reported no damage to these systems, the economic losses were estimated to be almost \$4 million. A summary of replacement values and economic losses by system can be found in Table 88.

Table 88) HAZUS summary of replacement values associated with transportation infrastructure in Okanogan County, WA as well as economic losses resulting from a modeled 7.3 magnitude earthquake near Chelan, WA (the earthquake was modeled after the 1872 North Cascades Earthquake).

System	Component	# Locations / # Segments	Replacement Value	Economic Loss
Highway	Bridges	145	\$213,100,000	\$709,000
	Segments	19	\$1,573,900,000	0
Railways	Bridges	34	\$168,400,000	\$14,000
	Facilities	1	\$2,700,000	\$43,000
	Segments	80	\$232,800,000	0
Bus	Facilities	7	\$11,100,000	\$609,000
Port	Facilities	2	\$6,300,000	\$52,000
Airport	Facilities	7	\$34,700,000	\$2,542,500
	Runways	6	\$152,500,000	0
Total			\$2,395,500,000	\$3,969,500

HAZUS estimated the total replacement value of utility lifeline infrastructure to be almost \$4.9 billion and for economic losses resulting from the modeled earthquake to be just over \$110 million. Table 89 provides a summary of the replacement value associate with each utility lifeline system and component in the county as well as a summary of economic losses resulting from the modeled earthquake.

¹⁰⁵ Buis, Alan, "Can Climate Affect Earthquakes, Or Are The Connections Shaky," Global Climate Change, NASA, October 29, 2019, <https://climate.nasa.gov/news/2926/can-climate-affect-earthquakes-or-are-the-connections-shaky/>.

Table 89) HAZUS summary of replacement values associated with utility lifeline infrastructure in Okanogan County, WA as well as economic losses resulting from a modeled 7.3 magnitude earthquake near Chelan, WA (the earthquake was modeled after the 1872 North Cascades Earthquake).

System	Component	# Locations / # Segments	Replacement Value	Economic Loss
Potable Water	Distribution Lines	NA	\$457,100,000	\$2,800,000
Wastewater	Distribution Lines	NA	\$274,300,000	\$1,400,000
	Facilities	22	\$3,116,200,000	\$104,800,000
Natural Gas	Distribution Lines	NA	\$182,900,000	\$500,000
Electrical Power	Facilities	2	\$866,700,000	\$500,000
Communications	Facilities	7	\$600,000	\$15,000
Total			\$4,897,800,000	\$110,015,000

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were approximately \$56.5 million; 19 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 61 % of the total loss. Of all loss categories related to building impacts, non-structural losses were the greatest (approx. \$28.2 million; 50% of total losses) followed by content (\$10.1 million; 18% of total losses) and structural (approx. \$7.3 million; 13% of total losses) losses (Table 90).

Table 90) HAZUS summary of losses related to buildings in Okanogan County, WA resulting from a modeled 7.3 magnitude earthquake near Chelan, WA (the earthquake was modeled after the 1872 North Cascades Earthquake).

Loss Category	Portion of Total Losses	Total Losses
Capital-Related	3%	\$1,694,700
Content	18%	\$10,168,200
Inventory	1%	\$564,900
Non-Structural	50%	\$28,245,000
Relocation	8%	\$4,519,200
Rental	3%	\$1,694,700
Structural	13%	\$7,343,700
Wage	4%	\$2,259,600
Total	100%	\$56,490,000

HAZUS estimated the long-term economic impacts for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within Okanogan County. The total economic loss estimate for an earthquake of this magnitude (7.3) in Okanogan County is \$170.54 million, which includes building and lifeline related losses based on the region's available inventory.

LANDSLIDE HAZARDS

“Washington State has six landslide provinces, each with its own characteristics. One of these provinces is the Okanogan Highlands, which extends from the slopes of the North Cascades in the west to the Selkirk Mountains in the northeast corner of the state. The primary slope stability problem in this province is in the sediments within and along the boundary of the highlands. Thick sections of sediments along the valleys of the Columbia, Spokane, and Sanpoil Rivers are the result of repeated damming of the Columbia River by lobes of the continental ice sheet and repeated catastrophic floods from breached ice dams. The occurrence of new landslides and the reactivation of old landslides increased dramatically with the filling of reservoirs behind the Grand Coulee and Chief Joseph dams. Drawdowns for flood control and power generation also trigger new landslides and/or reactivate and extend old ones. Some of the landslide complexes extend for thousands of feet along the lakeshores, have head scarps in terraces 300 feet or more above reservoir level and extend well below its surface. With landslide activity common along hundreds of miles of shoreline, one hazard in such a setting is water waves generated by fast-moving landslide masses.”¹⁰⁶

Determined by representatives of the county, the following table includes landslide hazard ratings for Okanogan County, WA.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	9 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

May 2011 – Dozens of Forest Service roads were impacted by landslides equating to \$3.75 million in damages. Campgrounds were cutoff and crews had to scramble to open roads so campers could evacuate.

June 2011 – Five years after the Tripod fire, a wetter than average Spring caused a landslide that left high-water marks up to 40 feet on the canyon walls. There were no witnesses during the event but the miles of formerly forested canyon and the tons of debris spread over the agriculture fields below left little question as to what happened.

¹⁰⁶ Gerald W. Thorsen, Landslide Provinces in Washington, Engineering Geology in Washington Volume 1, Washington Division of Geology and Earth Resources Bulletin 78, 1989.

August 22, 2014 – Hillsides that were burned by the Carlton Complex wildfire produced a number of mudslides that damaged homes and washed away roads in late summer of 2014. It was reported that mud, boulders, and tree limbs damaged and entered approximately ten homes along HWY 153 that were in the path of the multiple slides. SR 20 from Twisp to Old US 97 and SR 153 from Twisp to Carlton were closed due to mudslides¹⁰⁷.

March 6, 2016 – “A major slide of mud and rocks about 1 mile south of Black Canyon closed state Highway 153 early Sunday (March 6) after heavy rain fell overnight. Crews from the Washington State Department of Transportation (WSDOT) were on scene Sunday morning clearing debris and water from the roadway at three sites.”¹⁰⁸

April 8, 2017 – Okanogan County Emergency Management reported a slide that closed State Route 20 at mile marker 221.7 (Figure 30). In a Facebook post they reported that the road was very unstable, and the damage was 70 feet wide. As a detour, it was recommended that residents used State Route 153.

March 5, 2018 – An avalanche killed one person in Okanogan County near Winthrop. The skiers said they were at 6,200 feet on the south face just below Sun Mountain in Washington. Rescuers had difficulty reaching the victim due to hazardous conditions and extreme avalanche danger. Between March 1 and 5 of that year, five people were killed in avalanches in Washington State.¹⁰⁹

May 1, 2019 – A landslide along SR 20 on Loup Loup Pass, located 10 miles west of Okanogan at milepost 222.4 near Rock Creek, was caused by heavy spring rains. The slide caused significant damage to the road, creating long delays for vehicle traffic as the damaged section of road was reduced to one lane¹¹⁰.

¹⁰⁷ Anna King. “Houses in Mud, Fish on Land after Twisp Landslides. NW News Network. August 22, 2014. <https://www.nwnewsnetwork.org/post/houses-mud-fish-land-after-twisp-landslides>. April 2020.

¹⁰⁸ Marcy Stamper. “Mudslides near Black Canyon close Highway 153.” Methow Valley News. March 6, 2016. <https://methowvalleynews.com/2016/03/06/mudslides-near-black-canyon-close-highway-153/>. April 2020.

¹⁰⁹ “Avalanche Kills one in Okanogan County.” KREM2. Ma <https://www.krem.com/article/news/avalanche-kills-one->

¹¹⁰ Shawn Goggins. “Section of SR 20 compromised due to http://www.ifiberone.com/columbia_basin/section-of-sr-11e9-a974-532d34406c7a.html.” April 2020.



Figure 30) Damage to SR 20 in Okanogan County, WA caused by a landslide that took place on April 8, 2017. “Okanogan County Emergency Management reports a slide that has closed State Route 20 at mile marker 221.7. In a Facebook post they tell us the roadway is very unstable and the damage is 70 feet wide. To detour around the slide, use State Route 153.” Photos were taken by Okanogan County Emergency Management and were originally posted on the Fox Q13 website on April 8, 2017. The original story and photos can be accessed at the following URL: <https://q13fox.com/2017/04/08/sr-20-closed-near-okanogan/>

PROBABILITY OF FUTURE OCCURRENCE

According to the 2018 Washington State Enhanced Hazard Mitigation Plan, the overall risk rating for landslides in Okanogan County is medium-high. While a large area of Okanogan County is at high risk to landslides, most of this area occupies the rural mountainous regions. Okanogan County does not have many documented landslides. Those that have occurred are generally associated with damage and/or blockage of a roadway.

There has been limited business and residential development in areas of the county with higher landslide risk. Most of the landslide risk is present in the more mountainous and remote western half of the county; consequently, the Methow River Valley has significantly more landslide risk than the Okanogan River Valley. The landslide risk that is present in the more inhabited portions of the county naturally limits the type and location of development due to how steep and narrow the canyons are. These narrow canyons may only provide enough area for a road, for this reason roads are likely at the most risk to the effects of a landslide.

Landslides can be expected to occur annually and will most likely coincide with heavy and/or prolonged rain events. Most landslides will take place in areas where they have no impact on human development. However, residents who live, work, or recreate in or near landslide hazard areas could also be affected by landslides during the rainy/wet seasons each year.

IMPACTS OF LANDSLIDE EVENTS

Okanogan County is identified as one of the jurisdictions with the greatest vulnerability for landslides (ranked medium-high) in the State of Washington Hazard Mitigation Plan, specifically along the west side of the County in the Cascade Mountains. Those that have occurred are generally associated with damage and/or blockage of a roadway. There are several recent reports of mudslides, avalanches, and landslides along the steep slopes of the North Cascades Highway. For this reason, the North Cascades stretch of State Route 20 is closed during the winter and the wetter parts of the spring and fall.

Many populated areas in Okanogan County are at risk to flooding, which often results in damaging landslides. Flash floods typically carry large amounts of debris, silt, and rocks that are deposited in downstream floodplains. As shown in Figure 31, flash flooding can also have significant implications for structures that are located close to rivers as they could be at risk to flooding or riverbank failure.

Soil saturation ensuing from prolonged periods of rain or flooding can also lead to slope instability. Cut and fill slopes, even those well outside of the flood plain, are particularly at risk to slides and/or slumping as a result of soil saturation. The Okanogan County Historical Society has records of several personal accounts of the damage caused by flash floods and the associated landslides and mass movement of silt and debris. One such account from a family living near Tonasket says that the silt from a 1926 flash flood filled their house to the windowsills and buried most of their farm equipment. There is also record of a large landslide at Toats Coulee in 1905; however, no further information was given. Areas that are generally prone to landslides are:

- On existing landslides, old or recent
- On or at the base or top of slopes
- In or at the base of minor drainage hollows
- At the base or top of an old fill slope
- At the base or top of a steep cut slope

Overall, minor landslides along toe-slopes and roadways occur annually with minimal impact to local residents. Major landslides in western Okanogan County and along the steep river corridors could cause property damage, injury, and death and may adversely affect a variety of resources. For example, water supplies, fisheries, sewage disposal systems, forests, dams, and roadways can be affected for years after a slide event. The negative economic effects of landslides include the cost to repair structures, loss of property value, disruption of transportation routes, medical costs in the event of injury, and indirect costs such as lost timber and lost fish stocks.

Water availability, quantity, and quality can be affected by landslides and would have a very significant economic impact on Okanogan County. The loss or redistribution of water would affect agricultural crops grown in certain areas, ranching activities, and personal and municipal wells.



Figure 31) 2006 Landslide due to Flash Flooding in Methow River Valley.

LANDSLIDE HAZARD ANALYSIS

Estimates based on parcel information and asset values maintained by the Okanogan County Assessor's Office have been made for the number and value of structures located in landslide hazard zones that were delineated by the Planning Team. There are 865 structures in the Okanogan County landslide hazards zones that are worth approximately \$181.3 million. Maps of the different landslide hazard zones and at-risk structures are included in this section.

Landslide Risk Factors: Most of the population in Okanogan County is at low risk to landslides; however, homes and infrastructure located in or at the mouth of drainages have an elevated risk. Additionally, sections of some primary access routes are in low to moderate landslide prone areas. There is a moderate probability of small slides occurring on slopes ranging from 5-35%. This type of slide is common on the brows of hills, especially where there has been soil disturbance. Generally, these low angle slides will have a low velocity and will not impact structures or infrastructure.

Soil factors that increase the potential for landslide are soils developed from parent materials high in schist and granite, and soils that are less permeable containing a resistive or hardpan layer. These soils tend to exhibit higher landslide potential under saturated conditions than do well-drained soils. To identify the high-risk soils in Okanogan County, the NRCS State Soils Geographic Database (STATSGO) layer was used to identify the location and characteristics of all soils in the County. The specific characteristics of each major soil type within the County were reviewed. Soils information that suggested characteristics pertaining to very low permeability and/or developed a hardpan layer and soils developed from schist and granite parent material were selected as soils with potential high landslide risk. High-risk soils magnify the effect slope has on landslide potential; as indicated by the light pink areas in Figure 32, high-risk soils are primarily found in the eastern end of the county.

The locations of historical landslides can also be used to identify slide-prone areas. If a slide has occurred in a particular area it is likely that another slide could happen either in the same location or in other areas with similar soils, geological characteristics, and/or terrain. Landslides have, historically, occurred throughout Okanogan County; historical slides are indicated by blue-green areas in Figure 32.

Soils identified as having high potential landslide risk are further identified in areas with slopes between 14° and 30° (25-60%). In combination with soil characteristics, it is these areas that typically present the highest landslide risk. To portray areas of probable landslide risk due to slope related factors, slope models were used to identify areas of low, moderate, and high risk (Figure 32). This analysis identified the low risk areas as slopes in the range of 20°-25° (36-46%), moderate as 26°-30° (48-60%) and high risk as slopes in the range of 31°-60° (60-173%). Slopes that exceeded 60° (173%) were considered low risk as sliding most likely had already occurred relieving the area of the potential energy needed for a landslide. From the coverage created by these two methods, it is possible to depict areas of assumed risk and their proximity to development and human activity. With additional field reconnaissance the areas of high risk can be further defined by overlaying additional data points identifying actual slide locations, thus improving the resolution by specifically identifying the highest risk areas.

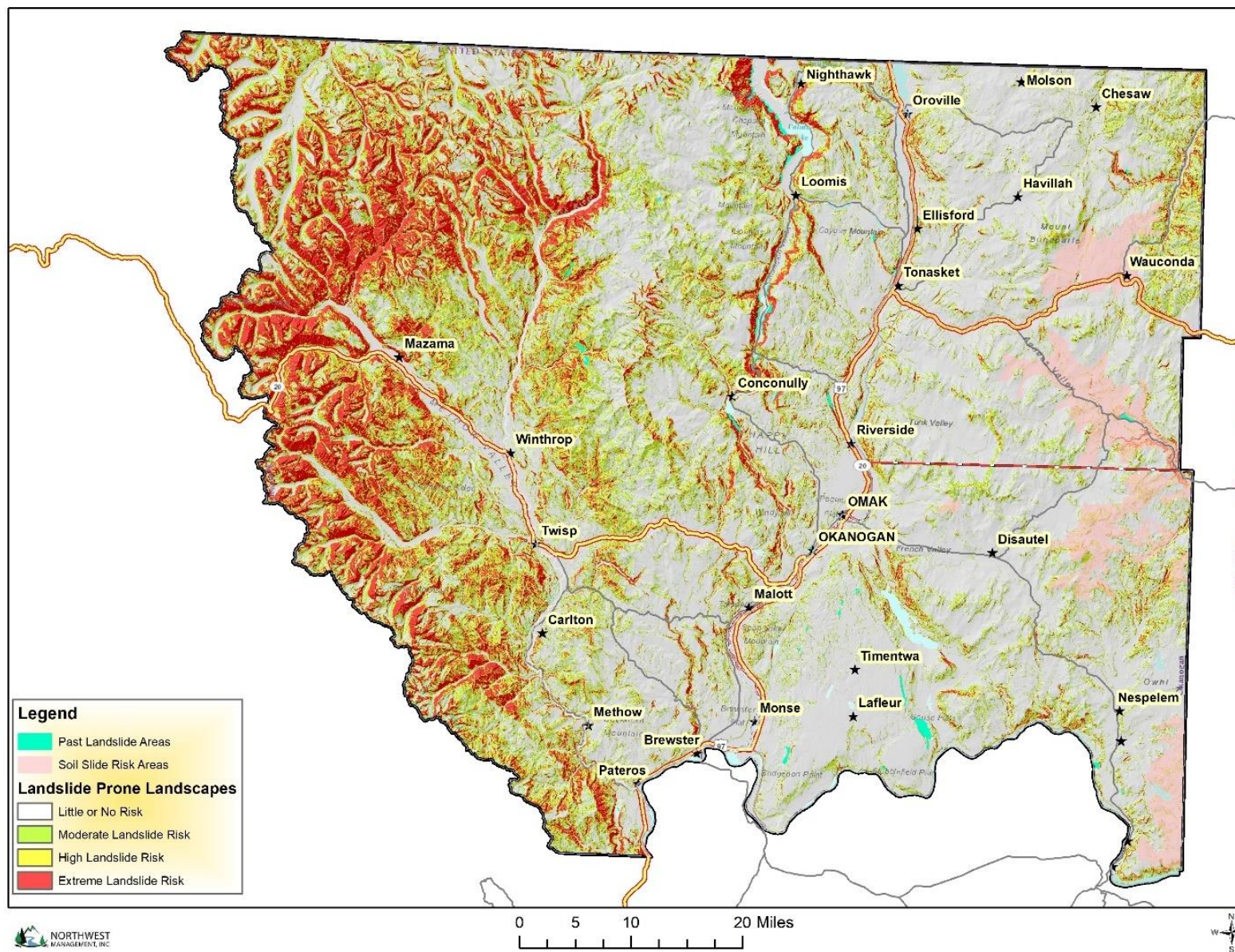


Figure 32) Landslide hazard map of Okanogan County, Washington displaying past landslides, landslide-prone soils, and risk areas based on slope.

Landslide Occurrence: Many of the slopes and hillsides in landslide hazard areas are comprised by material deposited by past landslides. In fact, much of the lower slopes near the valley floors are alluvial fans created by sediment being carried downstream and deposited at the mouths of the numerous small drainages. The presence of deposited material indicates the historic occurrence of high-energy, short duration floods and debris flows in these chutes in response to severe climatic conditions, such as thunderstorms and rain-on-snow events. These events are historically infrequent, with recurrence cycles on the order of years to decades. However, they can result in significant damage to buildings and infrastructure, disrupt travel, reduce water quality, and jeopardize safety.

Today, initiation and reactivation of landslides in the county is closely tied to unusual climatic events and land-use changes. Even small landslide activity on the upper slopes can transform into high-energy debris flows that damage or endanger roads, buildings, and people. Landslide debris is highly unstable when modified through natural variations in precipitation, artificial cuts, fills, and changes to surface drainage and ground water.

Landslide Impact Zones: The largest landslides typically occur where human development or disturbance has exposed landslide-prone sediments to steep topography. This can include areas that have been excavated or altered for the purposes of road, home, or infrastructure development. In addition to exacerbating landslide risk, human development in landslide hazard areas is typically at high risk to being damaged or destroyed by landslide activity. As it is likely that human development, including both residential development and roadway infrastructure, undermines slope stability, the Planning Team delineated several Landslide Impact Zones to describe risk associated with landslide hazard areas in the county.

The Planning Team identified eight different Landslide Impact Zones within Okanogan County. These zones are based on slope and encompass areas where steep terrain is concentrated. Of the eight zones, six collectively contain 865 structures that are worth approximately \$181.3 million, averaging almost \$210,000 per structure. The West Cascades Impact Zone contains the most at-risk structures (643) as it includes Mazama and the upper end of the Methow Valley. The structure layer used to perform this analysis did not feature any structures in either the Chewuch or North Cascades Impact Zones. The following figures correspond to the values listed in Table 91:

- Figure 33) All Landslide Impact Zones in the county (county-level map) with structure locations.
- Figure 34) Carlton (1) and Pateros (7) Landslide Impact Zones with structure locations.
- Figure 35) Malott (4) Landslide Impact Zones
- Figure 36) Northern end of Conconully (3) Landslide Impact Zones and east and west Nighthawk (5) Landslide Impact Zones.
- Figure 37) Section of West Cascades (8) Landslide Impact Zone that includes the Methow Valley.

Table 91) Landslide Impact Zones identified in Okanogan County, WA by the Planning Team.

No.	Landslide Impact Zone	Structure Count	Estimated Value	Total Value
1	Carlton Impact Zone	40	\$133,564	\$5,342,562
2	Chewuch Impact Zone	0	N/A	N/A
3	Conconully Impact Zone	5	\$224,237	\$1,121,184
4	Malott Impact Zone	79	\$189,541	\$14,973,763
5	Nighthawk Impact Zone	39	\$623,536	\$24,317,892
6	North Cascades Impact Zone	0	N/A	N/A
7	Pateros Impact Zone	58	\$188,246	\$10,918,244
8	West Cascades Impact Zone	643	\$210,645	\$135,444,834
-	Grand Total	865	\$209,632	\$181,331,551

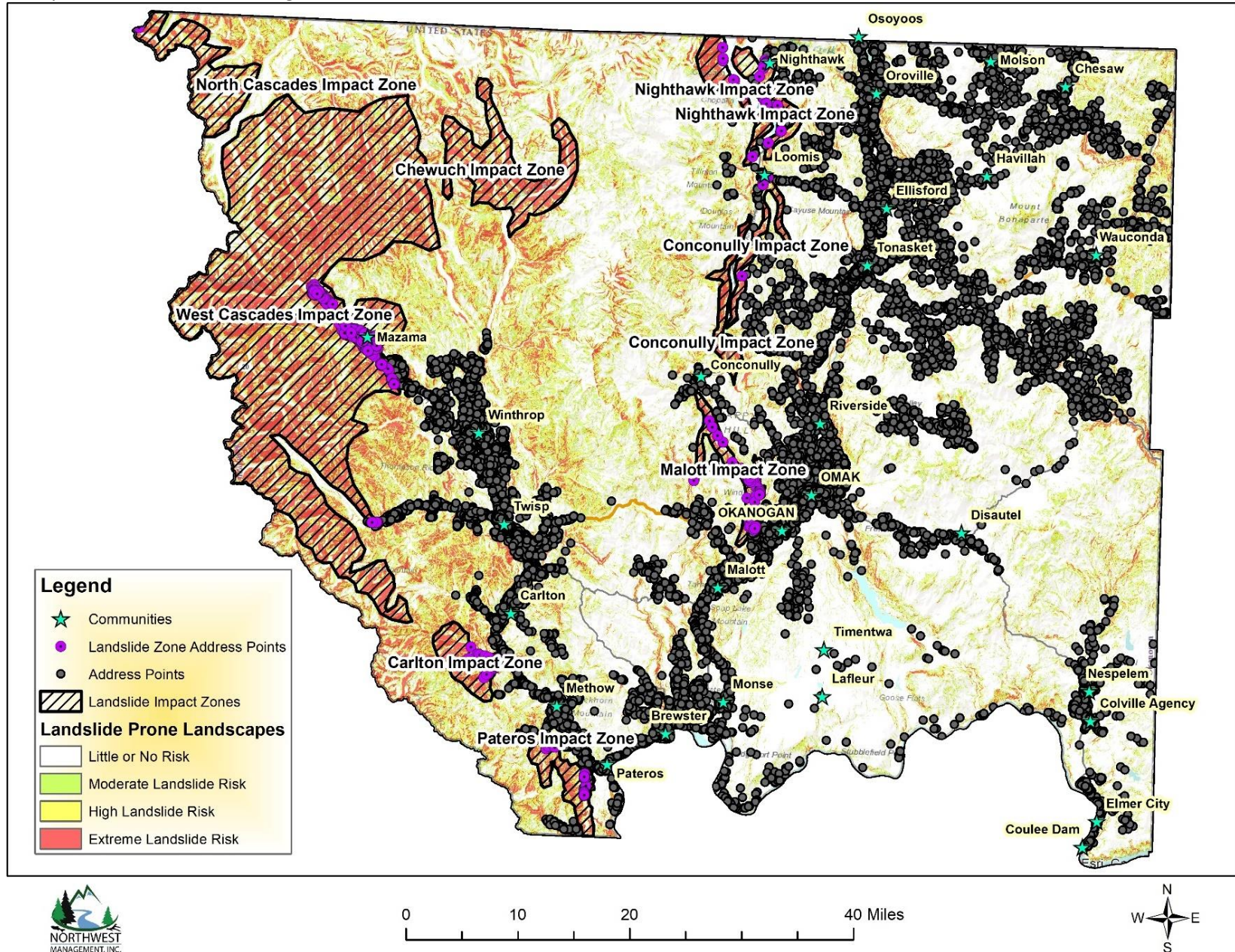


Figure 33) Landslide Impacts Zones with structure locations in Okanogan County, WA. Purple points are structures/address points within impact zones. Landslide Impact Zones were delineated by the Planning Team and the structure/address points are from a GIS layer provided by the State of Washington.

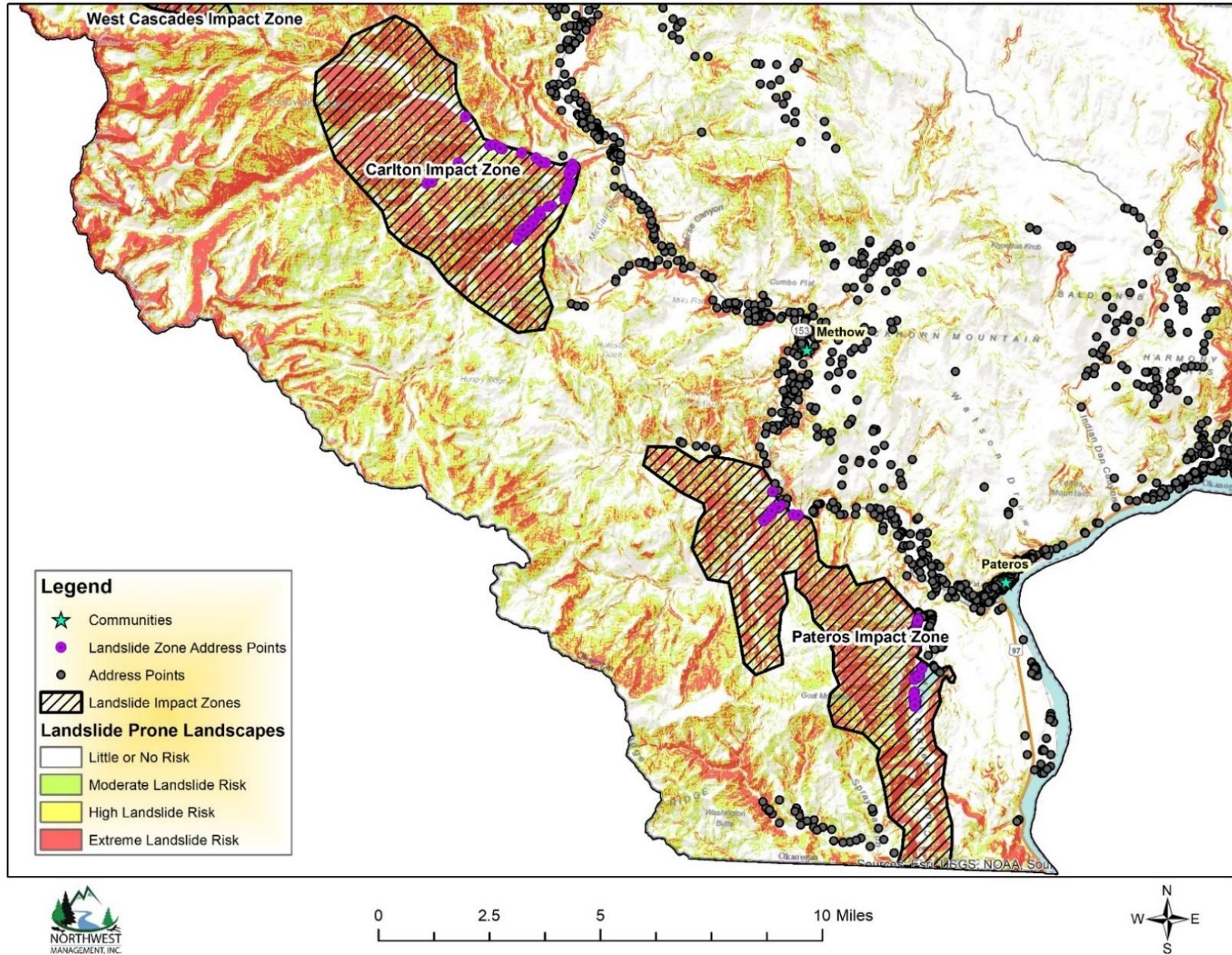


Figure 34) Carlton and Pateros Landslide Impacts Zones with structure locations in Okanogan County, WA. Purple points are structures/address points within impact zones. Landslide Impact Zones were delineated by the Planning Team and the structure/address points are from a GIS layer provided by the State of Washington.

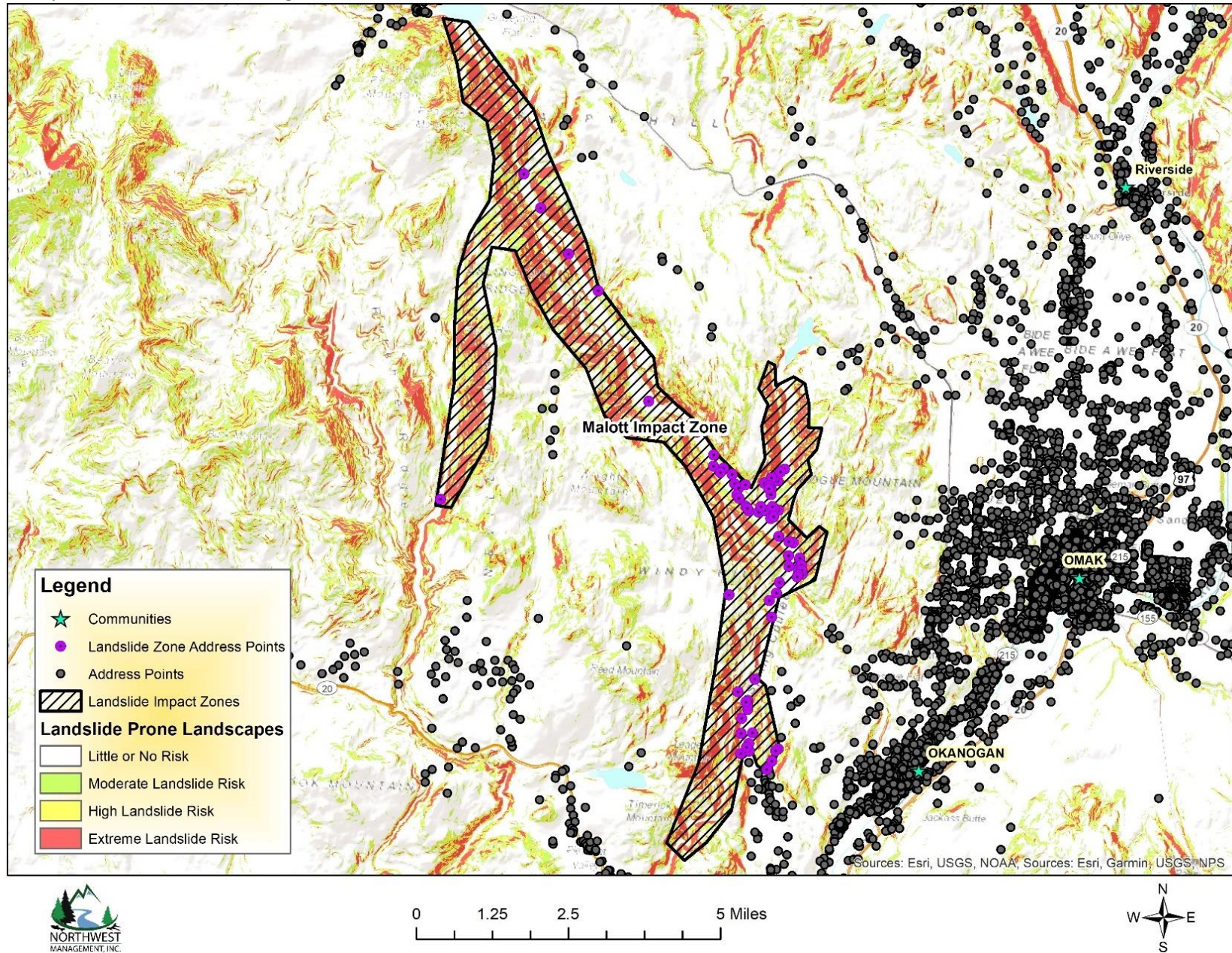


Figure 35) Malott Landslide Impacts Zones with structure locations in Okanogan County, WA. Purple points are structures/address points within impact zones. Landslide Impact Zones were delineated by the Planning Team and the structure/address points are from a GIS layer provided by the State of Washington.

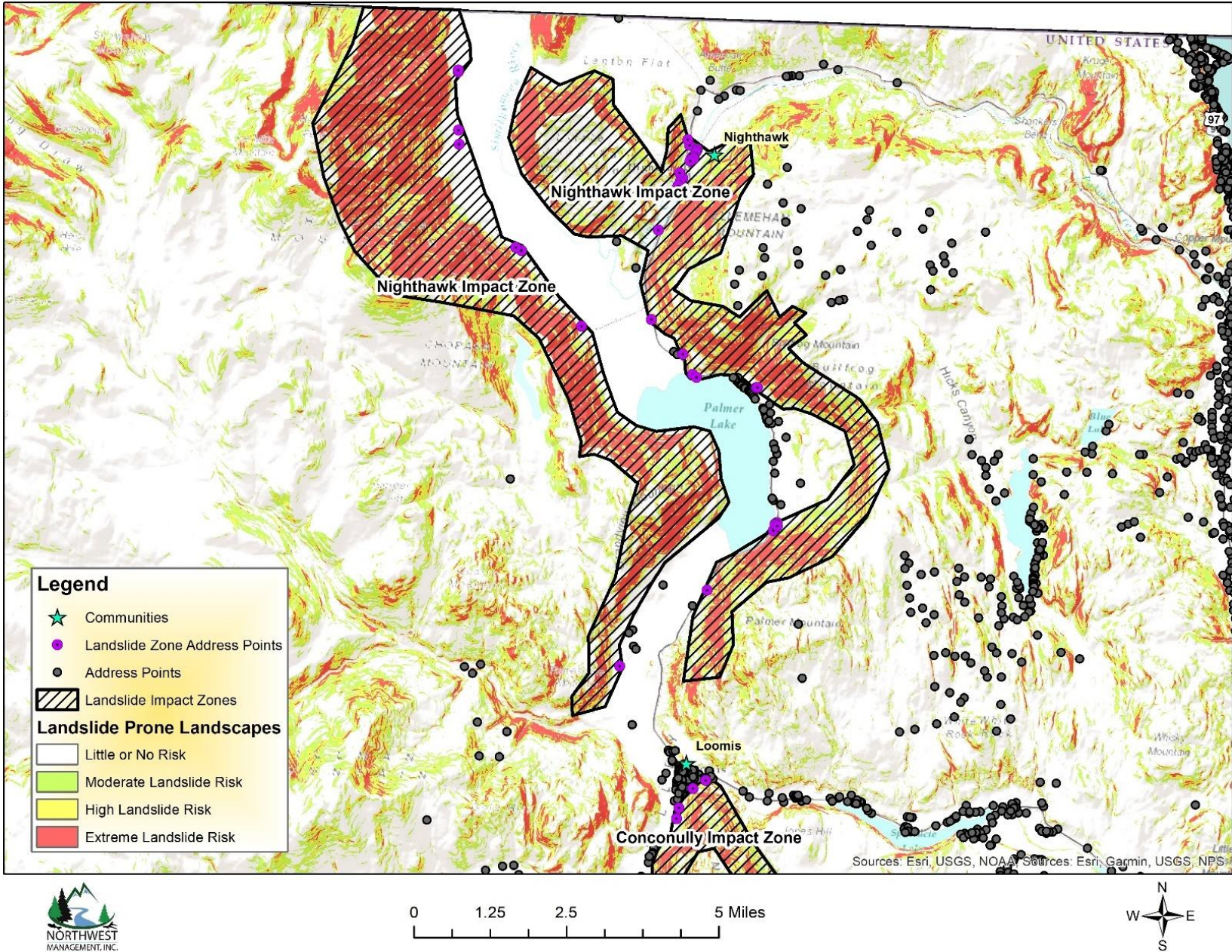


Figure 36) Conconully and Nighthawk Landslide Impacts Zones with structure locations in Okanogan County, WA. Purple points are structures/address points within impact zones. Landslide Impact Zones were delineated by the Planning Team and the structure/address points are from a GIS layer provided by the State of Washington.

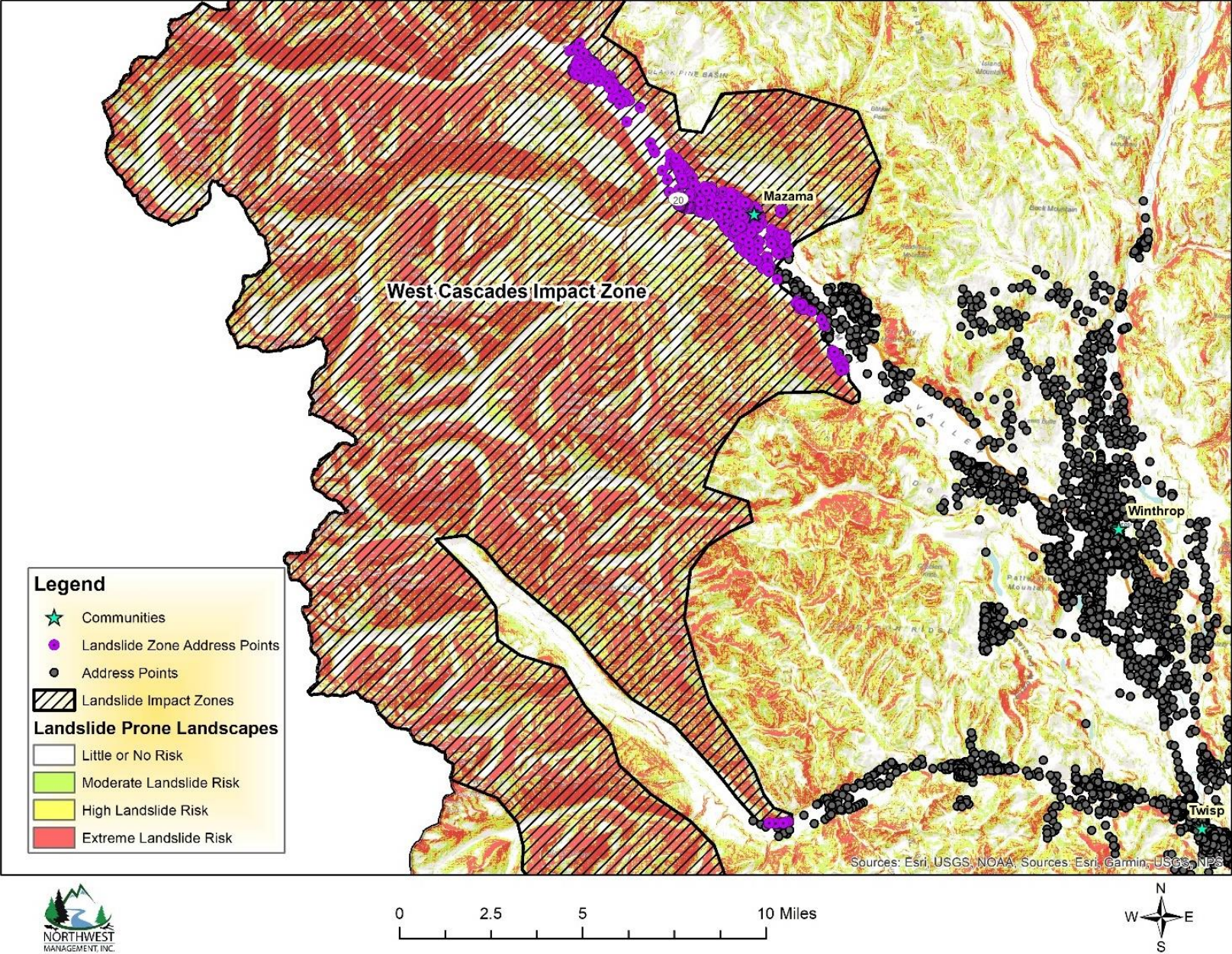


Figure 37) West Cascades Impact Zone with structure locations in Okanogan County, WA. Purple points are structures/address points within impact zones. Landslide Impact Zones were delineated by the Planning Team and the structure/address points are from a GIS layer provided by the State of Washington.

Wildfire Flooding/Mudslides/Landslides: Wildfires in these impact zones could cause a domino effect of multiple hazards. Higher intensity fires not only remove most of the vegetation, but they also cause soils to become hydrophobic or water repellent for a period of time after the fire. This combination leads to unusually high runoff after rain showers or during the spring runoff season. As streams and rivers begin to reach and exceed flood stage, bank failures and channel migration are common. Road building and other soil disturbances tend to exacerbate this effect leading to even more severe land and soil slides.

As of October first, the National Interagency Fire Center had six wildfires on record for Okanogan County for the 2020 fire season. The Anglin, Cold Springs, Green, Green House, Palmer, and Pothole fire burned approximately 217,000 acres in total (Figure 38). These new burn scars pose an immediate flood/mudslide/landslide risk to homes and other structures located downslope from or within proximity to any drainage features that could channel heavy runoff or mudslides.

CLIMATE CHANGE

Changes to the climate could lead to an increased number of landslides because of changes in precipitation patterns, erosion risk due to wildfires, and temperature changes. With increased average annual temperatures, precipitation is more likely to fall as rain and heavy rainfall events are likely to occur at a higher frequency. These types of events are more likely to cause slope failures as levels of soil saturation and erosion increase. Heavy rainfall events also increase the risk and broaden the scope of the hazards associated with burn scars from wildfires as heavy rainfall increases the risk of slope failure, most often in the form of mudslides, within burn scars. Overall, a more comprehensive examination of how landslides in Okanogan County could be affected by climate change is needed to make any predictions for planning purposes.

VALUE OF RESOURCES AT RISK

The cost of cleanup and repairs of roadways is difficult to estimate due to the variable circumstances with each incident including size of the slide, proximity to a State or County shop, and whether the slide occurred on the cut slope or the fill slope. Other factors that could affect the cost of the damage may include culverts, streams, and removal of debris. This type of information is very difficult to forecast; thus, no repair costs for damaged roadways have been estimated.

Slides in the identified Impact Zones are more likely to be larger and more damaging as weaknesses in the underlying rock formations give way. Although infrequent, this type of slide has the potential to not only block, but destroy road corridors, dam waterways, and demolish structures. The highest risk areas in these impact zones are typically at the higher elevations where slopes exceed 25% grade. There are numerous homes in each of these impact zones. Single slide events will not likely impact the entire population, but rather individual structures. Many of the main access and secondary roads could also be at risk from slides initiating in these impact zones.

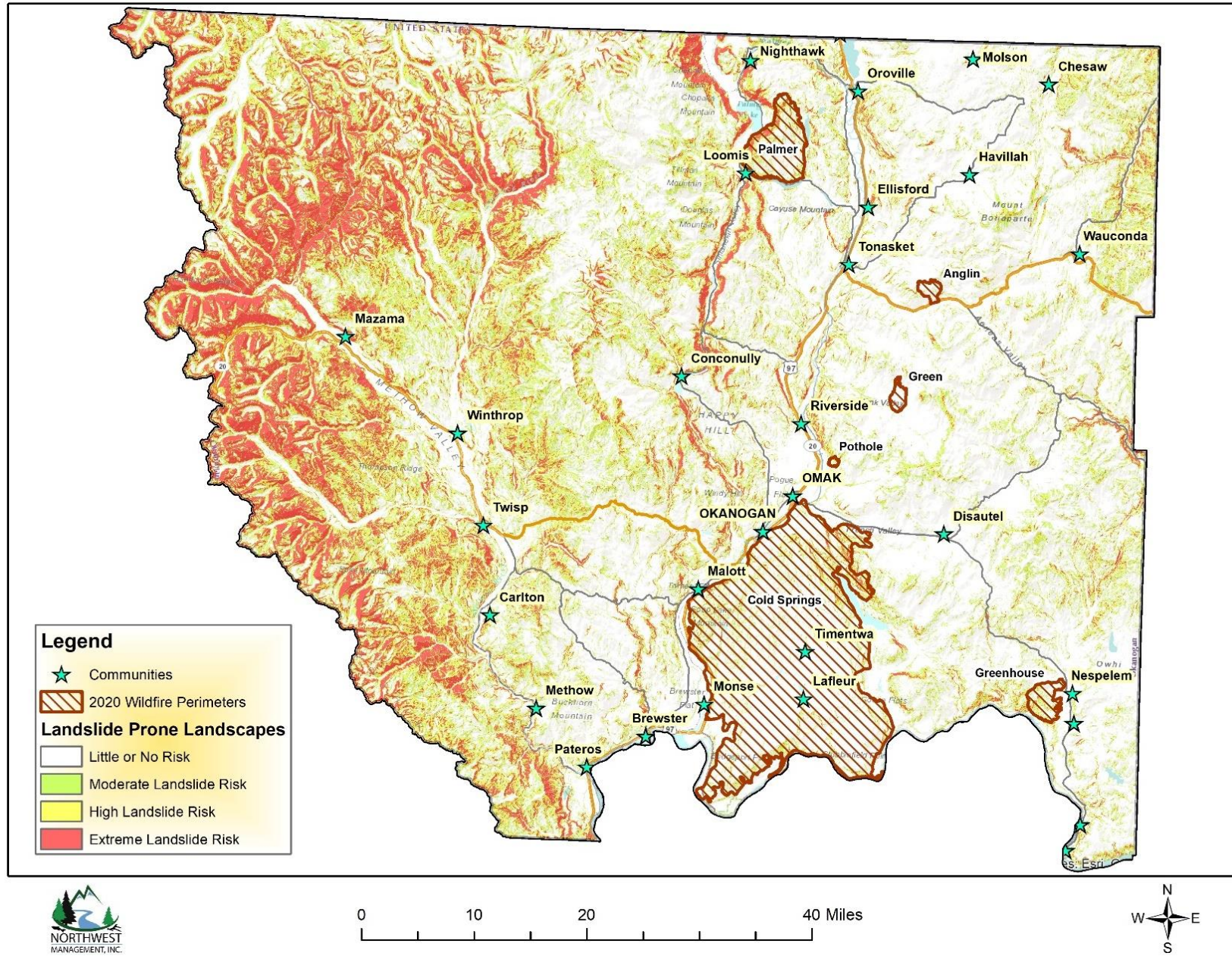


Figure 38) Wildfire perimeters that burned in Okanogan County, WA during the 2020 fire season. Data is from the National Interagency Fire Center and includes all fires that started before October 1, 2020.

Using a GIS structure layer from the State of Washington, it was determined that there are 865 structures within the Okanogan County landslide impact zones that are valued at little more than \$181 million. Containing 643 structures worth more than \$135 million, the West Cascades Impact Zone (which includes the Mazama area) has the greatest total structure value at risk to landslides. Excluding the Chewuch and North Cascades Impact Zone, which do not contain any structures, the other zones also have high asset values that are at risk to landslides, ranging from \$1.1 to 24 million. Residents in rural areas may also be affected, particularly near Conconully and in the unincorporated communities of Mazama, Nighthawk, and Loomis. Smaller scale slumps and road failures may also be an issue in some places around all Okanogan County communities. Refer to Table 91 in the Impacts of Landslide Hazard Events section for more information about estimates related to the number and value of structures in each landslide impact zones.

SEVERE WEATHER HAZARDS

Occurring annually with varying intensities, severe weather in Okanogan County ranges from the commonly occurring thunderstorms to hail, high winds, tornadoes, drought, dense fog, lightning, and snowstorms. Okanogan County is one of eight counties to receive a rating of HIGH for overall exposure to severe weather in Washington according to the Washington State Hazard Mitigation Plan.¹¹¹ Severe weather is a general term and definitions can be subjective. Therefore, this section will recognize a specific set of severe weather categories: *winter storms, thunderstorms, hail, windstorms, and tornados*.

Determined by representatives of the county, the following table includes severe weather hazard ratings for Okanogan County, WA.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	4 – Highly Likely	90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

Winter Storms

All of Okanogan County is at risk to severe winter weather events and there is a very high probability that those events will continue to occur on an annual basis. Due to topography and climatologic conditions, the higher elevations are often the most exposed to the effects of these storms. Commonly, higher elevations in the County will receive snowfall, while valley areas may not. Periodically though, individual storms can generate enough force to impact the entire County at one time. From high winds to ice storms to freezing temperatures, there are all types of winter storms that take place during the course of any given year. Winter conditions can change very rapidly. It is not uncommon to have a snowstorm at night with sunshine the next day.

In Okanogan County, ice storms occur when a layer of warm air is between two layers of cold air. Frozen precipitation melts while falling into the warm air layer, and then proceeds to refreeze in the cold layer above the ground. If the precipitate is partially melted, it will land on the ground as sleet. However, if the warm layer completely melts the precipitate, becoming rain, the liquid droplets will continue to fall,

¹¹¹ Washington Military Department Emergency Management Division. [2018 Washington State Hazard Mitigation Plan](https://mil.wa.gov/enhanced-hazard-mitigation-plan). Available online at <https://mil.wa.gov/enhanced-hazard-mitigation-plan>. Accessed: April 2020.

and pass through a thin layer of cold air just above the surface. This thin layer of air then cools the rain to a temperature below freezing (0 °C). However, the drops themselves do not freeze; a phenomenon called supercooling. When the supercooled drops strike the ground or anything else below 0 °C, they instantly freeze, forming a thin film of ice that can build up on trees, utilities, roads, and other structures, infrastructure, and personal property.¹¹²

Thunderstorms

Due to their relative frequency and minimal severity, severe thunderstorms are not well documented in Okanogan County. However, impacts on residents and communities from thunderstorms are typically limited and are seldom significant. Floods are a possible secondary hazard in the county that can result from heavy rain and can be significant; for more information refer to the Flood Profile.

Exposure to thunderstorms is largely dependent on local and regional geography. Flooding may be a much greater threat to communities and homes located near drainages or steep slopes, winds may be a much more significant threat to communities in large open areas, and other thunderstorm hazards, such as hail and lightning, may pose a risk to all communities in the county. In Okanogan County, lightning strikes pose a significant wildland fire threat throughout the county.

Hail

Hail can occur in any strong thunderstorm, which means hail is a threat everywhere. Hail is precipitation that is formed when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere. Large hail stones can fall at speeds faster than 100 miles per hour. Hail damage in Washington is very small in comparison with damage in areas of the central part of the United States. Often the hail that occurs does not grow to a size larger than one-half inch in diameter, and the areas affected are usually small. Quite often hail comes during early spring storms, when it is mostly of the small, soft variety with a limited damaging effect. During the summer months, hail can be larger and more widespread as it occurs in conjunction with thunderstorms; crop losses resulting from hail can be significant during summer months.

Windstorms

Windstorms and thunderstorm winds are frequent in Okanogan County. In the case of severe storm events, which can happen as frequently as every few years or multiple times in a single year, it is not uncommon for winds to reach speeds of up to 60 mph. Due to the abundance of agricultural development in Okanogan County, high winds can cause significant crop damage and result in substantial economic losses for farmers. In the case of extremely high winds, some buildings may be damaged or destroyed. Wind damages will generally be categorized into four groups: 1) structure damage to roofs, 2) structure damage from falling trees, 3) damage from wind-blown dust on sensitive receptors, or 4) wind driven wildfires. Structural injury from damaged roofs is not uncommon in Okanogan County. Airborne

¹¹² Wikipedia. "Ice Storm". Wikimedia Foundation, Inc. March 2011. Available online at http://en.wikipedia.org/wiki/Ice_storm.

particulate matter increases during high wind events. When this occurs, sensitive receptors including the elderly and those with asthma are at increased risk to complications.

The National Weather Service defines high winds as sustained winds of 40 mph or gusts of 58 mph or greater, not caused by thunderstorms, expected to last for an hour or more. Areas most vulnerable to high winds are those affected by a strong pressure difference from deep storms originating over the Pacific Ocean; an outbreak of very cold, Arctic air originating over Canada; or air pressure differences between western and eastern Washington that primarily affect the Columbia River Gorge, Cascade Mountain passes, ridges and east slopes, and portions of the Columbia Basin.

Okanogan County and the entire region are at increased risk to wildfires during high wind events. Ignitions can occur from a variety of sources including downed power lines, lightning, or arson. Once ignited, only wildfire mitigation efforts around the community and scattered homes will assist firefighters in controlling a blaze. Details about wildfire mitigation are discussed in the wildland fire annexes of this Multi-Hazard Mitigation Plan.

Tornados

A tornado is formed by the turbulent mixing of layers of air with contrasting temperature, moisture, density, and wind flow. This mixing accounts for most of the tornadoes occurring in April and May, when cold, dry air from the north or northwest meets warm, moister air moving up from the south. If this scenario was to occur and a major tornado was to strike a populated area in Okanogan County, damage could be widespread. Businesses could be forced to close for an extended period, and routine services such as telephone or power could be disrupted. The National Weather Service defines a tornado as a violently rotating column of air that contacts the ground; tornados usually develop from severe thunderstorms. Areas most vulnerable to a tornado are those subject to severe thunderstorms or those with a recurrence rate of 5 percent or greater, meaning the County experiences one damaging severe thunderstorm event at least once every 20 years.

According to the National Climatic Data Center¹¹³, there were 5 reports of tornadoes in Okanogan County between 1950 and 2019. They occurred in May 1982 (F1), May 1987 (F1), July 1997 (F1), July 1997 (F1), and August 1997 (F0).

LOCAL EVENT HISTORY

This section includes a summary of several notable major severe weather events that affected Okanogan County from 1950 up until the last disaster declaration made for the county in 2012. A summary of all severe weather events that occurred since 2014, when this plan was last updated, can be found at the end of the section.

¹¹³ National Climatic Data Center. 2020. *Storm Events Database*. NOAA Satellite and Information Service. U.S. Department of Commerce. Available online at <https://www.ncdc.noaa.gov/stormevents/>. Accessed April 2020.

January 1950 “The January 1950 Blizzard” - On this date, 21.4 inches of snow fell in Seattle, the second greatest 24-hour snowfall recorded. The snowfall was accompanied by 25-40 mph winds. The storm claimed 13 lives in the Puget Sound area. January had 18 days with high temperatures of 32 degrees or lower. The winter of 1949-50 was the coldest winter on record in Seattle, with an average temperature of 34.4 degrees. Eastern Washington, North Idaho, and parts of Oregon also were paralyzed by the snow – some lower-elevation snow depths reached nearly 50 inches and temperatures plunged into minus teens and twenties. Several dozen fatalities occurred.

1962 Columbus Day Windstorm – This storm is top weather event in Washington during the 20th Century according to the National Weather Service, Seattle Forecast Office. This storm is the greatest windstorm to hit the Northwest since weather recordkeeping began in the 19th century and called the “mother of all windstorms” in the 1900s. The Columbus Day Storm was the strongest widespread non-tropical windstorm to strike the continental U.S. during the 20th century, affecting an area from northern California to British Columbia. The storm claimed seven lives in Washington State; 46 died throughout the impacted region. One million homes lost power. More than 50,000 homes were damaged. Total property damage in the region was estimated at \$235 million (1962 dollars). The storm blew down 15 billion board feet of timber worth \$750 million (1962 dollars); this is more than three times the timber blown down by the May 1980 eruption of Mount St. Helens, and enough wood to replace every home in the state. Gusts of 88 miles per hour were recorded at Tacoma before power was lost to the recording stations.

February 1996 Severe Storm – Federal Disaster #1100. Stafford Act disaster assistance provided was \$113 million. Small Business Administration disaster loans approved totaled \$61.2 million. Heavy rainfall, mild temperatures and snowmelt caused flooding and mudslides in Adams, Asotin, Benton, Clark, Columbia, Cowlitz, Garfield, Grays Harbor, King, Kitsap, Kittitas, Klickitat, Lewis, Lincoln, Pierce, Skagit, Skamania, Snohomish, Spokane, Thurston, Wahkiakum, Walla Walla, Whitman and Yakima counties, and the Yakama Indian Reservation. This storm caused major flooding on rivers of western and southeast Washington. Mudslides occurred throughout the state. There were three deaths recorded and 10 people injured. Nearly 8,000 homes damaged or destroyed. Traffic flow both east and west, and north and south along major highways was shut down for several days. Damage throughout the Pacific Northwest estimated at \$800 million.

December 1996 - January 1997 Severe Storm – Federal Disaster #1159. Stafford Act disaster assistance provided was \$83 million. Small Business Administration loans approved totaled 31.7 million. Saturated ground combined with snow, freezing rain, rain, rapid warming and high winds within a five-day period produced flooding and landslides. Impacted counties – Adams, Asotin, Benton, Chelan, Clallam, Clark, Columbia, Cowlitz, Douglas, Ferry, Franklin, Garfield, Grant, Grays Harbor, Island, Jefferson, King, Kitsap, Kittitas, Klickitat, Lewis, Lincoln, Mason, Okanogan, Pacific, Pend Oreille, Pierce, San Juan, Skagit, Skamania, Snohomish, Spokane, Stevens, Thurston, Walla Walla, Whatcom, and Yakima. There were twenty-four deaths; \$140 million (est.) in insured losses; and 250,000 people lost power.

March 2009 Winter Storm - President Obama declared that a major disaster exists in the State of Washington. This declaration made Public Assistance requested by the Governor available to State and

eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe winter storm and record and near record snow in Clallam, Clark, Columbia, Cowlitz, Garfield, Grays Harbor, Island, Jefferson, King, Klickitat, Lewis, Lincoln, Mason, Pacific, Pend Oreille, Skagit, Skamania, Snohomish, Spokane, Stevens, Thurston, Wahkiakum, Walla Walla, and Whatcom Counties.¹¹⁴

July 2012 Severe Storm, Straight-line Winds and Flooding - The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) announced that federal disaster assistance was made available to Washington to supplement state, tribal, and local recovery efforts. Federal funding was available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storm, straight-line winds, and flooding in Ferry and Okanogan counties and the Confederated Tribes of the Colville Reservation.

Summary of Recent Severe Weather Events – According to data from National Climatic Data Center Storm Events Database, from January 1, 2014 to December 31, 2019 a total of 581 severe weather events affected Okanogan County. This date range was selected in order to provide a summary of events that occurred since 2014 when this plan was last updated. On average, there are almost 100 events recorded each year in the county, with the most occurring in 2015 and 2017 with 130 events each year. Heavy snow events accounted for the greatest number of events each year, ranging from 37 in 2014 to 84 in 2018. When rounded down, no other event-type averaged more than 10 events each year.

In total, the events summarized in Table 92 account for four fatalities and no recorded injuries. The fatalities happened in August 2015 when three firefighters died in an entrapment situation in the Twisp River Fire and September 2019 when a wildfire blew back on a firefighter who eventually died from severe burns. Across the region, a cold front generated winds of 15 to 25 mph and gusts of up to 30 to 40 mph. In some areas, winds were as strong as 60 to 70 mph. Over the six-year period, severe weather events caused more than \$370 million in property damage and, in 2014, just over \$1 million in crop damage. This information is summarized in more detail in Table 93.

PROBABILITY OF FUTURE OCCURRENCE

The risk rating for severe weather in Okanogan County is high. As shown in Table 92, there were, on average, approximately 100 severe weather events that affected the county over the last six years.

Extreme cold, snow accumulation, and wind events are common occurrences between November and March. Major winter storms are expected at least twice each year during the winter season; however, these weather patterns rarely last more than a few days. Severe ice storms also occur in Okanogan County during the winter months. Severe and damaging winter storms have occurred in Okanogan County twice in the last 4 years. The probability of this type of event is moderate to high annually.

¹¹⁴ FEMA. 2009. *Severe Winter Storm and Record and near Record Snow*. FEMA 1825-DR. Available online at <http://www.fema.gov/pdf/news/pda/1825.pdf>.

Table 92) Summary of severe weather events that affected Okanogan County, WA between January 1, 2014 and December 31, 2019. Data is from the NOAA National Climatic Data Center's Storm Events Database. The date range was selected in order to provide a summary of events that occurred since 2014 when the HMP was last updated. Refer to Table 93 for a summary of injuries, fatalities, and damage that resulted from these events.

Event Type	2014	2015	2016	2017	2018	2019	Total	Avg/Year
Debris Flow	4	2	7	1	6	2	22	3.7
Dense Smoke	0	0	0	2	6	0	8	1.3
Dust Storm	1	3	0	0	1	0	5	0.8
Flash Flood	1	5	5	0	0	0	11	1.8
Flood	0	0	3	5	11	0	19	3.2
Freezing Fog	1	1	0	0	0	0	2	0.3
Hail	1	1	0	1	0	0	3	0.5
Heavy Rain	0	1	1	0	0	0	2	0.3
Heavy Snow	37	46	38	71	84	59	335	55.8
High Wind	0	14	0	1	3	0	18	3.0
Ice Storm	0	1	0	5	0	0	6	1.0
Strong Wind	0	0	0	0	2	2	4	0.7
Thunderstorm Wind	6	0	1	1	9	0	17	2.8
Wildfire	9	25	13	4	4	2	57	9.5
Winter Storm	0	1	0	7	0	0	8	1.3
Winter Weather	18	28	3	1	4	7	61	10.2
Total	78	130	72	99	130	72	581	96.8

Table 93) Summary of injuries, fatalities, property damage, and crop damage resulting from severe weather events that affected Okanogan County, WA between January 1, 2014 and December 31, 2019. Data is from the NOAA National Climatic Data Center's Storm Events Database. The date range was selected to provide a summary of events that occurred since 2014 when the HMP was last updated. Refer to Table 92 for more information about the events recorded during this period.

Year	Deaths	Injuries	Property Damage	Crop Damage
2014	0	0	\$ 243,449,000	\$ 1,080,000
2015	3	0	\$ -	\$ -
2016	0	0	\$ 58,200	\$ -
2017	0	0	\$ 4,244,000	\$ -
2018	0	0	\$ 122,234,260	\$ -
2019	1	0	\$ 63,100	\$ -
Total	4	0	\$ 370,048,560	\$ 1,080,000

Wind events are also common in Okanogan County and can occur throughout the year. Wind is often associated with winter storms during the winter and thunderstorms during the warmer months but can also occur without additional storm influences. Significant wind events are expected 3-5 times annually.

Several major thunderstorms are expected in Okanogan County each year between April and September; however, these types of events rarely cause serious damage.

Okanogan County has a moderate probability of experiencing a damaging hailstorm in any given year. These types of events most frequently occur in the spring but can occur throughout the summer as well.

Tornadoes are relatively rare, but the conditions for a funnel cloud to form are reported in Okanogan County several times each year. Nevertheless, based on the historical record of tornadoes in this area, the probability for a small tornado to occur in Okanogan County is low. The probability of a higher magnitude tornado occurring in this area is extremely low.

IMPACTS OF SEVERE WEATHER EVENTS

Winter Storms

Winter storms with heavy snow, high winds, and/or extreme cold can have a considerable impact on Okanogan County; however, most residents are well accustomed to the severe winter conditions in this part of Washington. Power outages and unplowed roads are a frequent occurrence throughout many parts of the County, but most residents are prepared to handle the temporary inconvenience. Snow loads on roofs, ice-slides off of roofs onto vehicles or other buildings, and damaged frozen pipes are also potential hazards associated with winter weather. These events represent a significant hazard to public health and safety, a substantial disruption of economic activity, and a constant threat to structures during the winter months.

Okanogan County has experienced several “ice storms” in recent memory. The freezing rain from an ice storm covers everything with a heavy layer of ice that can cause hazardous road conditions resulting in numerous accidents. Trees have been heavily damaged as branches break from the weight of the ice. The weight of the ice can also snap power lines and bring down utility poles. The loss of power during the winter months can last from a few hours to a few days and is particularly dangerous for those relying on electrical heat. The loss of a heat source can cause hypothermia, frost bite, or even death and can also lead to damages caused by frozen pipes.

Thunderstorms

As a result of fire suppression, thunderstorms pose a threat to all areas of the county due to higher fuel loads and degraded ecosystem functioning in both rangeland and forests. Thunderstorms can cause lightning-strike fires which threaten county residents, infrastructure, and the local economy. Ranching families rely on public lands for grazing livestock at least for some portion of the year. Frequent fire and increasing degradation of rangeland plant communities threaten grazing leases, as burned rangeland generally receives post-fire rest, halting livestock grazing on the affected allotment to allow for land recovery. Ranchers are forced to buy feed or find other alternatives and are more likely to discontinue

grazing on rangelands that burn frequently. Loss of livestock grazing on these rangelands exacerbates the issue of high fuel accumulation and increases risk of fire.

Dry thunderstorms and lightning in the forested areas of the county are also at risk. Pests, pathogens, and overstocking have contributed to a general decline in forest health and increases in tree mortality. Dead and dying trees contribute to fuel loading in forests and increases the potential for catastrophic wildfires. Uncontrolled wildfires in the forested areas of the county threaten residents, homes, recreational facilities and infrastructure, wildlife and wildlife habitat, and standing timber.

Hail

The potential impacts of a severe hailstorm in Okanogan County include crop damage, downed power lines, downed or damaged trees, broken windows, roof damage, and vehicle damage. Hailstorms can, in rare and extreme cases, cause death by exposure. Overall, the most common direct impacts from hailstorms include traffic accidents and property damage. The highest potential damage from hailstorms in Okanogan County is the economic loss from crop damage. Even small hail can cause significant damage to young and tender plants and fruit.

Windstorms

The impacts of an extreme wind event on a community are usually minimal. However, the area affected by extreme wind events can be widespread making response difficult, especially if resources and emergency response personnel are limited. Utilities and transportation are usually impacted by extreme wind events because of poor road conditions and/or downed trees that block roadways and disrupt power distribution. Damage to structures, mostly the loss of siding and roofing materials, does occur on a more localized scale and is influenced by building materials and age of structure. Depending on the season of the event, severe winds may result in a loss of agricultural crops.

After such an event, it can take communities days, weeks, or longer to return to normal activities. In addition to costly structural damages, windstorms can cause injury or even death.

Tornados

So far, tornadoes have not had any serious impacts on Okanogan County residents. Minor damages may occur as a result of the high winds associated with a tornado.

CLIMATE CHANGE

Severe weather events are a part of the natural climatic cycle. As such, these events play an important role in maintenance and sustenance of local biodiversity. However, climate change, by its very nature, and following the basic laws of thermodynamics and the conservation of energy, is adding energy to many systems. This added energy in the atmosphere has to go somewhere and that somewhere can be realizing in stronger winds, more hailstorms and greater rain intensity. As such, Okanogan County should expect changes in weather patterns over the next five-year planning cycle. This includes storm systems with greater intensities as well as seasonal changes in the timing and type of precipitation. Refer to the Natural

Hazards and Climate Change section at the beginning of this chapter for more information about the influence of climate change on severe weather patterns.

VALUES OF RESOURCES AT RISK

Winter Storms

It is difficult to estimate the cost of potential winter storm damages to structures and the economy in Okanogan County. Damage to roofs by heavy snow accumulations depends on the moisture content of the snow and the structural characteristics of the buildings. In general, snow in this region tends to have low moisture content because of the low temperatures and arid environment. Snow plowing in Okanogan County occurs from a variety of departments and agencies. The state highways are maintained by the State of Washington. Plowing of county roads is done by the County Road Department and the road departments of the individual cities. Okanogan County has developed a pre-determined list of critical routes in order to prioritize the plowing of arterials and other main access routes. Private landowners are responsible for maintaining their own driveways or other private roads.

Utility supplies are impacted during severe winter storms as power is lost on a regional basis. This has a two-fold impact on Okanogan County residents as not only is power cut to homes and businesses, but primary heating is lost for many residents. Gas furnaces and wood stoves supplement electrical heating, but with wood heating the senior population is at a disadvantage. Frozen water pipes are the most common damage to residential and business structures. Older homes tend to be at a higher risk to frozen water pipes than newer ones.

All communities should be prepared to deal with power failures. Community shelters equipped with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water. More rural parts of the County are sometimes better prepared to deal with power outages for a few days due to the frequent occurrence of such events; however, prolonged failure, especially during cold winter temperatures can have disastrous effects.

Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for several days and businesses may not open. Damages are seen in the form of structural repair and loss of economic activity. Okanogan County schools are occasionally closed during and right after a severe winter storm because of snow and ice-covered roads that create hazardous driving conditions and power outages that result in loss of heat in school facilities.

Thunderstorms

Thunderstorms affect all counties in Washington, but they are generally localized events. Their impacts are various depending on specific conditions of the storm and characteristics of the affected area. Thunderstorms can result in hail, lightning, and flash flooding. Generally, thunderstorms do not

significantly affect the communities enough to declare a disaster. However, the loss potential from flooding as a result of severe thunderstorms can be significant in Okanogan County. Additionally, heightened drought conditions and fuel loads, especially in the arid regions of the county, present risk associated with lightning caused fires. Impacts of wildland fire affect the community in a variety of way and are very costly. From costs associated with fighting fire to restoration costs for replanting and losses of wildlife habitat, livestock grazing, and recreation, lightning caused fires are difficult to value.

Hail

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property as well as to the extensive agricultural development in Okanogan County. Potential losses to agriculture can be disastrous. They can also be very localized; thus, individual farmers can have significant losses, but the event may not drastically affect the economy of the County. Furthermore, crop damage from hail will also be different depending on the time of year and the type of crop. Most farmers carry insurance on their crops to help mitigate the potential financial loss resulting from a localized hailstorm. Federal and state aid is available for County's with declared hail disasters resulting in significant loss to local farmers as well as the regional economy. Homeowners in Okanogan County rarely incur severe damage to structures (roofs); however, hail damage to vehicles is not uncommon. Hail damage to vehicles is difficult to estimate because the number of vehicles impacted by a specific event is unknown. Additionally, most hail damage records are kept by various insurance agencies.

Windstorms and Tornadoes

The county has set standards for construction and building practices through the adoption of the latest International Building Codes. These codes consider various severe weather conditions, including high winds, and are likely to be sufficient for structures in the county. However, exceptional storm events producing significant wind speeds can cause power outages and topple trees onto houses, cars, and other structures. Older buildings that have not been updated with modern building materials will likely be the most vulnerable to such an event.

Therefore, the following calculations were used to estimate both structural damage and roof damage resulting from high winds.

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)
- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 36,337 total parcels with 15,793 improvements in unincorporated Okanogan County worth more than \$1.7 billion. Using the criteria outlined above an

estimate of the impact of high winds on the County has been made. The potential wind and tornado impact on improvements values is estimated at approximately \$25.7 million in damage. The estimated damage to roofs (on parcels with improvements) is just under \$2.4 million.

WILDLAND FIRE HAZARDS

Each year, wildland fire risk within Okanogan County can, potentially, reach extreme levels and produce what can become catastrophic wildfire seasons and many years of recovery afterward. Summer months in the region can be extremely hot and dry as rain can be absent for most of the summer (the rainy season often tapers off in June and returns sometime in September). In addition to high fire potential, much of Okanogan County can be classified as wildland-urban interface (WUI) because of expansive and remote wildland conditions that characterize the county and the way that many rural communities are distributed within and adjacent to wildland fuels. Given the potential for highly volatile wildfire seasons and the distribution of homes in the wildland-urban interface, wildfire seasons in Okanogan County can present extremely high levels of risk to residents and resources in the county.

Determined by representatives of the county, the following table includes wildland fire hazard ratings for Okanogan County, WA.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	4 – Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events	4 – Highly Likely	90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year
Overall Significance	12 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

Vegetative Cover-Types

Cover vegetation and wildland fuels exhibited across the county have been influenced by massive geologic events during the Pleistocene era that scoured and shifted the earth’s surface leaving areas of deep rich soil interspersed with rugged mountains and deep valleys. In addition to the geological transformation of the land, wildland fuels vary within a localized area based on slope, aspect, elevation, management practices, and past disturbances. Geological events and other factors have created distinct landscapes that exhibit different fuel characteristics and wildfire concerns.

Okanogan County has three predominant landscape types that exhibit distinct terrain and wildland fuels: forested highlands, shrub-covered hills, and fertile valleys. These landscapes, although intermixed in some areas, exhibit specific fire behavior, fuel types, suppression challenges, and mitigation recommendations that make them unique from a planning perspective.

The fertile valleys and the shrub-covered hills are ideal for farming and ranching operations, respectively. Agricultural fields occasionally serve to fuel a fire after curing, burning in much the same manner as low grassy fuels. Fires in grass and rangeland fuel types tend to burn at relatively low intensities with

moderate flame lengths and only short-range spotting. Common suppression techniques and resources are generally quite effective in this fuel type. Homes and other improvements can be easily protected from direct flame contact and radiant heat through adoption of precautionary measures around structures. Although fires in agricultural and rangeland fuels may not present the same control problems as those associated with large, high intensity fires in timber, they can cause significant damage if precautionary measures have not been taken prior to a fire event.

Shrub covered hills, which often resemble rangeland with a significant shrub component, will have much higher fuel loads, burn with greater intensity, and typically have longer flame lengths and greater spotting potential than fires burning in grass or agricultural fuels. Wind driven fires and fires on steep slopes in these fuel types spread rapidly and can be difficult to control. During extreme drought and when pushed by high winds or on steep slopes, fires in grass and shrub fuel-types can exhibit extreme behavior and high rates of spread, which complicates suppression efforts and structure protection.

The distribution of forest and woodland fuels in the county is largely dependent on temperature and moisture which vary by elevation, aspect, and topography (drainage features). In general, forest coverage in the county is the most continuous in the mountains and foothills and it becomes sparse and discontinuous at lower elevations where forested areas are primarily found on northerly aspects or along rivers and other drainage features. Excluding the arid shrub-steppe ecosystem type, forested areas are found throughout Okanogan County. Most of the forested area in the county is on hilly or mountainous terrain and is intermingled with grass and shrubland; these other fuel-types can function as ladder fuels which creates conditions where fuels are both vertically and horizontally continuous. These factors, combined with arid and windy conditions characteristic of the river valleys in the region, can result in high intensity fires with large flame length and fire brands that may spot long distances. Such fires present significant control problems for suppression resources and often results in large wildland fires.

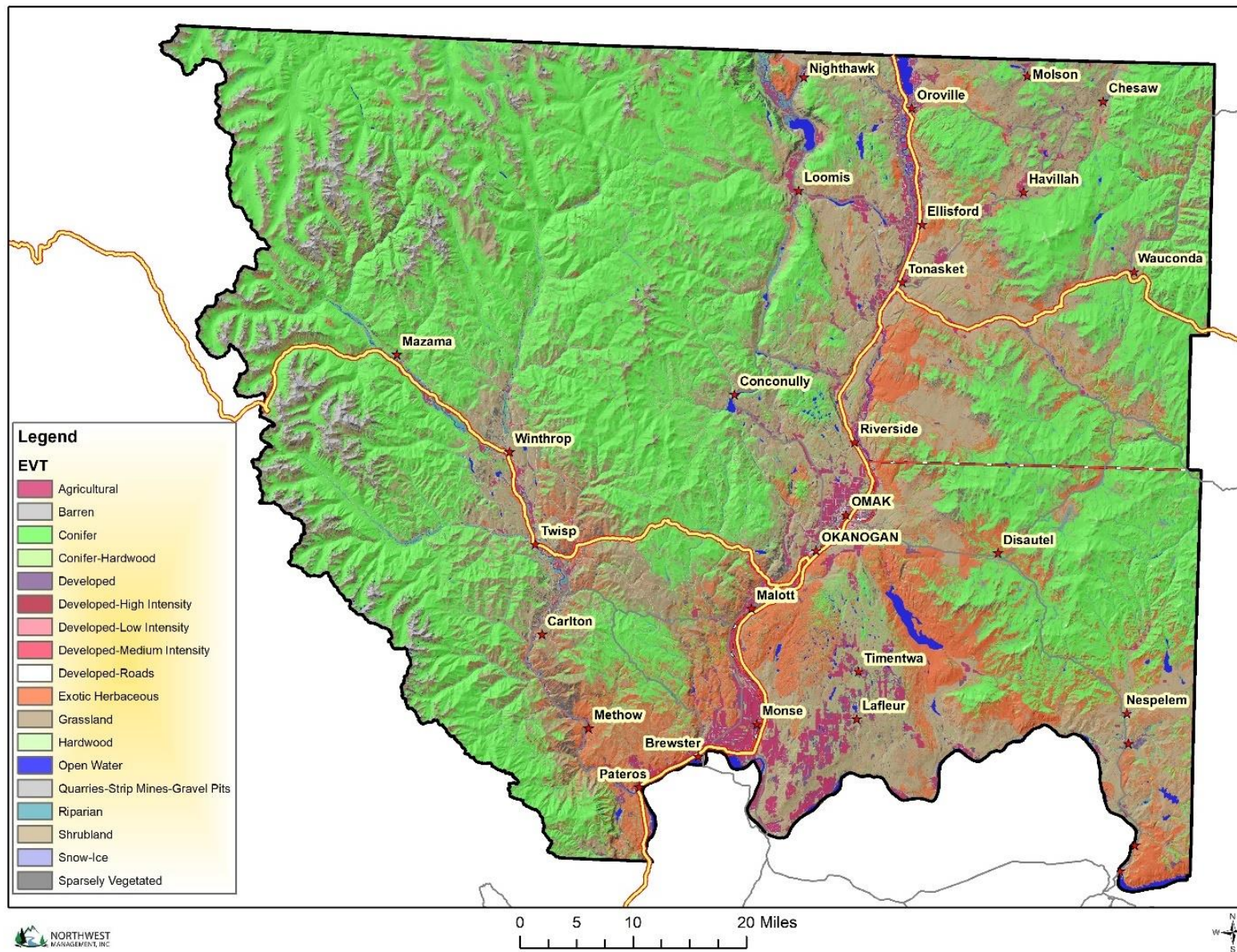


Figure 39) Okanogan County Existing Vegetation

Development

Since the adoption of the previous Community Wildfire Protection Plan, development is rapidly occurring along the Okanogan, Methow, and Columbia Rivers. Many people have purchased small tracts of land in these locations and built dwellings amongst the trees and shrubland. Some lots are being sold in the more mountainous areas outside of the cities for vacation homes. Scenic vistas and rolling topography close to Okanogan-Wenatchee National Forest makes these areas desirable. However, the risk of catastrophic loss from wildfires in this area is significant. Fires igniting along the bottom of the canyon have the potential to grow at a greater rate of speed on the steeper slopes and rapidly advance to higher elevations. Within the forest and woodland areas, large fires may easily produce spot fires up to 2 miles away from the main fire, compounding the problem and creating fires on many fronts. Fire suppression efforts that minimize loss of life and structures in this area are largely dependent upon access, availability and timing of equipment, prior fuels mitigation activities, and public awareness.

LOCAL EVENT HISTORY

This section contains multiple analyses of wildland fire history in Okanogan County, including a summary of ignitions as reported by multiple fire protection agencies (the Washington DNR, United States Forest Service, and Bureau of Indian Affairs) from 1975 through 2019, a summary of wildfire ignitions by cause and acreage as reported by the Washington DNR for 2008 through 2019, and an analysis of recent large wildland fire (those that were 300 acres and larger) that affected Okanogan County since the last update of this plan (2014 through 2019).

HISTORY OF IGNITIONS ON AGENCY PROTECTED LANDS

Detailed records of fire ignitions and extents have been compiled from the Washington Department of Natural Resources (DNR), the United States Forest Service (USFS), and Bureau of Indian Affairs (BIA) within the County. The Washington DNR dataset includes fires from 2000-2019, the USFS database includes data from 1975-2019, and the BIA database includes data from 1983-2016; fires included in each agency dataset occurred within that agency's jurisdiction.

Collectively, all three agencies reported approximately 2.9 million acres burned and more than 5,000 ignitions during 99 agency fire seasons (since the date ranges for each dataset are different, the count of separate agency fire seasons was used instead). Lightning started nearly 2,600 fires and resulted in over 1 million acres burned (contributing to 37% of the total acres burned). Meanwhile, human activity caused 40% of recorded ignitions because of activities such as logging, debris burning, recreation, etc. and resulted in 22% of the total acres burned (Table 94). The "miscellaneous" category includes ignitions originating from burning material from aircraft, electric fences, hot ashes, spontaneous combustion (other than sawdust piles), use of fire (other than logging), woodcutting, and an "other" category. The "undetermined" category includes ignitions that are still under investigation or undeterminable.

Table 94) Summary of ignitions by cause and acreage burned in Okanogan County. Data is from the Washington DNR (2000 to 2019), USFS (1975 to 2019), and BIA (1983 to 2016) Fire Statistics Databases (The total number of fire seasons was determined by adding the number of years each agency reported data for; collectively, the data cover 99 agency fire seasons).

Cause	Acres Burned	% of Total Acres	Approx. Acres Burned each Season	No. of Ignitions	% of Total Ignitions	Avg. Number Each Season
Human	644,306	22%	6,500	2,005	40%	20.3
Lightning	1,088,545	37%	11,000	2,598	52%	26.2
Miscellaneous	164,202	6%	1,700	343	7%	3.5
Undetermined	1,035,664	35%	10,500	66	1%	0.7
Total	2,932,718	100%	29,600	5,012	100.0%	50.6

To display the locations and distribution of the fires included in the federal datasets, datapoints from 2000 to 2019 were selected and displayed on a map (the BIA dataset only went through 2016). A shorter date range was selected for several reasons: 1) points from the same period were included from each dataset where possible, 2) focus on current datapoints was prioritized, 3) the sample size was just large enough to see distribution patterns but not too large that the points display poorly. The ignition points are displayed in Figure 40 and are displayed as either a naturally started fire (i.e. lightning) or a human caused fire; there are 2,879 points displayed on the map in total. The naturally caused fires (pink triangles, 1,587 points) appear to be more randomly distributed across the county, which should be expected from lightning strikes, while human-caused fires (yellow circles, 1,292 points) appear to be concentrated in populated areas, along roadways, along waterways, and in recreation areas. Approximately 55% of the ignitions were caused by lightning while the remaining 45% of ignitions were caused by human activity.

To look at more specific causes of wildfire, data for Okanogan County from the Washington DNR Fire Statistics¹¹⁵ dataset was analyzed. This dataset is used to track wildfire information, assess wildfire risks, and to plan wildfire prevention activities. It includes information about wildfires that have occurred on lands protected by the Washington State Department of Natural Resources, 2008 to present.

According to the data, there were approximately 1,380 wildfire ignitions on DNR protected lands from 2000 to 2019 in Okanogan County. Lightning started 700 fires while human activity caused the other 680 fires. Aside from the 250 miscellaneous fires recorded during that period, debris burning (211 ignitions) and recreation (83 ignitions) were the two human activities that caused the most ignitions (Figure 41 and Table 95). Lightning strikes fire also burned the most acreage during that period, totaling nearly 614,000 acres on DNR protected lands. Aside from the almost 217,000 acres burned by fires that are still under investigation, miscellaneous causes (87,988 acres burned) and debris burning (3,438 acres burned) were the two categories of human activity that burned the most acreage (Table 96).

¹¹⁵ DNR Fire Statistics 2008- Present. Washington Geospatial Open Data Portal. Available online at <http://geo.wa.gov/datasets/wadnr::dnr-fire-statistics-2008-present-1>. Accessed August 2020.

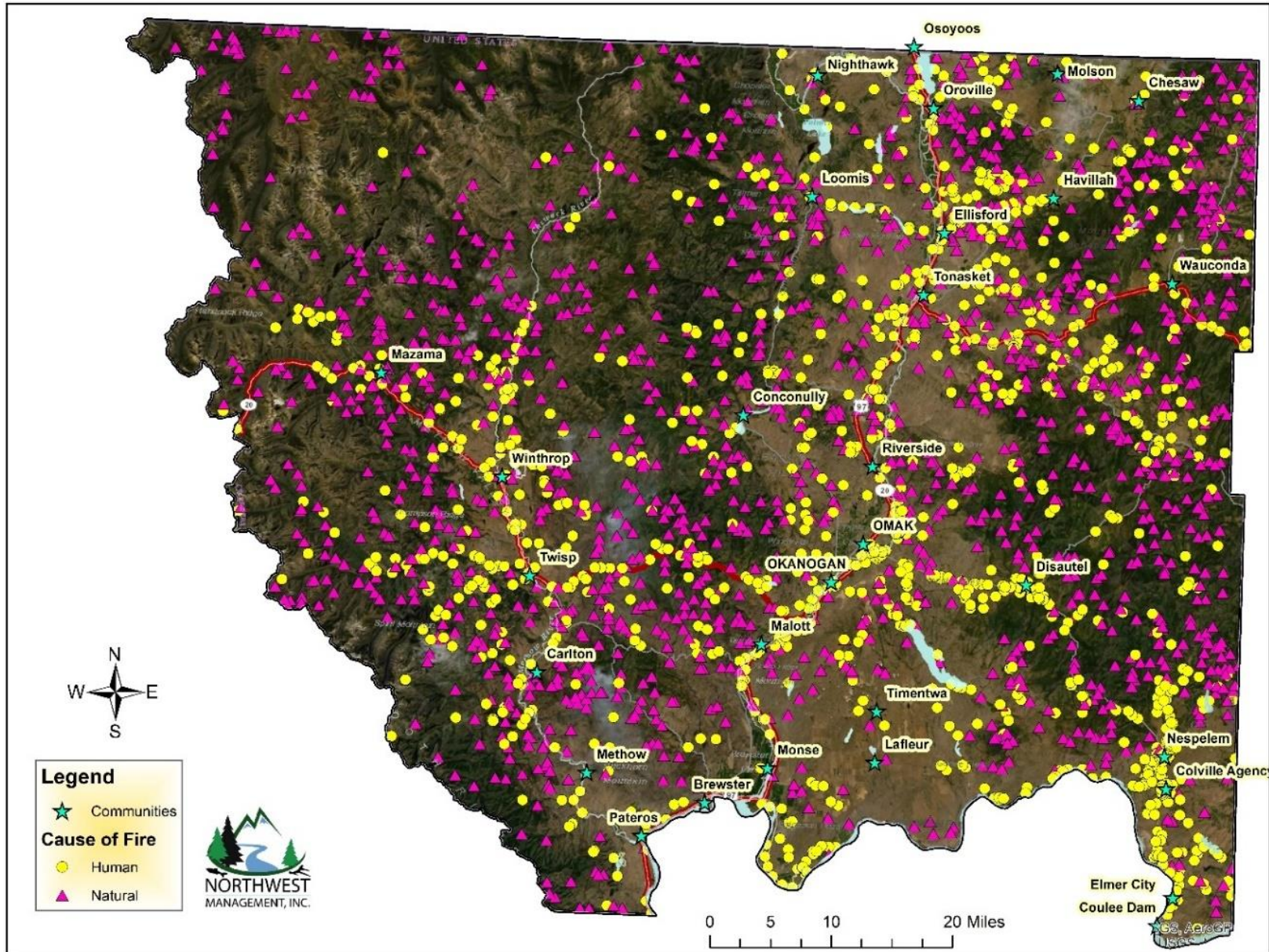


Figure 40) Locations of human and lightning caused wildland fire ignitions in Okanogan County (2000-2019). Data is from the Washington DNR (2000 to 2019), USFS (1975 to 2019), and BIA (2000 to 2016) Fire Statistics Databases.

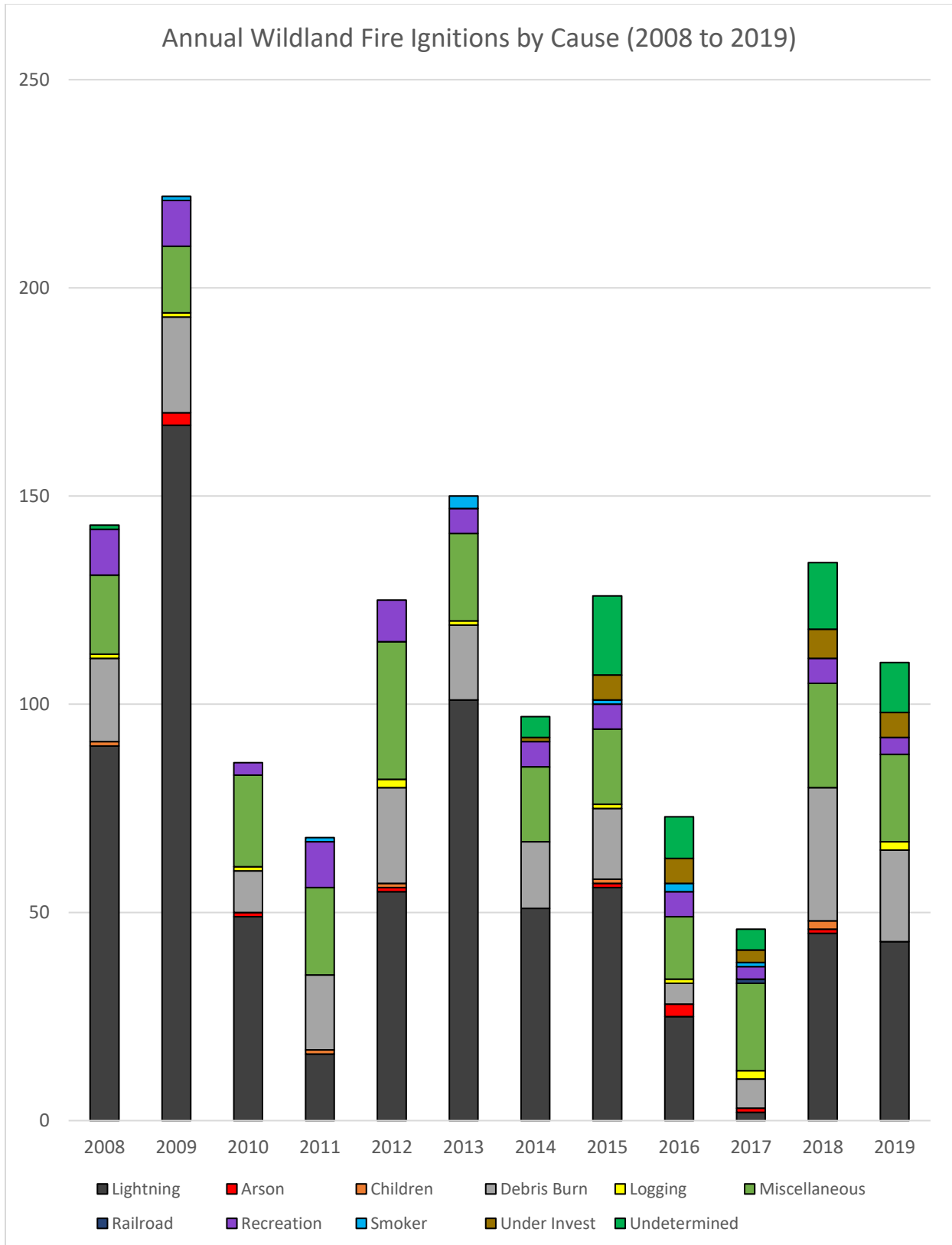


Figure 41) Summary of ignitions by cause in Okanogan County from 2008 to 2019. Data is from the Washington DNR Fire Statistics Database.

Table 95) Summary of ignitions by cause in Okanogan County from 2008 to 2019. Data is from the Washington DNR Fire Statistics Database.

Cause	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Arson	0	3	1	0	1	0	0	1	3	1	1	0	11
Children	1	0	0	1	1	0	0	1	0	0	2	0	6
Debris Burn	20	23	10	18	23	18	16	17	5	7	32	22	211
Lightning	90	167	49	16	55	101	51	56	25	2	45	43	700
Logging	1	1	1		2	1	0	1	1	2		2	12
Misc.	19	16	22	21	33	21	18	18	15	21	25	21	250
Railroad	0	0	0	0	0	0	0	0	0	1	0	0	1
Recreation	11	11	3	11	10	6	6	6	6	3	6	4	83
Smoker	0	1	0	1	0	3	0	1	2	1	0	0	9
Under Invest	0	0	0	0	0	0	1	6	6	3	7	6	29
Undetermined	1	0	0	0	0	0	5	19	10	5	16	12	68
Total	143	222	86	68	125	150	97	126	73	46	134	110	1380

Table 96) Summary of acreage burned by cause in Okanogan County from 2008 to 2019. Data is from the Washington DNR Fire Statistics Database.

Cause	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Arson	0	332	1	0	5	0	0	14	1	3	3	0	358
Children	9	0	0	0	0	0	0	0	0	0	3	0	12
Debris Burn	1,805	55	19	56	575	80	79	120	4	26	415	202	3,438
Lightning	4,703	10,824	127	3	6,110	1949	250,342	295,210	36	0	81	44,514	613,899
Logging	0	0	0	0	0	0		0	0	1		0	2
Misc.	26,630	2,663	475	3,364	37,079	1732	1,564	11,979	20	147	50	2,285	87,988
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0
Recreation	121	8	1	7	9	0	2	2	0	0	23	1	175
Smoker	0	0	0	0	0	0	0	0	0	19	0	0	19
Under Invest	0	0	0	0	0	0	0	215,764	760	0	0	149	216,673
Undetermined	0	0	0	0	0	0	4	4,741	2	1,258	42	145	6,192
Total	33,268	13,883	623	3,430	43,779	3,762	251,991	527,830	823	1,453	617	47,296	928,756

RECENT LARGE WILDLAND FIRES

According to the Washington DNR and National Interagency Fire Center, 28 large wildland fires burned acreage within Okanogan County from 2014 to 2020 (large wildfires, as defined by the USFS, are those that are 300 acres or larger in size). The 2014 Carlton Complex fire was the largest wildfire to occur during that period (Table 97). It was started by lightning and burned more than 250,000 acres. The North Star fire was the second largest at just over 218,000 acres and was started by human activity. Refer to Figure 42 for a map of the fires that are listed in Table 97.

Table 97) large wildland fires (300 acres and larger) that burned within Okanogan County, WA from 2014-2020; data is from the Washington DNR (2014-2019 data) and the National Interagency Fire Center (2020 data). It is important to note that some fires did burn across the county boundary so the acreage listed in the “Acres” column may include acreage that burned outside of the county. Refer to Figure 42 for a map of the fires listed in the table.

FIRENAME	START DATE	ACRES	CAUSE
BELVEDERE	6/4/2014	865	HUMAN
MIDDLE MOUNTAIN	7/13/2014	412	LIGHTNING
CARLTON COMPLEX-RISING EAGLE RD	7/14/2014	255,900	HUMAN
BUGG ROAD	7/21/2014	1,169	HUMAN
LITTLE BRIDGE CREEK	8/3/2014	4,959	LIGHTNING
UPPER FALLS	8/6/2014	8,114	LIGHTNING
NEWBY LAKE	7/2/2015	5,158	LIGHTNING
9 MILE	8/13/2015	4,720	HUMAN
NORTH STAR	8/13/2015	218,252	HUMAN
LIME BELT	8/14/2015	133,821	LIGHTNING
REACH	8/14/2015	89,093	LIGHTNING
TUNK BLOCK	8/14/2015	165,924	LIGHTNING
TWISP RIVER	8/19/2015	11,222	HUMAN
TIMM RANCH	6/8/2016	1,357	HUMAN
PICKENS NORTH	8/24/2016	724	HUMAN
ELMER CITY	9/11/2016	5,491	HUMAN
CANYON CREEK	7/15/2017	3,822	HUMAN
DIAMOND CREEK	7/23/2017	127,786	HUMAN
UNO PEAK	8/30/2017	8,751	HUMAN
CRESCENT MOUNTAIN	7/29/2018	51,972	LIGHTNING
MCLEOD	8/11/2018	22,875	LIGHTNING
ELMER CITY	6/23/2019	2,019	HUMAN
GREEN	7/7/2020	1,784	UNDER INVESTIGATION
POTHOLE	7/7/2020	352	UNDER INVESTIGATION
GREENHOUSE	7/23/2020	5,167	UNDER INVESTIGATION
ANGLIN	7/27/2020	1,758	UNDER INVESTIGATION
PALMER	8/18/2020	17,989	UNDER INVESTIGATION
COLD SPRINGS	9/6/2020	189,924	UNDER INVESTIGATION

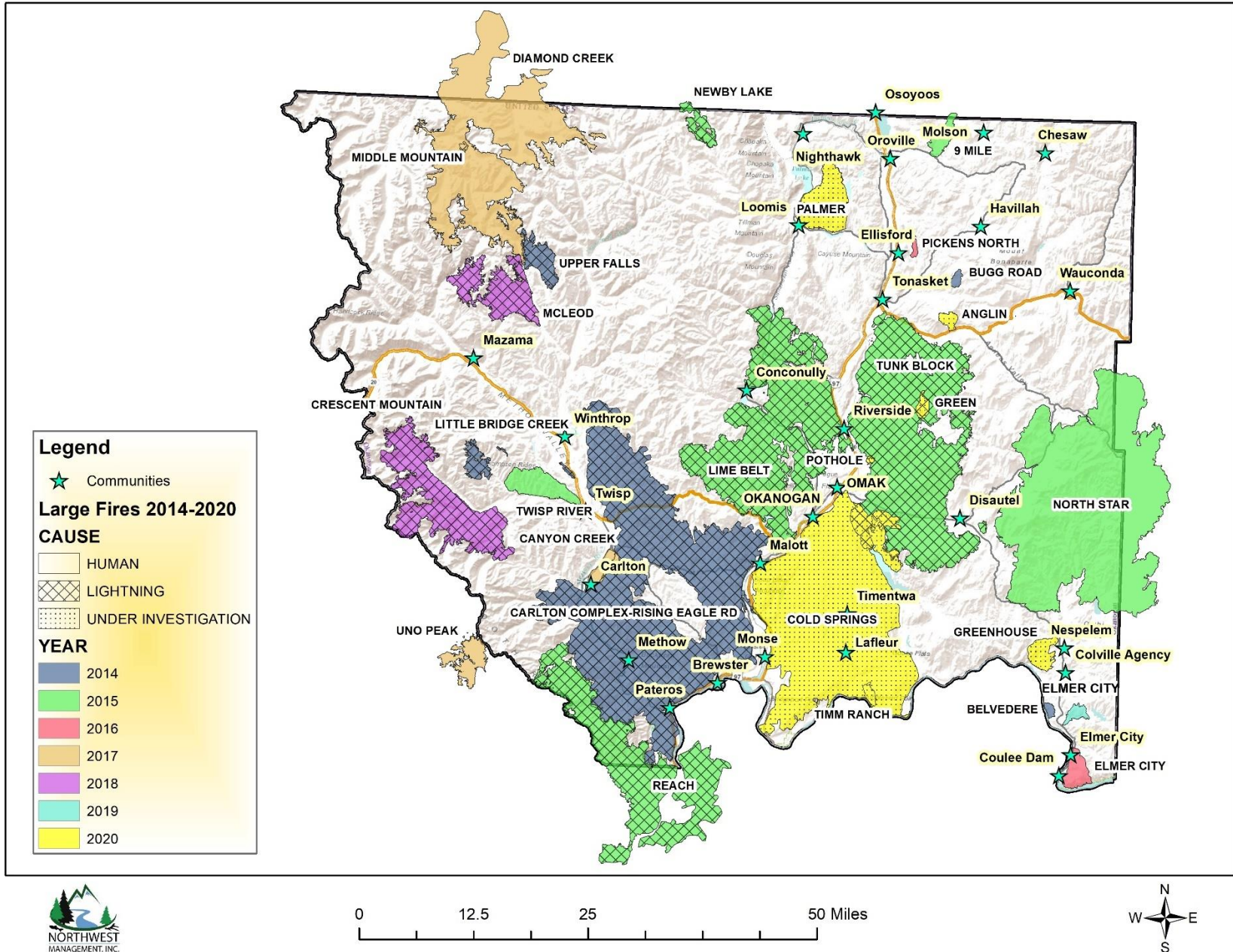


Figure 42) Recent large wildland fire perimeters in Okanogan County, WA. This map displays fires 300 acres and larger that occurred from 2014 to 2019. Data is from the Washington Large Fires 1973-2019 dataset and the National Interagency Fire Center (2020 fire perimeters).

PROBABILITY OF FUTURE OCCURRENCE

The risk rating for severe weather in Okanogan County is high. Fire was once an integral function of the majority of ecosystems in northeastern Washington. The seasonal cycling of fire across the landscape was as regular as the July, August and September lightning storms plying across the canyons and mountains. Depending on the plant community composition, structural configuration, and buildup of plant biomass, fire resulted from ignitions with varying intensities and extent across the landscape. Shorter return intervals between fire events often resulted in less dramatic changes in plant composition.¹¹⁶ The fires burned from 1 to 47 years apart, with most at 5- to 20-year intervals.¹¹⁷ With infrequent return intervals, plant communities tended to burn more severely and be replaced by vegetation different in composition, structure, and age.¹¹⁸ Native plant communities in this region developed under the influence of fire, and adaptations to fire are evident at the species, community, and ecosystem levels. Fire history data (from fire scars and charcoal deposits) suggest fire has played an important role in shaping the vegetation in the Columbia Basin for thousands of years.

Ideally, pre-European settlement historical fire data would be used to estimate the annual probability for fires in Okanogan County. However, current data are not adequate to make credible calculations because the data for local, state, and federal responsibility areas are not reported by the same criteria. Nevertheless, the data reviewed above provides a general picture of the level of wildland-urban interface fire risk for Okanogan County overall. Based on the historical information available, Okanogan County has a high probability of wildland fires occurring on an annual basis. Recreational areas, major roadways, debris burning, and agricultural equipment are typically the most likely human ignition sources. Lightning is also a significant source of wildfires in the county.

LANDSCAPE RISK ASSESSMENT

This section includes several different analyses that were used to explore wildland fire risk in Okanogan County. Analyses considered current and historic vegetation cover types (fuels) and anticipated fire behavior, terrain variability, and the spatial relationship of structures, infrastructure, and fuels throughout the county (Wildland Urban Interface). Several different model outputs were used to conduct the analyses, outputs were produced using the Fire Regime Group, Vegetation Condition Class, and Wildland-Urban Interface models. The outputs from these models are based on recent or historical conditions; it is assumed that the effects of climate change could increase the levels of risk or wildfire severity that are expected to be associated with the model outputs. Increased annual average temperatures result in

¹¹⁶ Johnson, C. G. 1998. *Vegetation Response after Wildfires in National Forest of Northeastern Oregon*. 128 pp.

¹¹⁷ Barrett, J. W. 1979. *Silviculture of ponderosa pine in the Pacific Northwest: The state of our knowledge*. USDA Forest Service. General Technical Report PNW-97. Pacific Northwest Forest and Range Experiment Station. Portland, Oregon. 106pp.

¹¹⁸ Johnson, C.G.; et al. 1994. *Biotic and Abiotic Processes of Eastside Ecosystems: the Effects of Management on Plant and Community Ecology, and on Stand and Landscape Vegetation Dynamics*. Gen. Tech. Report PNW-GTR-322. USDA-Forest Service. PNW Research Station. Portland, Oregon. 722pp.

longer growing seasons, hotter and drier conditions, extreme wildland fire behavior, and severe wildland fire impacts. Refer to the Natural Hazards and Climate Change section at the beginning of this chapter for more information about climate change. Refer to the following document for in-depth analysis and discussion about forest health in the State of Washington:

- Washington DNR Forest Health Assessment and Treatment Framework 2020
 - https://www.dnr.wa.gov/publications/rp_2020_fh_report.pdf

FIRE REGIME GROUP

Historical variability in fire regime is a conservative indicator of ecosystem sustainability, and thus, understanding the natural role of fire in ecosystems is necessary for proper fire management. Fire is one of the dominant processes in terrestrial systems that constrain vegetation patterns, habitats, and ultimately, species composition. Land managers need to understand historical fire regimes, the fire return interval (frequency) and fire severity prior to settlement by Euro-Americans, to be able to define ecologically appropriate goals and objectives for an area. Moreover, managers need spatially explicit knowledge of how historical fire regimes vary across the landscape.

Many ecological assessments are enhanced by the characterization of the historical range of variability which helps managers understand: (1) how the driving ecosystem processes vary from site to site; (2) how these processes affected ecosystems in the past; and (3) how these processes might affect the ecosystems of today and the future. Historical fire regimes are a critical component for characterizing the historical range of variability in fire-adapted ecosystems. Furthermore, understanding ecosystem departures provides the necessary context for managing sustainable ecosystems. Land managers need to understand how ecosystem processes and functions have changed prior to developing strategies to maintain or restore sustainable systems. In addition, the concept of departure is a key factor for assessing risks to ecosystem components. For example, the departure from historical fire regimes may serve as a useful proxy for the potential of severe fire effects from an ecological perspective.

The historic fire regime data shows that 62% of the area in Okanogan County is classified as FRG I and FRG III; these areas are characterized by conifer vegetative cover-types and are expected to burn with low and mixed severity. The difference between FRG I and FRG III areas is the return interval; fires are expected to reoccur in areas classified as FRG I every 35 years or less and every 35 to 200 years in areas classified as FRG III. Fires in these areas are likely to be carried by grassy understories in ponderosa pine and mixed conifer stands. Areas expected to carry fires of replacement severity, classified as FRG II and FRG IV, cover 25% of the total area in the county and are largely characterized by grasslands and shrublands. The light, flashy fuel-types found in grassland and sagebrush steppe ecosystems typically fall into the “replacement severity” fire-intensity category because those fuels burn quickly and high levels of fuel consumption often occur during a fire. The difference between FRG II and FRG IV areas is the return interval; fires are expected to reoccur in areas classified as FRG II every 35 years or less and every 35 to 200 years in areas classified as FRG IV. Only 10% of the county is classified as FRG V; these areas are expected to burn at any severity at intervals greater than 200 years. Table 98 provides a summary of FRG values and Figure 43 is a map of FRG areas in Okanogan County.

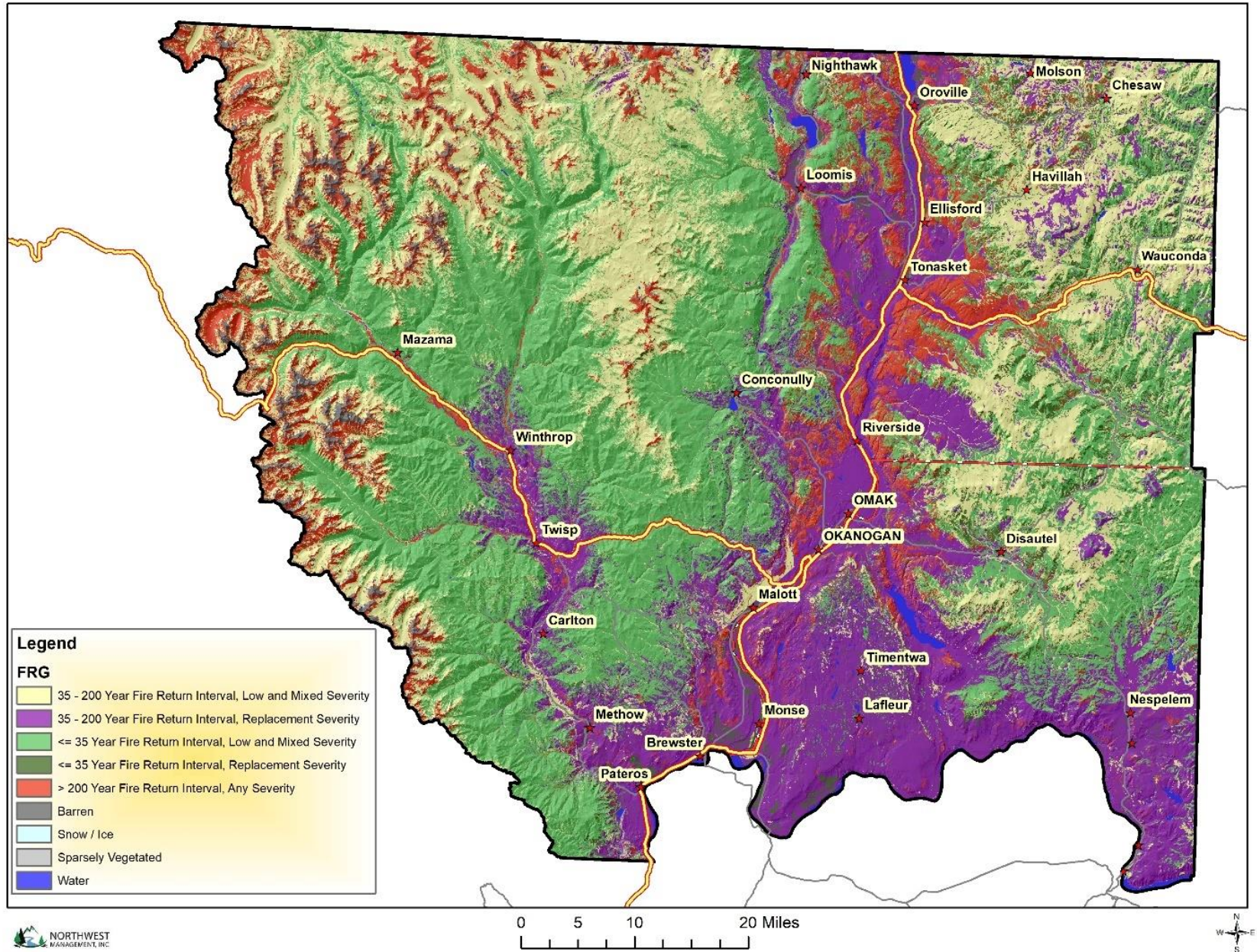


Figure 43) Fire Regime Group map of Okanogan County, WA. Map was produced using data from LANDFIRE (<https://landfire.gov/frg.php>).

Table 98) Fire Regime Group values for Okanogan County, WA.

Fire Regime Group	Description	Acres	Percent
FRG I	<= 35 Year Fire Return Interval, Low and Mixed Severity	1,239,006	36%
FRG II	<= 35 Year Fire Return Interval, Replacement Severity	97,863	3%
FRG III	35 - 200 Year Fire Return Interval, Low and Mixed Severity	873,555	26%
FRG IV	35 - 200 Year Fire Return Interval, Replacement Severity	761,544	22%
FRG V	> 200 Year Fire Return Interval, Any Severity	332,626	10%
Water	Water	33,838	1%
Snow / Ice	Snow / Ice	147	0%
Barren	Barren	50,644	1%
Sparsely Vegetated	Sparsely Vegetated	12,377	0%
Total		3,401,600	100%

VEGETATION CONDITION CLASS

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning.^{119, 120} Coarse scale definitions for historic fire regimes have been developed by Hardy et al¹²¹ and Schmidt et al¹²² and interpreted for fire and fuels management by Hann and Bunnell.

A vegetation condition class (VCC) is a classification of the amount of departure from the historic regime.¹²³ The three classes are based on low (VCC 1), moderate (VCC 2), and high (VCC 3) departure from the central tendency of the natural (historical) regime.^{124, 125} The central tendency is a composite estimate of vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic

¹¹⁹ Agee, J. K. *Fire Ecology of the Pacific Northwest forests*. Oregon: Island Press. 1993.

¹²⁰ Brown, J. K. "Fire regimes and their relevance to ecosystem management." *Proceedings of Society of American Foresters National Convention*. Society of American Foresters. Washington, D.C. 1995. Pp 171-178.

¹²¹ Hardy, C. C., et al. "Spatial data for national fire planning and fuel management." *International Journal of Wildland Fire*. 2001. Pp 353-372.

¹²² Schmidt, K. M., et al. "Development of coarse scale spatial data for wildland fire and fuel management." General Technical Report, RMRS-GTR-87. U.S. Department of Agriculture, Forest Service. Rocky Mountain Research Station. Fort Collins, Colorado. 2002.

¹²³ Hann, W. J. and D. L. Bunnell. "Fire and land management planning and implementation across multiple scales." *International Journal of Wildland Fire*. 2001. Pp 389-403.

¹²⁴ Hardy, C. C., et al. "Spatial data for national fire planning and fuel management." *International Journal of Wildland Fire*. 2001. Pp 353-372.

¹²⁵ Schmidt, K. M., et al. "Development of coarse scale spatial data for wildland fire and fuel management." General Technical Report, RMRS-GTR-87. U.S. Department of Agriculture, Forest Service. Rocky Mountain Research Station. Fort Collins, Colorado. 2002.

pattern); fuel composition; fire frequency, severity, and pattern; and other associated natural disturbances. Low departure is within the natural (historical) range of variability, while moderate and high departures are outside.

An analysis of Vegetation Condition Classes (VCC) in Okanogan County shows that 41% of the non-developed land in the county is moderate to low departed (VCC II.A areas in Table 99) from its historic fire regime and associated vegetation and fuel characteristics. Moderate to low departure means that area is 34 to 50% departed from (or changed from) its simulated historical vegetative composition. The levels of departure reported for these areas could be attributed to changes in the distribution, vertical structure, or species composition of vegetative communities. Existing Vegetative Cover-Type data indicates most VCC II.A areas, yellow areas in Figure 44, are coniferous forests. Another 29% of the total area of the county is low to moderately departed from the simulated historical vegetative composition. Most of these areas, which are classified as VCC I.B, are found at mixed-conifer elevations throughout the county (bright green areas in Figure 44). Departure reported for VCC I.B areas may also be attributed to changes in the distribution, vertical structure, or species composition of mixed conifer forests.

Areas of high departure cover 12% of the total area in the county. Most of these areas, which are classified as VCC III.A, are found in the valley bottoms and at lower elevations which are largely characterized by grassland and sagebrush steppe communities (red areas in Figure 44). The high levels of departure reported for these areas might be attributed to the presence of invasive grass and herbaceous species that alter the fire regime of native range plant communities.

About 8% of the total area of the county was assigned a non-VCC classification which includes water, urban, barren, sparsely vegetated, or agricultural cover types. Most of these areas are concentrated in the valley bottoms and around populated areas.

Table 99) Vegetation Condition Class values for Okanogan County, ID.

Vegetation Condition Class	Description	Acres	Percent
VCC I.A	Very Low, Vegetation Departure 0-16%	15,182	3%
VCC I.B	Low to Moderate, Vegetation Departure 17-33%	1,295,376	29%
VCC II.A	Moderate to Low, Vegetation Departure 34-50%	2,531,256	41%
VCC II.B	Moderate to High, Vegetation Departure 51-66%	63,099	6%
VCC III.A	High, Vegetation Departure 67-83%	236,944	12%
Water	Water	1,513	1%
Non burnable Urban	Non burnable Urban	3,418	1%
Burnable Urban	Burnable Urban	3,103	1%
Barren	Barren	3,390	1%
Sparsely Vegetated	Sparsely Vegetated	201	<1%
Non burnable Agriculture	Non burnable Agriculture	964	1%
Burnable Agriculture	Burnable Agriculture	4,030	2%
Total		3,401,600	100%

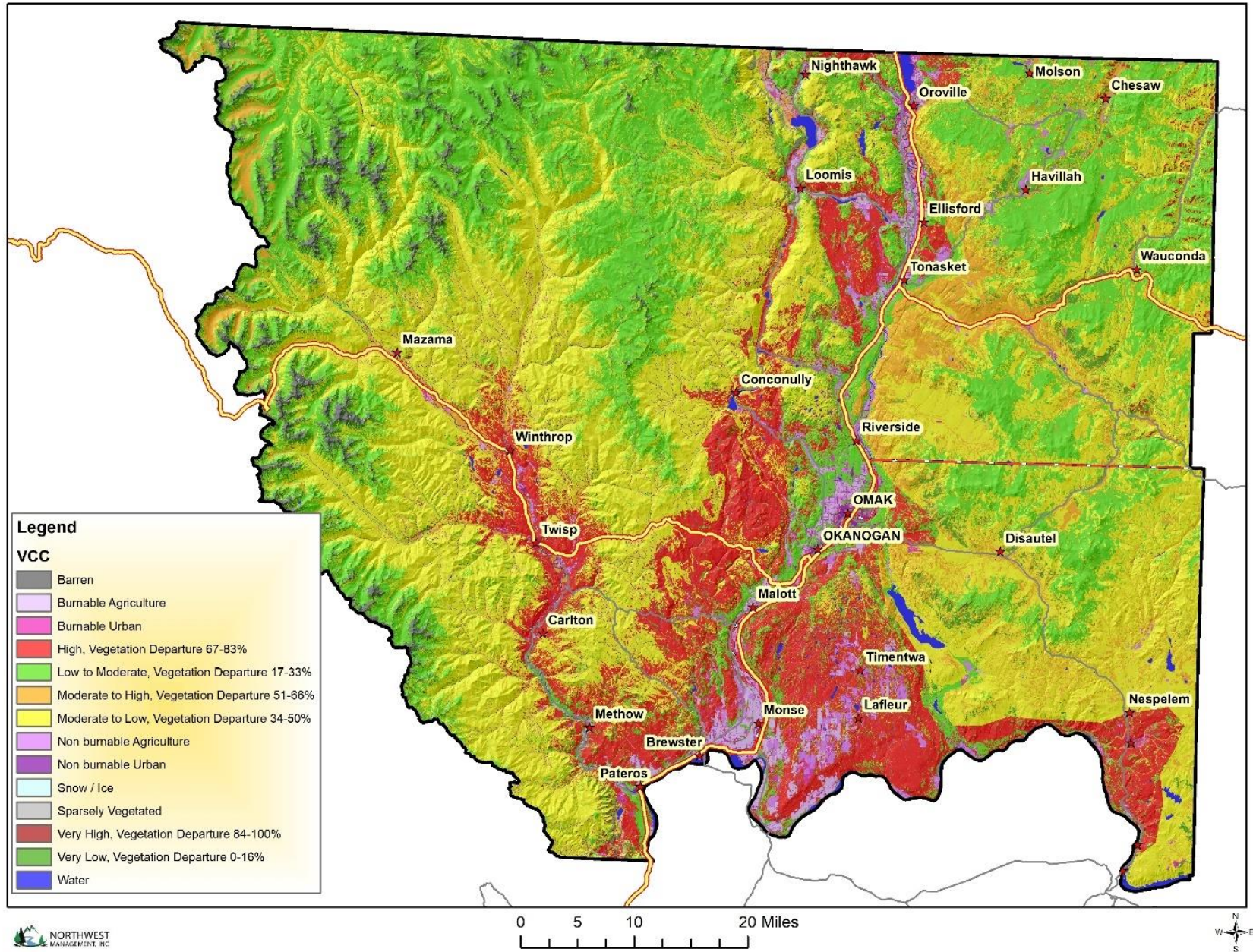


Figure 44) Vegetation Condition Class map of Okanogan County, WA. Map was produced using data from LANDFIRE (<https://landfire.gov/vcc.php>).

WILDLAND URBAN INTERFACE

The wildland urban interface (WUI) has gained attention in recent decades due to growing public interest in rural living. This has increased the need for wildland fire hazard awareness in these areas and for analytics that identify the WUI. This section will only address the WUI and wildland fire; however, this technique is also useful when considering other hazards as it compares the spatial distribution of people and structures relative to wildland fuels.

Key to protecting people and structures in the WUI is the identification and treatment of wildland fire hazards. The WUI refers to areas where wildland vegetation meets or is integrated with human development, particularly populated areas ranging from urban areas and business centers to neighborhoods and bedroom communities. The WUI encompasses not only the interface (areas immediately adjacent to urban development), but also the surrounding vegetation and topography. Reducing the hazard in the WUI requires the efforts of federal, state, local agencies, and community members.¹²⁶ “The role of [most] federal agencies in the WUI includes wildland firefighting, hazard fuels reduction, cooperative prevention and education, and technical experience. Structural fire protection [during a wildfire] in the WUI is [largely] the responsibility of Tribal, state, and local governments”.¹²⁷

In the event of a wildfire in the county, the role of the federal agencies will likely be limited to wildland fire suppression. Property owners do have a responsibility to protect their residences and businesses from wildfire by creating defensible space and making their homes less susceptible to damage from fire embers, intense heat, and other hazards associated with wildfire¹²⁸. With treatment, defensible space in the WUI can provide firefighters with an area from which they can suppress wildfires or provide other means of support to communities in the event of other types of hazards. Additionally, a community in the WUI that is properly treated, meaning that each home has defensible space and roadways are wide enough for emergency response vehicles and vegetation has been trimmed back, will be less likely to sustain a crown fire that that could cause widespread destruction and total loss of structures.¹²⁹

Through fuel reduction and the creation of defensible space, landowners can make the WUI more resistant and resilient to the effects of wildfire. Fuels reduction projects and structure modifications can help with the following:

¹²⁶ Norton, P. Bear Valley National Wildlife Refuge Fire Hazard Reduction Project: Final Environmental Assessment. Fish and Wildlife Services, Bear Valley Wildlife Refuge. June 20, 2002.

¹²⁷ USFS. 2001. United States Department of Agriculture, Forest Service. Wildland Urban Interface. Web page. Date accessed: 25 September 2001. Accessed at: <http://www.fs.fed.us/r3/sfe/fire/urbanint.html>

¹²⁸ USFS. 2001. United States Department of Agriculture, Forest Service. Wildland Urban Interface. Web page. Date accessed: 25 September 2001. Accessed at: <http://www.fs.fed.us/r3/sfe/fire/urbanint.html>

¹²⁹ Norton, P. Bear Valley National Wildlife Refuge Fire Hazard Reduction Project: Final Environmental Assessment. Fish and Wildlife Services, Bear Valley Wildlife Refuge. June 20, 2002.

- Reduce the potential of high-severity ground or crown fires entering or leaving the area;
- Reducing the potential impact of firebrands (sparks and embers carried by the wind in front of the wildfire) on the WUI. Research indicates that firebrands from a crown fire can ignite additional wildfires as far as 1¼ miles away during periods of extreme fire weather and fire behavior;¹³⁰
- Improving defensible space in the immediate area for wildfire suppression efforts.

WUI Model Output and Analysis

The boundary of Okanogan County's wildland urban interface (WUI) is based on the distribution of address points in the county. The resulting WUI model (Figure 45) shows the WUI as a buffered zone (orange area) that encompasses all address points included in the address GIS point layer provided to Northwest Management by Okanogan County. A few cities, such as Okanogan and Omak, have green concentric rings that indicate that they are larger urban population centers.

This is the official Wildland Urban Interface map that is to be used by the county. Due to the rural condition of Okanogan County, the planning team opted to include all populated areas in the county in the wildland-urban interface.

The WUI map does include areas that match different classifications of the wildland-urban interface, but the planning team decided that, for the purpose of simplicity and to reduce potential for confusion, to make all areas in the WUI a uniform color. Even though the different conditions are not displayed in the WUI map, additional supplemental maps have been added to the following section to help describe specific conditions within the WUI.

The WUI, as defined here, is unbiased, consistent, and, most importantly, it addresses all of the county, not just Federally identified communities at risk. It is a planning tool showing the locations and density of homes and businesses, information that is used to develop WUI categories. It can be determined again in the future, using the same criteria, to show how the WUI has changed in response to increasing population densities. It uses a repeatable and reliable analysis process that is unbiased.

The Healthy Forests Restoration Act makes a clear designation that the location of the WUI is at the determination of the governing entity when a formal and adopted Community Wildfire Protection Plan is in place. It further states that the federal agencies are obligated to use this WUI designation for all Healthy Forests Restoration Act purposes. In addition to a formal WUI map for use with the federal agencies, this map will serve as a planning tool for Tribal, state and federal agencies, and local fire districts.

¹³⁰ McCoy, L. K., et al. Cerro Grand Fire Behavior Narrative. 2001.

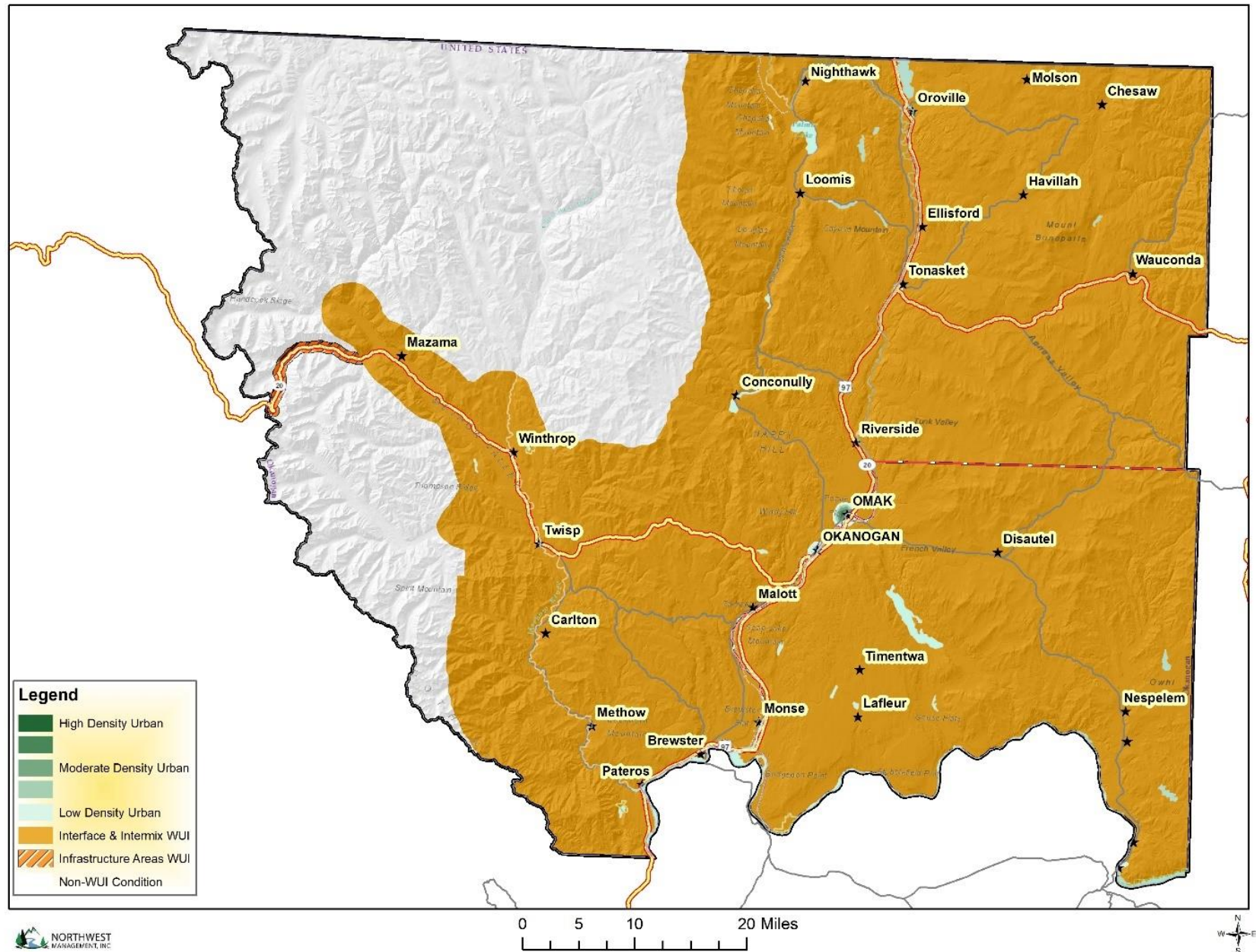


Figure 45) Wildland Urban Interface (WUI) map of Okanogan County, WA. This is the official WUI map that will be used by Okanogan County.

Analysis of Wildland Urban Interface Area

The area designated as the wildland urban interface can be further separated into different classifications of WUI. By recognizing different WUI conditions, certain generalizations can be made about areas in the county that satisfy the criteria for each condition. Primarily, it provides a general idea of what conditions might be found in certain areas of the county and the types of wildfire mitigation projects that might be most effective based on the distribution of homes, structures, infrastructure, and wildland fuels.

The map of WUI classifications (Figure 46) is based on relative population density across the county which was estimated using a GIS based kernel density population model that uses object locations to produce, through statistical analysis, concentric rings or areas of consistent density. To graphically identify relative population density across the county, structure locations are used as an estimate of population density. The county's 911 address layer (GIS) was used to identify the locations of possible structures. The resulting output identified the extent and level of population density throughout the county.

By evaluating structure density in this way, WUI areas can be identified on maps by using mathematical formulae and population density indexes. The resulting population density indexes create concentric circles showing interface condition (high density) and intermix condition (low density) WUI (as defined below). This portion of the analysis allows us to "see" where the highest concentrations of structures are located relative to high-risk landscapes, limiting infrastructure, and other points of concern. Because these conditions likely exist in combination with one another, they should be thought of as the two end points on a spectrum, with Interface and Intermix placed at each end and various "blends" of the two conditions in the middle.

Two WUI conditions have been identified (Federal Register 66(3), January 4, 2001) in Okanogan County. These include the Interface and Intermix conditions. Although it is not necessarily a classification of WUI, Rural condition areas have also been identified in the county. Descriptions of each are as follows:

- **Interface Condition** – a situation where structures abut wildland fuels. There is a clear line of demarcation between the structures and the fuels along roads or back fences. The development density for an interface condition is usually 3+ structures per acre. *These are the dark brown areas on the map that are more commonly associated with population centers in the county.*
- **Intermix Condition** – a situation where structures are scattered throughout a wildland area. There is no clear line of demarcation; the wildland fuels are continuous outside of and within the developed area. The development density in the intermix ranges from structures very close together to one structure per 40 acres. These are light brown areas on the map that are populated yet found away from population centers (they boarder rural areas).
- **Rural Condition** – Areas featuring heavy or continuous fuels that abut the wildland-urban interface. These areas typically have few structures, if any, and may have roads that provide access to utility infrastructure, recreation, or other purposes. The potential for fuel loading in these areas and their proximity to the WUI has significant implications for wildfire risk.

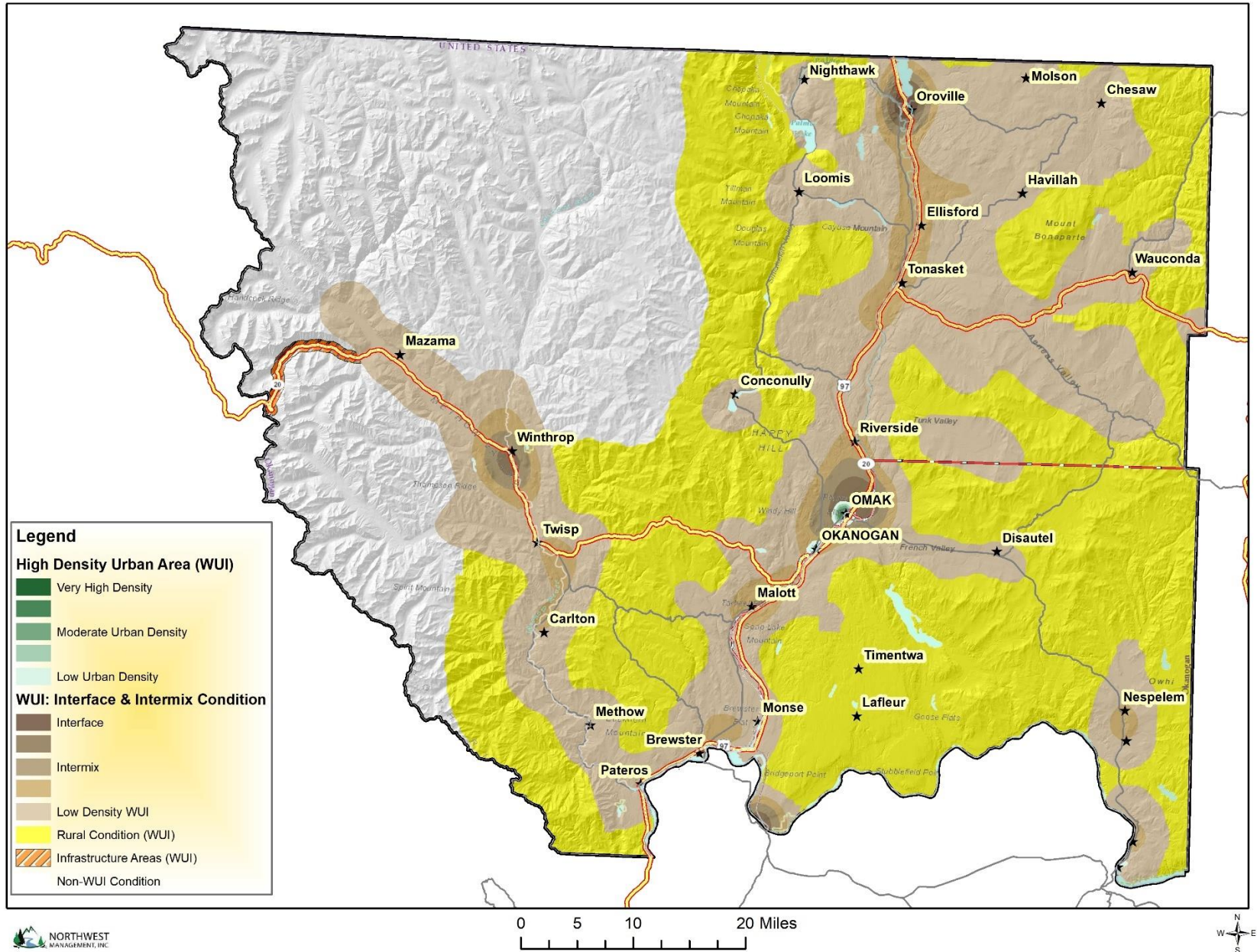


Figure 46) Wildland Urban Interface classifications in Okanogan County, WA.

Structures Within the Wildland Urban Interface

Another way to analyze the wildland-urban interface is to look at the distribution and density of structures within the WUI. The WUI classification map identifies areas that satisfy different WUI conditions based on address points, but it does not show exactly how structures are distributed within the WUI. Using a GIS structure layer from the State of Washington, a map of structure location and density was created for Okanogan County (Figure 47). This type of analysis may be useful for identifying project areas based on the way structures and wildland fuels intermingled. For example, large fuel breaks may be implemented more often in interface areas, near the boundary where wildland fuels and urban areas abut, while defensible space may be the primary wildfire mitigation strategy in intermix areas, where homes are scattered and large fuel breaks may not be as beneficial.

IMPACTS OF WILDLAND FIRE EVENTS

Communities and Capabilities: Wildland fires, big and small, are dangerous to both residents and emergency response personnel. Residents located in the path of wildland fire will likely suffer the greatest impacts through loss of personal property, structures, and/or the value of any rangeland or agricultural operations on their property. Risk to wildland firefighters is greatest when performing suppression activities as they are often at risk to injury from heat exhaustion and smoke inhalation. Fatalities do occur on the fire line, but they are rare.

Other than smoke and fire brands, the effects of a wildfire are largely localized and can be contained or minimized with an effective management strategy. However, even if a fire is successfully contained, communities in proximity to the fire may still experience disruptions as municipal resources are diverted to suppression efforts. Should a wildfire grow beyond the capabilities of local fire agencies, other in-state resources as well as federal resources may be requested for additional support. Fire events typically result in a multi-department and agency response effort; thus, coordinating activities and ensuring everyone's safety is paramount.

If a wildfire exhibits extreme behavior, it may be necessary for some communities to evacuate. The evacuation of densely populated areas will require the coordination of law enforcement and fire entities, extensive traffic control, safe routes that can accommodate high traffic volumes, and additional resources and facilities will be required if evacuees need emergency shelter and they do not have alternate lodging options. Accommodations for evacuees will place additional demand on community resources and may further disrupt neighboring communities. Local businesses could be affected in several ways, particularly if access to business districts are limited or restricted altogether. In addition to heavy smoke, closures of natural or recreational areas may also have adverse impacts on the tourist industry.

Typically, structures located in forested areas without adequate defensible space or fire-resistant landscaping have the highest risk of loss. Timber, shrubland, grassland, rangeland, and agricultural fuel types are distributed throughout the county, presenting a significant wildfire threat. Although fires in light, flashy fuel types are considered somewhat easier to suppress, given the appropriate resources, than forest fires they can also be the most destructive due to the potential for long flame lengths and high rates of spread.

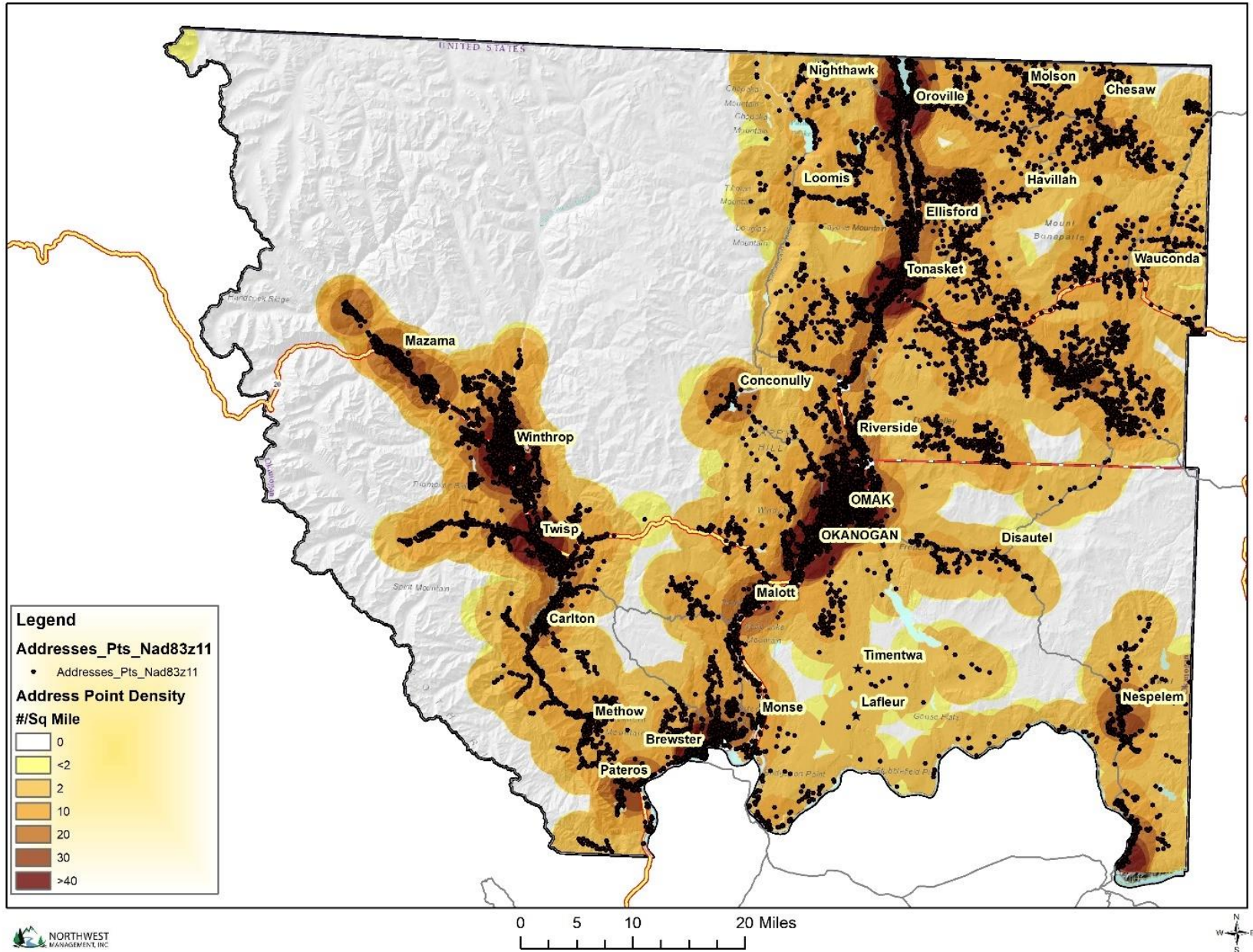


Figure 47) Address point density map of Okanogon County, WA.

Smoke: Smoke is the most widespread impact from wildfire; cities, communities, and residents can be affected by the smoke from wildfires burning hundreds of miles away. Consequently, the residents of Okanogan County are much more likely to be indirectly affected by wildfire because of smoke than they are to be directly affected by flames. Smoke and particulates can severely degrade air quality, triggering health problems with sensitive populations in Okanogan County, such as elders and children, who may be affected by air quality during a wildland fire. In areas heavily impacted by smoke, people with breathing problems might need additional support from medical facilities or the need to access a clean-air shelter.

Smoke can also have negative impacts on the local economy. People are much less likely to go site-seeing or recreate outdoors when visibility is low or because of the smell of smoke. Many other outdoor activities, such as organized sports, may be canceled if air quality warnings are in place. Refer to the Air Quality section in the Okanogan County community profile in Chapter 3.

Environment: The environmental impacts from a fire are dependent on the vegetation present and the intensity of the fire. Most rangeland and forest ecosystems in the Pacific Northwest are adapted to periodic fire events and benefit from occasional, low intensity burns. On the other hand, overcrowded forest conditions or over mature stands of sage brush will likely burn much more intensely than occurred historically. These types of fires tend to result in a high rate of mortality in the vegetation and often adversely impact soil conditions. High intensity fires are also much more dangerous and difficult to suppress.

CLIMATE CHANGE

Climate change is likely to increase the likelihood of occurrence, scope, and/or severity of the impacts listed above. Climate change, coupled with the current high fuel and vegetation status of the forest, suggest that high intensity fires will continue to degrade the landscape unless proper management policies are implemented. Winters are becoming shorter and wetter with less snow, while summers are becoming drier and longer. This process is resulting in the generation of flash fuels, uncharacteristically denser forests, and are stressing normal regenerative processes and increasing wildland fire risk.

Accordingly, forested areas in the county may become less resilient in the absence of management and the continued displacement of native grass and shrub species by invasive species increases the risk of wildland fires county-wide.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Okanogan County due to wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

Financial losses to wildland fire may vary considerably depending on the level of homeowner compliance with defensible space and structure/property hardening recommendations. Homes and structures surrounded by wildland fuels, from irrigated agriculture to shrubs to standing timber, without adequate defensible space or fire-resistant construction and landscaping are at the highest risk of loss. Even with

defensible space, homes can be lost if they have not been evaluated for vulnerability and susceptibility to all ignition pathways and appropriately hardened. For example, possible sources of ignition for the home would be: (1) firebrands landing on the roof or entering the vents, (2) radiant heat igniting blinds through the windows or raising the temperature of the house's exterior to the point of ignition, or (3) flames carried directly from the forest to the side of the house through burning fuels (shrubs, pine needles, dry grasses, or dead leaves)¹³¹. Overall, financial losses to wildland fire will be less if fewer homes and structures are damaged or destroyed.

¹³¹ Randall, Cotton K. Fire in the Wildland-Urban Interface: Understanding Fire Behavior. Available online at: <https://www.srs.fs.usda.gov/factsheet/pdf/fire-understanding.pdf>

VOLCANO HAZARDS

Washington State has five major volcanoes (composite volcanoes) that are active and hundreds of smaller non-active volcanoes. Most of the smaller ones erupted only once or several times and have shut down. All are in the Cascade Range. The five major active systems are, from north to south, Mount Baker, Glacier Peak, Mount Rainier, Mount Adams, and Mount St. Helens. Excluding Mount Adams, all have recently been identified on the USGS's list of most dangerous Volcanos in the United States. Of the five major volcanos, Mount St. Helens is one of the most active and typically explosive systems that commonly produces significant amounts of volcanic ash during eruptions. Ash is carried by wind, and part of the time wind directions could transport erupting ash over Okanogan County, where fallout of that ash could impose a widespread hazard.

Determined by representatives of the county, the following table includes volcano hazard ratings for Okanogan County, WA.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

LOCAL EVENT HISTORY

Mount St. Helens is the furthest from Okanogan County, but it has been, by far, the most active volcano in the Cascades over the past 4,000 years (Figure 48). Its last ash-producing explosive eruptive events were in 1980 (six between May and October), although it erupted lava to build lava domes between late 1980 and 1986 and again between 2004 and 2008. It also erupted intermittently between 1800 and 1857 and between 1479 and about 1720. The volcano's symmetrical summit was built during the latter part of this earlier eruptive period, but two massive explosive eruptions—both considerably larger than the May 18, 1980 eruption—heralded the onset of this activity in 1479 and 1482. Seismic data from the USGS suggests that fresh new magma, potentially gas-rich and explosive, may have been slowly accumulating beneath the volcano since 2008—an indication that Mount St. Helens will likely erupt again, although the timing is uncertain.

Mount Adams is the second furthest from Okanogan County and, by contrast, is a sleepy giant that has never produced large explosive eruptions. Its last eruptive activity was about 1,000 years ago, and it is seismically quiet currently. However, catastrophic lahars were initiated by landslides off the southwest summit area of Mount Adams about 6,000 and 260 years ago, and additional large volumes of weakened,

potentially unstable rock have been detected in this same area and on the eastern flank. The next major volcano nearest to Okanogan County, Mount Rainier, has erupted within the last 300 years, but it has not been a major producer of volcanic ash, and therefore it poses little to no threat to Okanogan County.

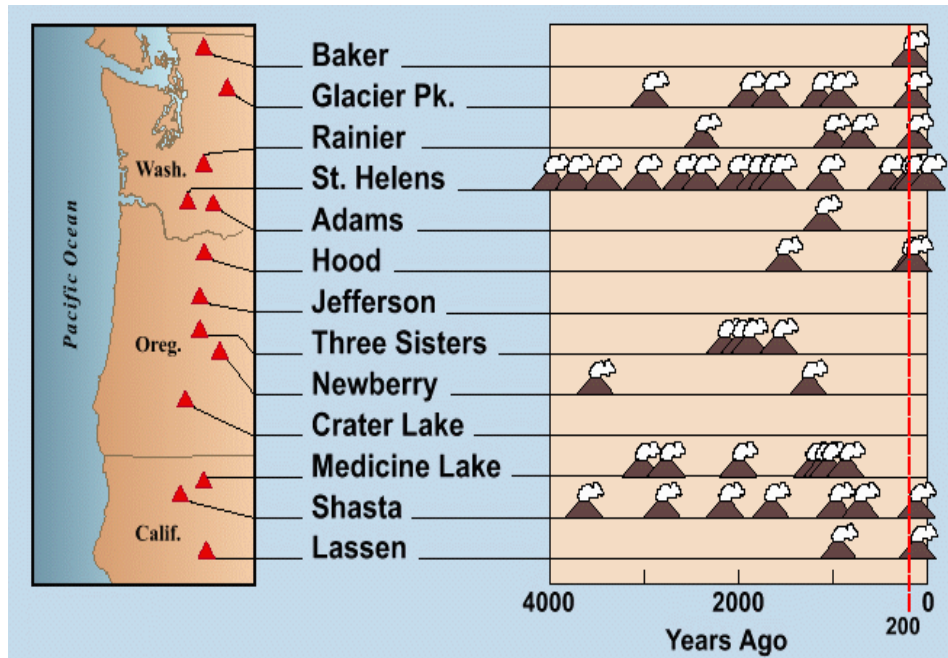


Figure 48) History of relatively recent volcanic activity in the Pacific Northwest in the last 4,000 years. Figure is from the USGS.

Mount Baker and Glacier Peak are the two closest volcanos to Okanogan County. Glacier Peak, like Mount St. Helens, is another northern Cascades Volcano that erupts violently and produces significant ashfall. However, it has not been as active as Mount St. Helens, but if it were to erupt a large ash cloud, its position directly west of Okanogan County means that prevailing westerly winds would deliver ash to the county. Mount Baker last erupted in 1880, but the most recent major eruption of Mount Baker was about 6,700 years ago. In 1975-76, Sherman Crater, immediately south of the summit, exhibited signs of renewed volcanic activity as a result of magma intruding into the volcano but not erupting. Sherman Crater has been the site of increased steam emission since 1975¹³². Like Glacier Peak, Mount Baker is located to the west of Okanogan County, making it a significant threat if ash is carried over Okanogan County by prevailing westerly winds. Both volcanos would likely produce lahars in the event of a major eruptions, however, they would follow river systems that flow to west so they would not affect Okanogan County.

If Mount St. Helens or any of these other volcanoes were threatening to erupt again, precursory signals would be detected by the USGS monitoring systems, and alerts would be given to officials and the public

¹³² United States Geological Survey. Mount Baker. <https://www.usgs.gov/volcanoes/mount-baker/>

at least weeks to months in advance of future eruptions¹³³. Mount Baker is one of several Cascade volcanoes that are high priority to have their monitoring systems enhanced in the coming years.

PROBABILITY OF FUTURE OCCURRENCE

The Pacific Ring of Fire, whose perimeter includes the Cascades, has produced 22 of the 25 largest volcanic eruptions over the last roughly 11,000 years. The USGS studies and monitors many of the active volcanoes in Washington State. Studies have shown that Glacier Peak has erupted an estimated five times in the last 13,000 years; likewise Mount St. Helens last eruption on May 18, 1980 demonstrated that the Volcanoes within the Cascade Mountain Range are still active, and they will erupt again. While not a common occurrence, there are, on average, two eruptions in the Cascade Mountain Range every 100 years. The map on the left in Figure 49 indicates that there is, depending on location, a 1 in 10,000 to 1 in 50,000 chance every year that either some or all jurisdictions in Okanogan County will receive more than 0.5 inches of tephra (ashfall) from a Glacier Peak eruption. The annual probability that Okanogan County will receive any ash fall during an eruption is much higher. It should be noted that probabilities of occurrence are influenced by size and duration of an eruption, the point of eruption, prevailing wind direction and wind speed, and other weather factors. The map on the right in Figure 49 shows the approximate distribution and thickness of tephra produced by a Glacier Peak eruption that occurred nearly 13,000 years ago. From the map, it appears that up to 60 inches could have been deposited on what is now the southern half of Okanogan County.

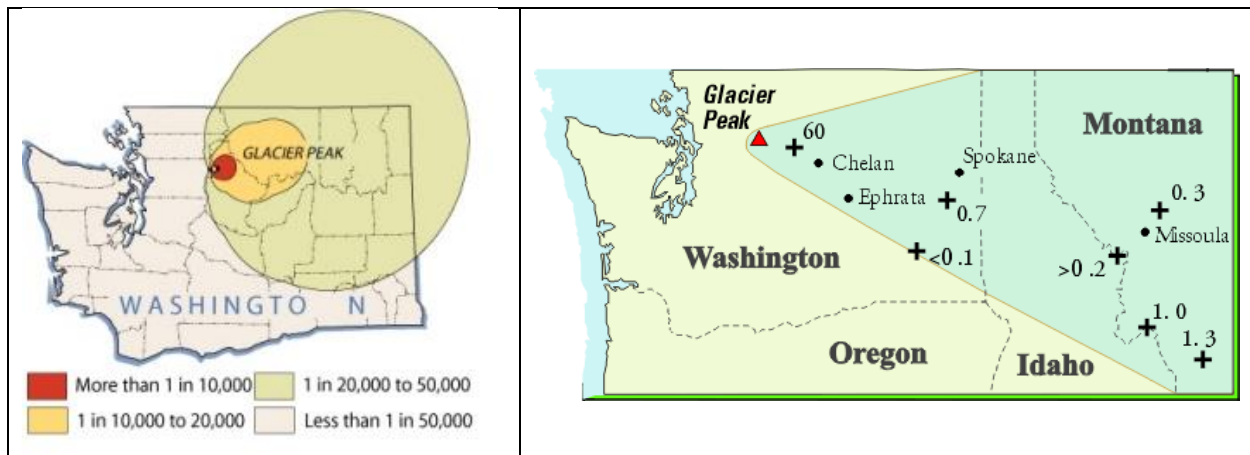


Figure 49) LEFT MAP: Annual probability of tephra fall exceeding 0.5 inch thick from an eruption of Glacier Peak. Communities east of the volcano are more susceptible to tephra fall because the wind is normally from the west. Glacier Peak has produced large tephra eruptions, but not frequently. RIGHT MAP: Total thickness of tephra (inches) erupted from Glacier Peak during a series of large eruptions about 13,100 years ago. Light blue indicates approximate area covered by ash during these eruptions¹³⁴.

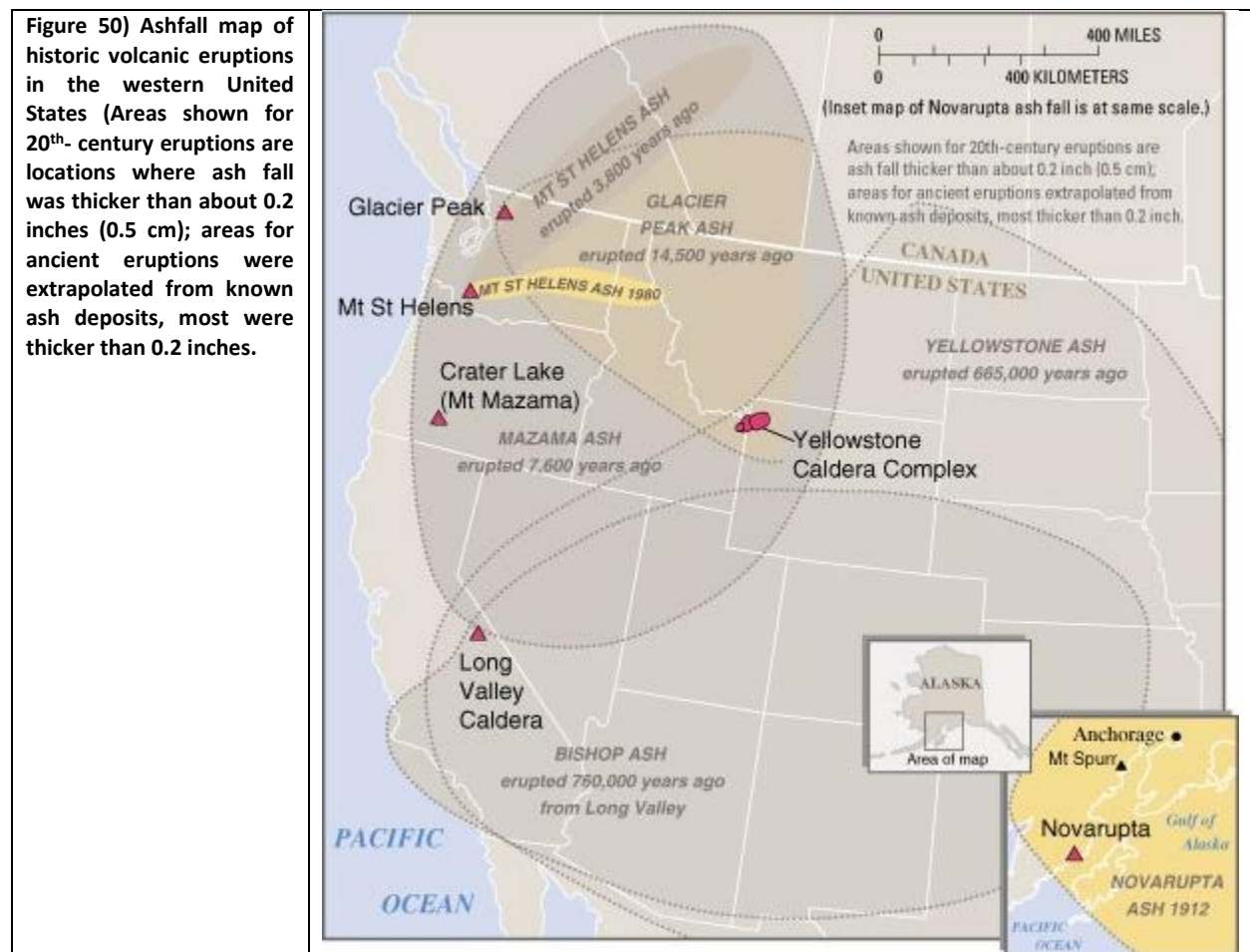
¹³³ Mount St. Helens—Mount Adams Volcanic Region Coordination Plan-- https://volcanoes.usgs.gov/vsc/file_mgr/file-132/mount-st.-helens--mount-adams-volcanic-region-coordination-plan-october-2014.pdf.

¹³⁴ United States Geological Survey. Glacier Peak-History and Hazards of a Cascade Volcano. Accessed online at: <https://pubs.usgs.gov/fs/2000/fs058-00/>

Another explosive eruption from Mount St. Helens within the next 50 years is possible, based on current geophysical evidence that magma has been ascending beneath the volcano since 2008. If an eruption does occur, prevailing winds will most likely carry volcanic ash to the north, potentially affecting Okanogan County. Winds carried ash from the 1980 Mount St. Helens eruption to east so the main plume did not extend directly over Okanogan County. However, geologic evidence indicates that ash from an eruption that occurred 3,800 years ago was carried to the north by prevailing winds, directly over what is now Okanogan County (Figure 50).

IMPACTS OF VOLCANIC EVENTS

Areas likely to be affected by the fall of volcanic ash (ashfall) are determined by wind direction (at various altitudes) during and following the time that ash is being ejected from the source volcanic vent. Depending on the direction that the wind is blowing, ashfall from any of Washington's volcanos could affect Okanogan County.



Heavy ashfall (accumulations over about 4 inches or 10 cm) can be life-threatening; the weight can cause roofs to collapse. Significant light ashfall, on the other hand, is not a threat to buildings, but it can lead to extremely hazardous driving conditions and can threaten aircraft operations. Furthermore, inhalation of

the fine abrasive particles is particularly hazardous for people with asthma and other lung diseases. Besides the abrasiveness of ash, tiny droplets of acid commonly adhere to ash particles, making the ash corrosive, highly damaging to crops, and sometimes toxic to livestock and to fish and wildlife.

Ashfall can have a wide range of effects on communities, as outlined below. Severity of impact is affected by variables such as fineness of the ash, whether it falls wet (mixed with rain) or dry, and whether post-ashfall winds keep it stirred up. The following points are summarized from the USGS website, *Volcanic Ash Impacts & Mitigation*. Please visit that site for more detailed information¹³⁵.

- **Buildings**— Ash can clog air filters on HVAC systems; easily brought inside by wind, clothing, footwear; it is damaging to computers, electronics, and electric motors; it can corrode metal roofs; it plugs gutters and downspouts.
- **Transportation**— Ashfall may severely disrupt transportation systems over extremely large areas for hours to days. Roads and cars, airports and aircraft, railways, and marine craft are vulnerable.
 - Aviation: Ash can cause severe impacts to aircraft, and the presence of ash can result in the temporary shutdown of airports and flights.
 - Roads, Vehicles, and Railways: Ashfalls of 1 mm (1/32 in) or more can seriously reduce visibility on highways and railways, make roads and tracks slippery for cars and trains, strand travelers and damage vehicles.
 - Marine Transportation: Ash can clog air filters and water intakes and can reduce visibility for marine craft, affecting operations.
- **Power Supply**— Ashfall can quickly lead to widespread power outages, impacting communities, businesses, and critical life-support services. The generation, transmission, distribution, and substation components of a modern power system are vulnerable to different ash-induced impacts, depending on the equipment at each phase of power delivery. The most commonly reported problems are:
 - Supply outages from insulator flashover caused by wet ash on insulators.
 - Disruption of generation facilities.
 - Controlled outages during ash cleaning.
 - Abrasion and corrosion of exposed equipment.
 - Line (conductor) breakage due to ash loading.
- **Human Health**— Exposure to ashfall rarely endangers human life directly, except where very thick falls cause structural damage to buildings (e.g. roof collapse) or indirect casualties such as those sustained during ash clean-up operations or in traffic accidents. Short-term effects commonly include irritation of the eyes and upper airways and exacerbation of pre-existing respiratory disease such as asthma; serious health problems are rare. In addition, affected communities may experience increased levels of psychological distress. This is particularly the case when eruptions cause social and economic disruption. The International Volcanic Health Hazards Network

¹³⁵ https://volcanoes.usgs.gov/volcanic_ash/

(IVHHN) is an umbrella organization for all research and information on volcanic health hazards. IVHHN has produced guidelines and databases on volcanic health issues¹³⁶.

- People should avoid unnecessary exposure to ash and wear an effective face mask when outside to reduce inhalation of ash particles. People with existing respiratory problems should take special care to avoid exposure to airborne ash and should carry their medication with them.
- Medical services can expect an increased number of patients with respiratory and eye symptoms during and after ashfall. People will generally be very concerned about the effects of ash, and questions commonly arise about the characteristics of the ash and the implications for their health.
- **Agriculture: Crops and Livestock**— Ashfall can have detrimental effects on agricultural crops and livestock depending mainly on ash thickness, the type and growing condition of a crop, the presence of soluble fluoride on the ash, timing and intensity of subsequent rainfall, condition of pasture and animals prior to ashfall, and availability of uncontaminated feed and water. Fluorine poisoning and death can occur in livestock that graze on ash-covered grass if fluoride is present in high concentrations; it may be advisable to sample and analyze ash or ash-coated vegetation to determine whether this potential hazard exists for livestock in areas covered with ash, even as thin as 1 mm. Livestock eating pasture that is contaminated with ash can suffer and die from gastrointestinal blockages. Shortages of uncontaminated feed and water after an ashfall can also lead to starvation.
 - Survival of agricultural crops and pasture is often severely limited when ash thickness is greater than 100-150 mm (4-6 in). Predicting the potential crop losses from ashfall, however, is difficult and usually exaggerated because of the great variety of environmental and plant conditions that exist in tropical and temperate areas during and after ashfalls of varying thicknesses.
 - The abrasiveness of ash can damage farm machinery and equipment, but increased maintenance and a few precautionary actions can significantly reduce the cost of keeping the machinery in working condition.
- **Water and Wastewater**— Following an eruption, there is often concern about chemical contamination of water supplies. However, the physical impacts of ashfall are often the primary issue with water systems that are subjected to heavy ashfall. Problems caused by the release of chemical contaminants is likely to be the primary concern in systems that accumulate minimal ash as water systems will likely still work and contamination may not be obvious. In general, impacts vary according to the type of treatment system.
 - It is difficult to exclude ash from the sewage and storm-water collection networks. Systems with combined stormwater/sewer lines are most at risk. Ash will enter sewer

¹³⁶ *New IVHHN guidelines on Protection from Breathing Ash, Guidelines on Preparedness Before, During and After an Ashfall, and Health Hazards of Volcanic Ash-A Guide for the Public* may be downloaded from the IVHHN website: <http://www.ivhhn.org/>.

- lines where there is inflow by stormwater (e.g., cross connections, around manhole covers, or through holes and cracks in sewer pipes).
- Ash-laden sewage entering a treatment plant is likely to cause failure of mechanical prescreening equipment such as step screens or rotating screens. Ash that penetrates further into the system will settle and reduce the capacity of biological reactors, as well as increasing the volume of sludge and changing its composition.

CLIMATE CHANGE

Volcanic activity can cause changes to climate patterns and more significant volcano events do have a global impact on weather and climate. An eruption that emitted enough particles and gases into the atmosphere could actually trigger a temporary period of global cooling.¹³⁷ The stress that a local volcanic eruption could have on the local environment might exacerbate conditions that are already strained due to drought, wildfire, or other climate-related issues.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk from volcanic hazards. Costs associated with ash-related damage would likely depend on the duration of exposure, thickness of ash layer, and size of ash particles during and following ash fallout. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall and occurrence/severity of other impacts related to volcanic activity, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the general public.

¹³⁷ <https://climate.nasa.gov/faq/42/what-do-volcanoes-have-to-do-with-climate-change/>

HAZARDOUS MATERIALS HAZARDS

Although there are numerous ways that hazards associated with hazardous materials could be analyzed, this section has been modeled after the hazardous materials section in the 2018 Washington State Enhanced Hazard Mitigation Plan and only include information relevant to Okanogan County.

Determined by representatives of the county, the following table includes hazardous materials hazard ratings for Okanogan County, WA.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

LOCAL EVENT HISTORY

Between July 21, 2015 and March 31, 2019 only four hazardous materials spills have been reported to the Washington Department of Ecology for Okanogan County (Table 100). All four incidents concerned the release of oil or an oil by-product, primarily gasoline and diesel fuel, into the environment. The largest spill released 1,014 gallons of fuel into a freshwater body near Tonasket in November of 2018.

Table 100) Incidents involving the release of hazardous materials in Okanogan County, WA; data includes spills that occurred between July 21, 2015 and March 31, 2019 (Washington State Department of Ecology Spills Map).

City	Date of Incident	Oil-Type and Volume Released	Source of Spill	Medium
Tonasket	11/28/2018	Diesel/Marine Gas Oil; 1,014 gallons.	Private Property-Underground Storage Tank	Fresh water
Omak	4/3/2019	Gasoline; 5 gallons	Non-Commercial Vehicle Accident	Stream/River
Okanogan	1/19/2020	Diesel Low Sulphur (ULSD); 40 gallons	Construction/Utility Vehicle Accident	Creek
Omak	3/7/2020	Gasoline; 25 gallons	Non-Commercial Vehicle Accident	Creek

PROBABILITY OF FUTURE OCCURRENCE

The probability of the release of small quantities of hazardous materials into the environment in Okanogan County is high. It is likely that small spills (several gallons or less) occur all the time in the county

and they go unreported. These spills are most likely to occur in areas where fuels and other chemicals are being transported, transferred, or stored. The probability of large spills in the county is low. There are no oil or gas pipelines or trains carrying hazardous materials that run through the county so the largest quantities of hazardous materials will be transported through the county using the road system. This limits the size of large spills (those that are most likely to happen) to the capacity of a semi-truck or other highway-approved vehicle, but it could mean that large spills will be much more likely to affect human populations, directly.

IMPACTS OF HAZARDOUS MATERIALS

SPILLS

From 2000-2007, a total of 79 spills were reported to the Washington State Department of Ecology for Okanogan County (Figure 51). Relative to the rest of the counties in the state, Okanogan County was in the bottom ten counties for number of spills during that period. According to the 2018 Washington State Enhanced Hazard Mitigation Plan, there have never been any spills larger than 10,000 gallons in Okanogan County. This could be attributed to the absence of oil and natural gas pipelines and railways that transport large quantities of hazardous materials. There are multiple segments of railroad that are used to transport crude oil from North Dakota, none of which run through Okanogan County. Refer to Figure 52 for maps of oil and natural gas pipelines (left map) and railways used to transport crude oil (right map) in Washington State.

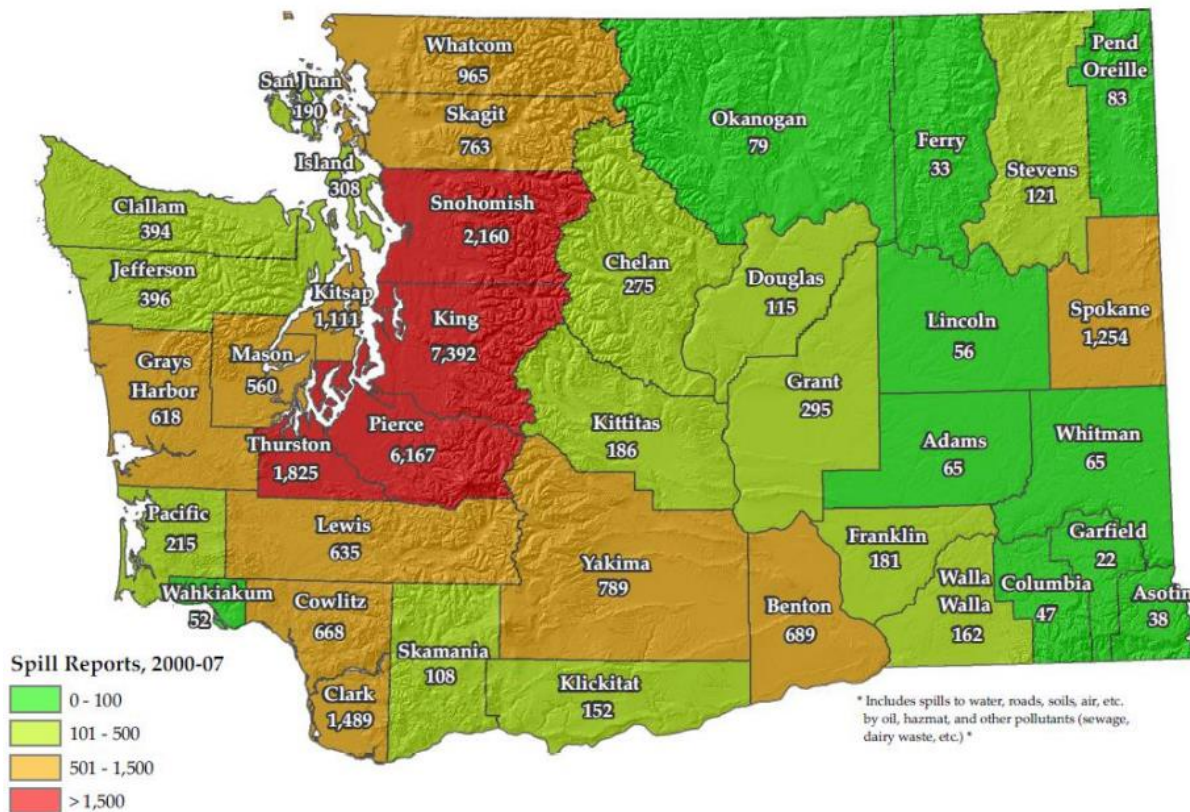


Figure 51) Number of spills reported by county to the Washington State Department of Ecology (2000-2007).

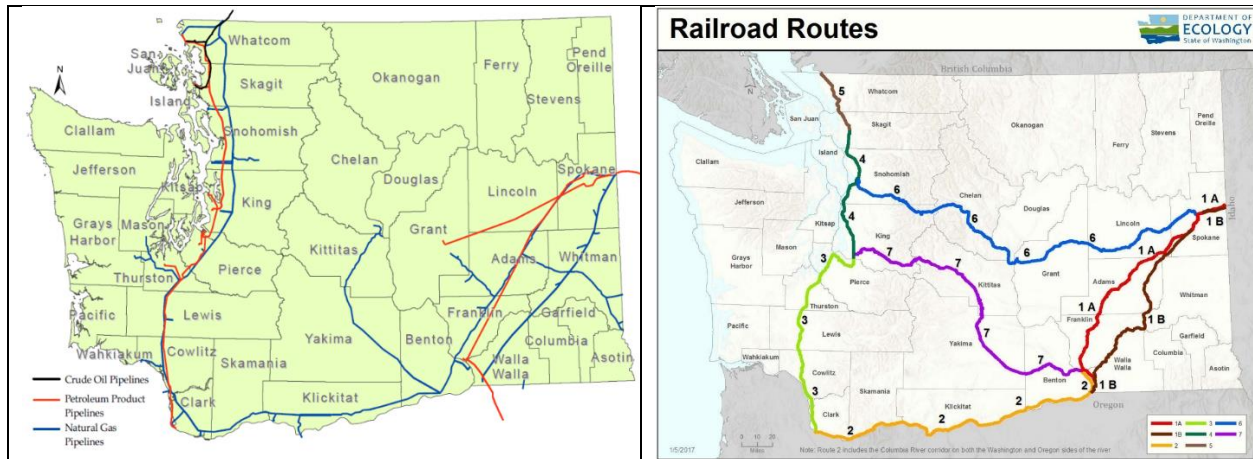


Figure 52) Pipeline infrastructure (left map) and railroad routes (right map) used to transport crude oil and other petroleum products throughout the state of Washington. Maps were taken from the 2018 Washington State Enhanced Hazard Mitigation Plan.

A few other operations recognized in the Washington State Enhanced Hazard Mitigation Plan that are often associated with the storage of hazardous materials include chemical storage facilities and clandestine drug labs and dump sites. As of 2017, there were 77 Chemical Storage Facilities in Okanogan County (Figure 53). These facilities are heavily regulated, but they could, pending a natural disaster, mechanical failure, or human error, be the source of a large hazardous material spill. Given the amount of oversight at these facilities, a leak or spill will likely be recognized and reported immediately. Relative to a chemical storage facility, a drug lab or dump is often associated with small quantities of chemicals, but they are illegal and operate discretely. People who find drug labs and dumps or unknowingly handle garbage and other equipment from a lab can be injured. Unlabeled containers, chemical spills, chemical residues, flammable substances, and faulty containers are all examples of the hazards that someone could be exposed to at drug lab or dump. Between 1999 and 2011, only 25 drug labs or dump sites were discovered and reported in Okanogan County (approximately two reports per year). Relative to the rest of the state, Okanogan County is at the lower end of the number of drug labs or dump sites discovered and reported each year.

The release of hazardous materials almost always has a direct effect on the environment which, in turn, can adversely affect human populations as a secondary impact. The four spills reported to the Washington Department of Ecology all resulted in water pollution, but air pollution, soil contamination, fish kills/impacts to wildlife, and degradation of sensitive habitat can all result from spills.

Although spills can have a direct impact on human health, resulting from direct exposure to a hazardous material through contact, ingestion, etc., the most common impacts are usually economic/financial. Degradation of shoreline or other natural areas that are popular for recreation can affect tourism, the closure of and damage to roadways because of an accident resulting in a spill can affect commerce within the county, and the cost of cleanup or compensation paid out to displaced residents can be extremely high. These are just a few general examples of the impacts that hazardous materials can have.

Total Chemical Storage Facilities by County 2017

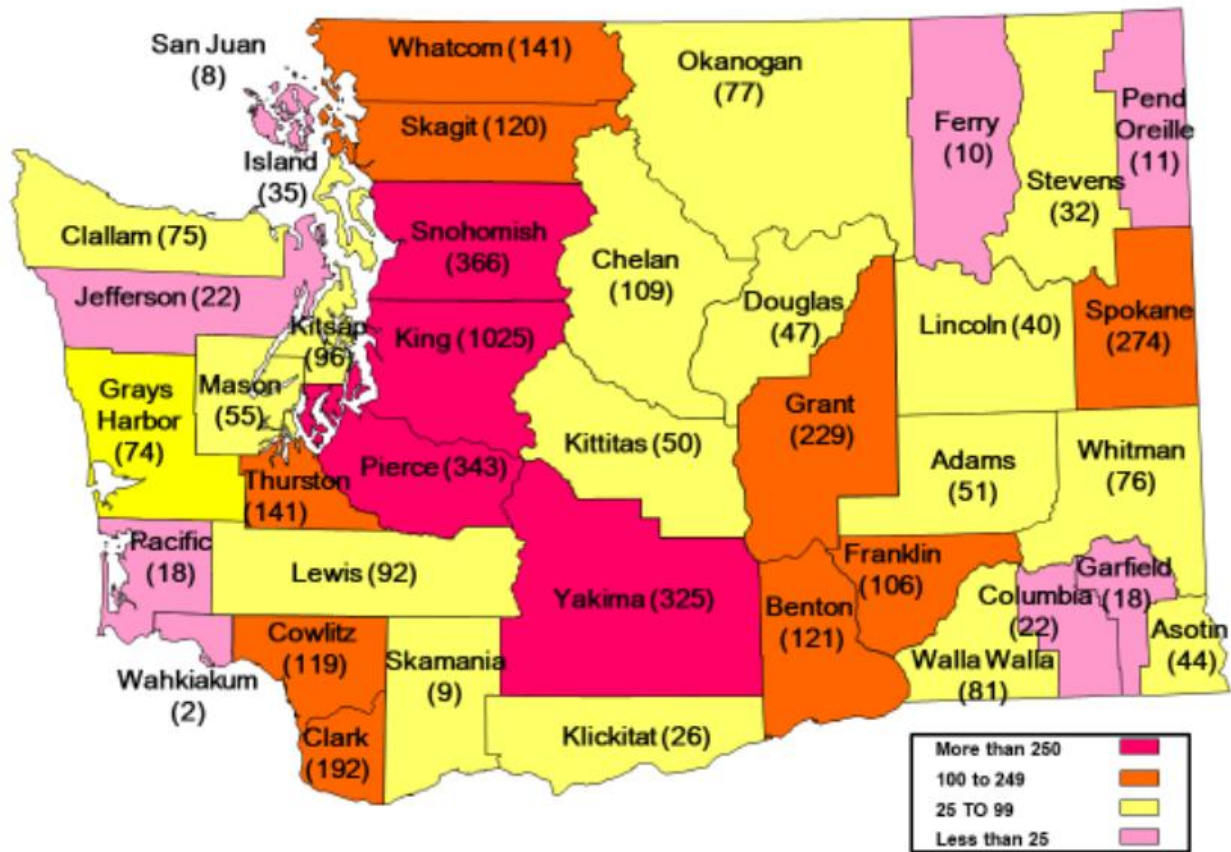


Figure 53) The total number of chemical storage facilities in each county in the State of Washington for 2017.

CLEANUP SITES

The Washington State Department of Ecology lists 139 cleanup sites within Okanogan County, many of which have been remediated and require no further action. Of the 139 sites listed, there are 43 that have a site ranking (1 through 5, with one being the highest risk) which indicates the perceived level of risk associated with a cleanup site. These sites are listed in Table 101, they have been organized by site ranking, where additional information, such as site status (i.e. clean-up status) and general location, can be found. The Cleanup Site Search tool can be accessed online at the Washington Department of Ecology website¹³⁸.

Of the 139 cleanup sites in the county, 21 different classifications of contaminants have been identified and, when combined, there have been 226 counts of contaminants across all sites (averaging 1.6

¹³⁸ State of Washington Department of Ecology. Toxic Cleanup Sites. Cleanup Site Search. Accessible online at <https://apps.ecology.wa.gov/gsp/SiteSearchPage.aspx>.

contaminants found on each site). Of all contaminants, those most frequently released in the environment include petroleum, metals, arsenic, and lead.

Table 101) Hazardous waste clean-up sites in Okanogan County that have been assigned a site ranking. Data is from the Washington State Department of Ecology Cleanup Site Search.

Cleanup Site ID	Site Name	Site Status	Site Rank	City
4720	Alder Mill	Cleanup Started	1 - Highest Assessed Risk	Twisp
4473	Red Shirt Mill	Cleanup Started	1 - Highest Assessed Risk	Twisp
4355	PARISEAU FARM DUMP	No Further Action	1 - Highest Assessed Risk	Brewster
3395	US DOI BLM Kaaba Texas Mine	Construction Complete- Performance Monitoring	1 - Highest Assessed Risk	Nighthawk
3245	GEBBERS FARMS	No Further Action	1 - Highest Assessed Risk	Brewster
2154	Triune Mine	Awaiting Cleanup	1 - Highest Assessed Risk	Oroville
2092	Antimony Queen Mine	Awaiting Cleanup	1 - Highest Assessed Risk	Carlton
11805	Kenneth Sasse Property	Cleanup Started	1 - Highest Assessed Risk	Tonasket
7017	Quick Mart Eisen Chevron	Cleanup Started	2 - Moderate-High Risk	Oroville
5684	Omak Gull 611	Cleanup Started	2 - Moderate-High Risk	Omak
4913	Coca Cola Distribution Co	Cleanup Started	2 - Moderate-High Risk	Omak
4910	UNOCAL 0855	No Further Action	2 - Moderate-High Risk	Omak
488	Ruby Mine	Awaiting Cleanup	2 - Moderate-High Risk	Nighthawk
4356	Minnie Mine	Cleanup Started	2 - Moderate-High Risk	Carlton
3986	Brook Mine	Awaiting Cleanup	2 - Moderate-High Risk	Omak
3751	Brett Pit	Awaiting Cleanup	2 - Moderate-High Risk	Coulee Dam
2168	Alice Mine	Awaiting Cleanup	2 - Moderate-High Risk	Nighthawk
1481	Pilot Hill Mine	Awaiting Cleanup	2 - Moderate-High Risk	Chesaw
771	Copper World Extension Mine	Awaiting Cleanup	3 - Moderate Risk	Loomis
7018	JACKPOT FOOD MART 01 081	No Further Action	3 - Moderate Risk	Oroville
6258	DALES TEXACO OROVILLE	Cleanup Started	3 - Moderate Risk	Oroville
4909	LOOMIS KWIK STOP	No Further Action	3 - Moderate Risk	Loomis
4906	ARDENS STORE	No Further Action	3 - Moderate Risk	Malott
422	Brewster Elementary School	No Further Action	3 - Moderate Risk	Brewster
3004	Kings Pacific Pride	Awaiting Cleanup	3 - Moderate Risk	Twisp
2181	Four Metals Mine	Awaiting Cleanup	3 - Moderate Risk	Nighthawk
839	Black Bear Mine	Awaiting Cleanup	4 - Low-Moderate Risk	Loomis
4171	Spokane Mine	Awaiting Cleanup	4 - Low-Moderate Risk	Oroville
405	Sheridan Mine	Awaiting Cleanup	4 - Low-Moderate Risk	Wauconda
1972	Golden Zone Mine	Awaiting Cleanup	4 - Low-Moderate Risk	Nighthawk
1670	Montanye Property	Awaiting Cleanup	4 - Low-Moderate Risk	Tonasket
11392	Taplett Farms	Awaiting Cleanup	4 - Low-Moderate Risk	Omak

708	Havillah Rd Oil Dumping	No Further Action	5 - Lowest Assessed Risk	Tonasket
6272	Conconully General Store	Cleanup Started	5 - Lowest Assessed Risk	Conconully
6097	TRAIN STATION MINI MART	No Further Action	5 - Lowest Assessed Risk	Twisp
4914	Lloyd Logging Equipment Yard	Cleanup Started	5 - Lowest Assessed Risk	Twisp
4719	OROVILLE DUMP	No Further Action	5 - Lowest Assessed Risk	Oroville
4357	Lloyds Logging Exc Soil	Awaiting Cleanup	5 - Lowest Assessed Risk	Twisp
4354	Molson Dump	Awaiting Cleanup	5 - Lowest Assessed Risk	Molson
3661	Tonasket Post & Rail	Awaiting Cleanup	5 - Lowest Assessed Risk	Tonasket
3345	Virginia Houser Property	Awaiting Cleanup	5 - Lowest Assessed Risk	Okanogan
2390	Richard Reed Property	Awaiting Cleanup	5 - Lowest Assessed Risk	Oroville
1096	Leonard Judd Property	Awaiting Cleanup	5 - Lowest Assessed Risk	Okanogan

VALUES OF RESOURCES AT RISK

It is difficult to estimate the damages that could occur with a hazardous materials release because it depends on multiple factors (type of material, physical property, and location of release). If a spill were to occur in the rural parts of the county it would only likely temporarily close roads. If a spill were to occur closer to larger population centers there could be evacuations, human illness resulting from exposure, environmental damage, and minor impacts to the economy (road/business closures). The release of hazardous materials in areas featuring some of the county's larger industrial operations could produce widespread effects that are beyond the scope of this plan. Many towns rely heavily on tourism to support the local economy throughout the year. Therefore, a reduction in tourism to the area could impact businesses depending on the time of year of a potential hazmat release. Many impacts from a vehicular spill, which is the most common type of spill to occur in the county, would likely be temporary, resulting in cleanup that could take several days or weeks.

PANDEMIC HAZARDS

Until the COVID-19 pandemic began in December 2019, modern pandemics that have affected the Pacific Northwest, including Okanogan County, have largely concerned different strains of influenza virus. Each year, communities in Okanogan County prepare for “flu season” which always presents a risk to residents as it could spread rapidly and have adverse impacts on vulnerable populations. While most people recover quickly, the flu can cause severe illness and even death in vulnerable populations. The number of fatalities related to the flu is typically low (there were two deaths reported in Okanogan County for the 2018-2019 flu season) making it unlikely that medical facilities will become overwhelmed by the number of infected individuals requiring more extensive or prolonged treatment. Additionally, individuals who are infected develop symptoms quickly which allows for rapid identification of the illness and quarantine of the individual. Conversely, COVID-19 can be asymptomatic, has a longer incubation period, and can adversely affect most adults with pre-existing or underlying conditions. Because of the potential for rapid spread, hospitals and other medical facilities could become overwhelmed by individuals infected with COVID-19, making it much more dangerous than the seasonal flu.

Because of the exceptional risk presented by COVID-19 and its immediate relevance to this plan update, this section will focus primarily on information concerning the impacts of and response to COVID-19. ***This section was written Between August and October of 2020 and should be updated periodically to reflected new changes and findings related to COVID-19.***

Determined by representatives of the county, the following table includes pandemic hazard ratings for Okanogan County, WA.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

The following information is a direct excerpt from the Centers for Disease Control and Prevention webpage on past pandemics¹³⁹.

¹³⁹ Centers for Disease Control and Prevention. Past Pandemics. <https://www.cdc.gov/flu/pandemic-resources/basics/past-pandemics.html>. Accessed September 2020.

1918 PANDEMIC (H1N1 VIRUS)

The 1918 influenza pandemic was the most severe pandemic in recent history. It was caused by an H1N1 virus with genes of avian origin. Although there is not universal consensus regarding where the virus originated, it spread worldwide during 1918-1919. In the United States, it was first identified in military personnel in spring 1918. It is estimated that about 500 million people or one-third of the world's population became infected with this virus. The number of deaths was estimated to be at least 50 million worldwide with about 675,000 occurring in the US.

Mortality was high in people younger than 5 years old, 20-40 years old, and 65 years and older. The high mortality in healthy people, including those in the 20 to 40-year age group, was a unique feature of this pandemic. While the 1918 H1N1 virus has been synthesized and evaluated, the properties that made it so devastating are not well understood. With no vaccine to protect against influenza infection and no antibiotics to treat secondary bacterial infections that can be associated with influenza infections, control efforts worldwide were limited to non-pharmaceutical interventions such as isolation, quarantine, good personal hygiene, use of disinfectants, and limitations of public gatherings, which were applied unevenly.

1957-1958 PANDEMIC (H2N2 VIRUS)

In February 1957, a new influenza A (H2N2) virus emerged in East Asia, triggering a pandemic ("Asian Flu"). This H2N2 virus was comprised of three different genes from an H2N2 virus that originated from an avian influenza A virus, including the H2 hemagglutinin and the N2 neuraminidase genes. It was first reported in Singapore in February 1957, Hong Kong in April 1957, and in coastal cities in the US in summer 1957. The estimated number of deaths was 1.1 million worldwide and 116,000 in the US.

1968 PANDEMIC (H3N2 VIRUS)

The 1968 pandemic was caused by an influenza A (H3N2) virus comprised of two genes from an avian influenza A virus, including a new H3 hemagglutinin, but also contained the N2 neuraminidase from the 1957 H2N2 virus. It was first noted in the US in September 1968. The estimated number of deaths was 1 million worldwide and about 100,000 in the US. Most excess deaths were in people 65 years and older. The H3N2 virus continues to circulate worldwide as a seasonal influenza A virus. Seasonal H3N2 viruses, which are associated with severe illness in older people, undergo regular antigenic drift.

2009 H1N1 PANDEMIC

In the spring of 2009, a novel influenza A (H1N1) virus emerged. It was detected first in the US and spread quickly across the US and the world. This new H1N1 virus contained a unique combination of influenza genes not previously identified in animals or people. This virus was designated as influenza A (H1N1)pdm09 virus. Ten years later work continues to better understand influenza, prevent disease, and prepare for the next pandemic.

The (H1N1)pdm09 virus was very different from H1N1 viruses that were circulating at the time of the pandemic. Few young people had any existing immunity (as detected by antibody response) to the (H1N1)pdm09 virus, but nearly one-third of people over 60 years old had antibodies against this virus, likely from exposure to an older H1N1 virus earlier in their lives. Since the (H1N1)pdm09 virus was very different from circulating H1N1 viruses, vaccination with seasonal flu vaccines offered little cross-

protection against (H1N1)pdm09 virus infection. While a monovalent (H1N1)pdm09 vaccine was produced, it was not available in large quantities until late November—after the peak of illness during the second wave had come and gone in the US. From April 12, 2009 to April 10, 2010, CDC estimated there were 60.8 million cases (range: 43.3-89.3 million), 274,304 hospitalizations (range: 195,086-402,719), and 12,469 deaths (range: 8,868-18,306) in the US due to the (H1N1)pdm09 virus.

Additionally, CDC estimated that 151,700-575,400 people worldwide died from (H1N1)pdm09 virus infection during the first year the virus circulated.** Globally, 80 percent of (H1N1)pdm09 virus-related deaths were estimated to have occurred in people younger than 65 years of age. This differs greatly from typical seasonal influenza epidemics, during which about 70 percent to 90 percent of deaths are estimated to occur in people 65 years and older.

Though the 2009 flu pandemic primarily affected children and young and middle-aged adults, the impact of the (H1N1)pdm09 virus on the global population during the first year was less severe than that of previous pandemics. Estimates of pandemic influenza mortality ranged from 0.03 percent of the world's population during the 1968 H3N2 pandemic to 1 percent to 3 percent of the world's population during the 1918 H1N1 pandemic. It is estimated that 0.001 percent to 0.007 percent of the world's population died of respiratory complications associated with (H1N1)pdm09 virus infection during the first 12 months the virus circulated.

The US mounted a complex, multi-faceted and long-term response to the pandemic, summarized in *The 2009 H1N1 Pandemic: Summary Highlights, April 2009-April 2010*. On August 10, 2010, WHO declared an end to the global 2009 H1N1 influenza pandemic. However, (H1N1)pdm09 virus continues to circulate as a seasonal flu virus, and cause illness, hospitalization, and deaths worldwide every year.

2019 COVID-19 PANDEMIC (DECEMBER 2019 TO PRESENT)

In late 2019, a novel coronavirus emerged in China and quickly spread around the world. Between December 2019 and October 2020, almost 37 million cases of the virus had been detected and more than 1 million deaths had occurred world-wide. Because of its immediate relevance, most of the information in this section concerns the COVID-19 pandemic.

PROBABILITY OF FUTURE OCCURRENCE

Given the frequency at which pandemics occur and the rural condition of the county, Okanogan County is at low risk to future pandemics. However, future pandemics will occur; in a little more than 100 years, five different pandemics, including COVID-19, have occurred, and been recognized by health officials all over the world. Based on those five pandemics, which occurred between 1918 and 2020, Okanogan County might expect a pandemic to occur every 10 to 40 years.

IMPACTS OF A PANDEMIC

The following descriptions are largely based on COVID-19, but they could describe the expected impacts from a future pandemic. The data presented in this section is from January 21, 2020 to August 24, 2020; the figures and data can be updated at any time to reflect current trends with COVID-19. Many people were affected by COVID-19 and related policy in the following ways:

HUMAN HEALTH

A pandemic is an epidemic that has spread over several countries or continents, usually affecting many people. The infectious nature of a disease determines how it spreads and rapidly it is transmitted from person to person. For example, health officials attempt to answer a number of questions as quickly as they can once disease transmission has been detected: how does it spread -is it airborne or does it spread via droplets? What surfaces can it survive on and for how long? How long is the incubation period and when are people contagious? How severe are the symptoms and what is the rate of mortality? Which populations are the most vulnerable to the disease and how can they be protected?

The rate of spread of COVID-19 was monitored closely by health officials, but there were challenges related to testing, the primary method of detection, that concerned the availability and accuracy of the tests, delays with lab results, controversy with mandating tests, and asymptomatic individuals who were not tested. Consequently, testing efforts were focused on people with symptoms, people involved with facilities that were re-opening (i.e. universities), and new outbreak centers or “hot spots”. Between January 21, 2020 and August 24, 2020 there were 72,703 confirmed cases in Washington State that were detected with the administration of more than 1.4 million tests. Of those cases, 971 were detected in Okanogan County; the most cases were detected in the Seattle, Spokane, and Tri-Cities areas (Figure 54).

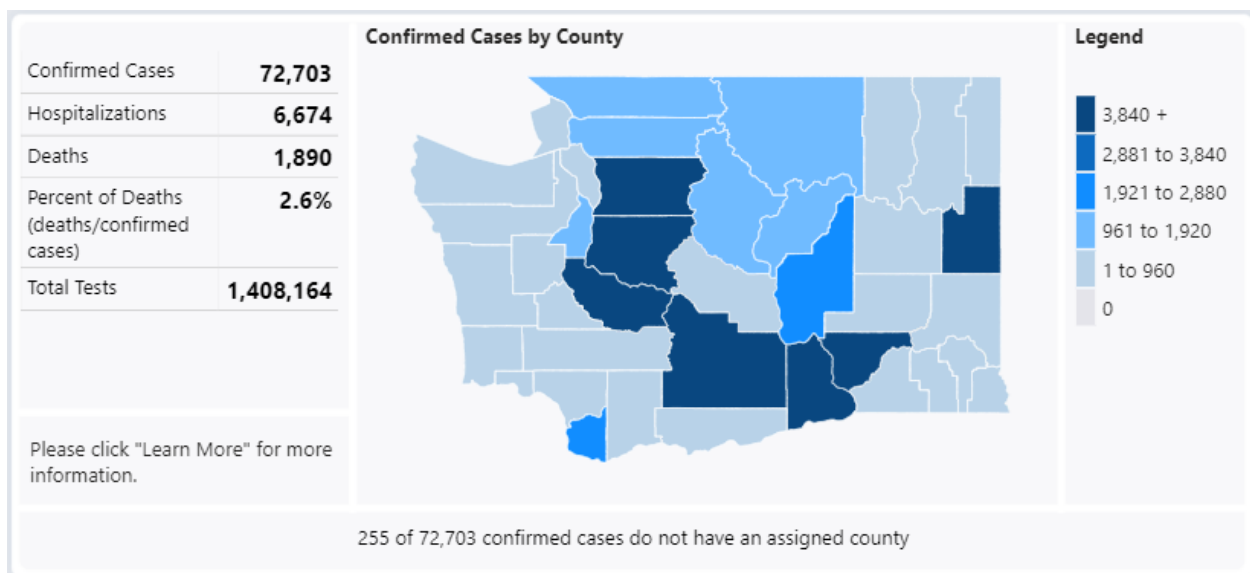


Figure 54) Confirmed cases of COVID-19 by county in the State of Washington (Data are from the Washington State Department of Health COVID-19 Data Dashboard -January 21, 2020 through August 24, 2020).

To help prevent hospitals from becoming overwhelmed by patients with COVID-19 state governments began to enforce “lockdown” measures. These measures required that access to public spaces and businesses be restricted or closed to the general populous, and it also placed restrictions on public gatherings. Consequently, the total number of confirmed cases began to flatten by late spring/early summer; this was often referred to as “flattening the curve”. By mid-summer, states began to implement their own strategies for limiting the spread of COVID-19 and most had outlined a set of criteria for lifting restrictions on business operations, the use of public spaces, and public gatherings. Although restrictions

were placed gathering sizes, social distancing measures were enforced, and masks were required in many businesses, restaurants, public facilities, and public places, the reduction in lockdown measures often resulted in a steady increase in confirmed cases. These trends can be seen in Figure 55; as of September 2020, the total number of confirmed cases was declining.

As is the case with most diseases, different age groups have, in general, been affected differently by COVID-19 because of both health disparities and behavioral differences. As of September 2020, it appears that young children are of low susceptibility to contracting the virus while adults are highly susceptible. In addition to being susceptible to the virus older adults, senior citizens, and people with pre-existing conditions are much more vulnerable to the symptoms associated with COVID-19.

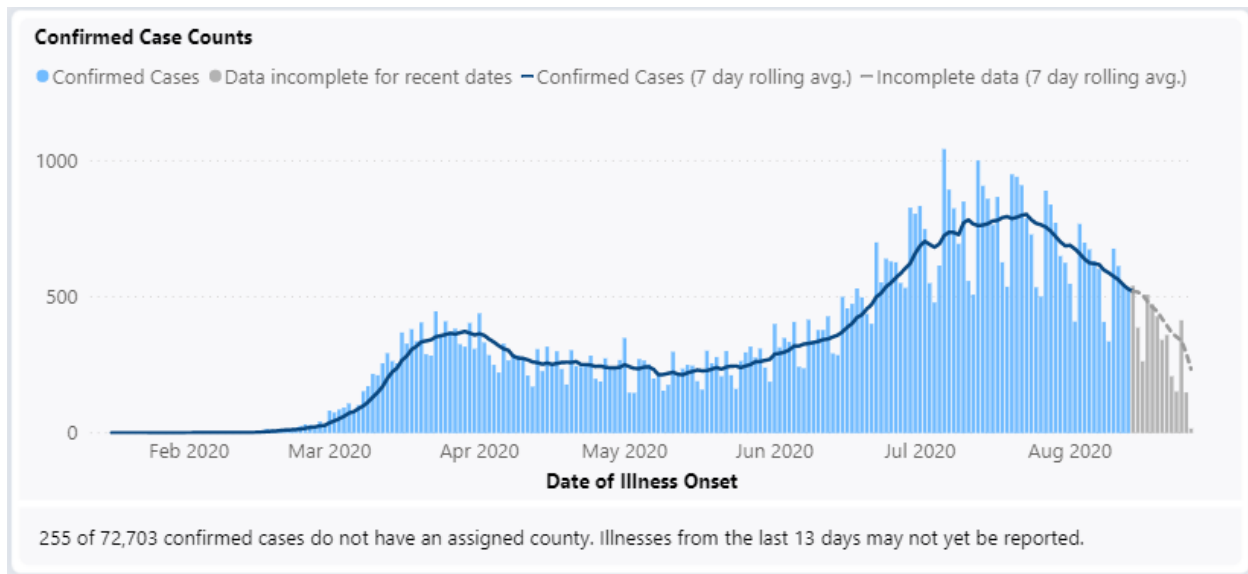


Figure 55) Daily total confirmed cases of COVID-19 for the State of Washington (Data are from the Washington State Department of Health COVID-19 Data Dashboard -January 21, 2020 through August 24, 2020).

The age-group with the most confirmed cases is 20 to 39 which, as of August 24th, 2020, accounted for 40% of all confirmed cases (Figure 56). The young adult demographic leads in the number of confirmed cases because people in that age-group are the most likely to go to public places, public events, travel, and socialize during the pandemic. Older adults who are much more vulnerable to COVID-19 symptoms are, conversely, exercising more caution when entering public spaces and seem to be doing what they can to limit their exposure and risk.

The most immediate impacts resulting from a pandemic include those that concern human health, as described above, and medical services and facilities. In addition to illness affecting individuals and the potential for rapid spread, hospitals and other medical facilities could become overwhelmed by people who are admitted for care for the disease. As medical staff are repeatedly exposed to patients infected with the disease, they are at ever increasing risk of contracting the disease themselves. Consequently, medical staff, in addition to medical supplies and resources, may also become depleted and reduce the capacity of a facility for patient care.

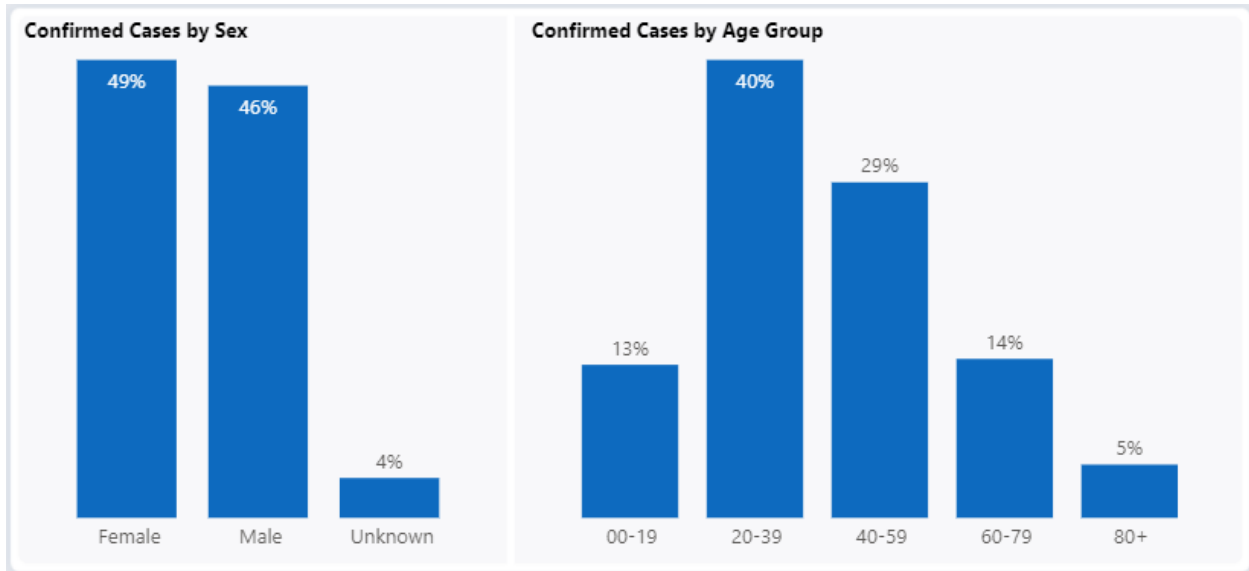


Figure 56) Total number of confirmed cases of COVID-19 by age group and sex for the State of Washington (Data are from the Washington State Department of Health COVID-19 Data Dashboard -January 21, 2020 through August 24, 2020).

From January 21, 2020 (when the first US case was detected in Washington State) to August 24, 2020, there were almost 6,700 total hospitalizations in Washington State from COVID-19 (Figure 57). The single day high for total hospitalizations for that same period, which occurred at the end of March, was 88 (Figure 58). Of the 6,700 cases recorded in the state, there were 36 total hospitalizations in Okanogan County (also for that period). While most hospitalizations were concentrated in urban counties with large populations and there tended to be fewer hospitalizations in rural counties, all counties faced similar concerns over the rate of spread of COVID19 and the ability of medical facilities to accommodate and care for the growing number of people who contracted the virus.

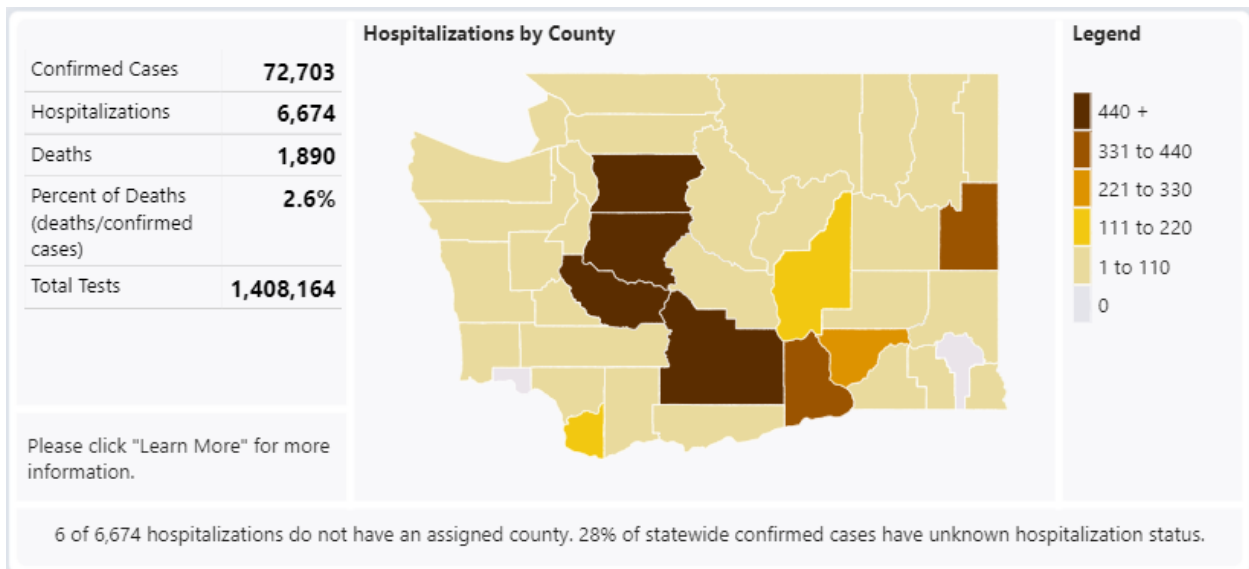


Figure 57) Total number of hospitalizations related to COVID-19 reported by county for the State of Washington (Data are from the Washington State Department of Health COVID-19 Data Dashboard -January 21, 2020 through August 24, 2020).

Most states and local governments implemented lockdown measures to prevent hospitals and other medical facilities from becoming overwhelmed by patients with COVID-19. While Okanogan County only had 36 total hospitalizations by August 24, 2020, there are fewer than 100 hospital bed available in the county for in-patient care. According to records available online through the Washington State Hospital Association, there are 75 beds available between the three hospitals in the county; those hospitals are the North Valley Hospital in Tonasket (25 beds), Mid-Valley Hospital in Omak (25 beds), and the Three Rivers Hospital in Brewster (25 beds).

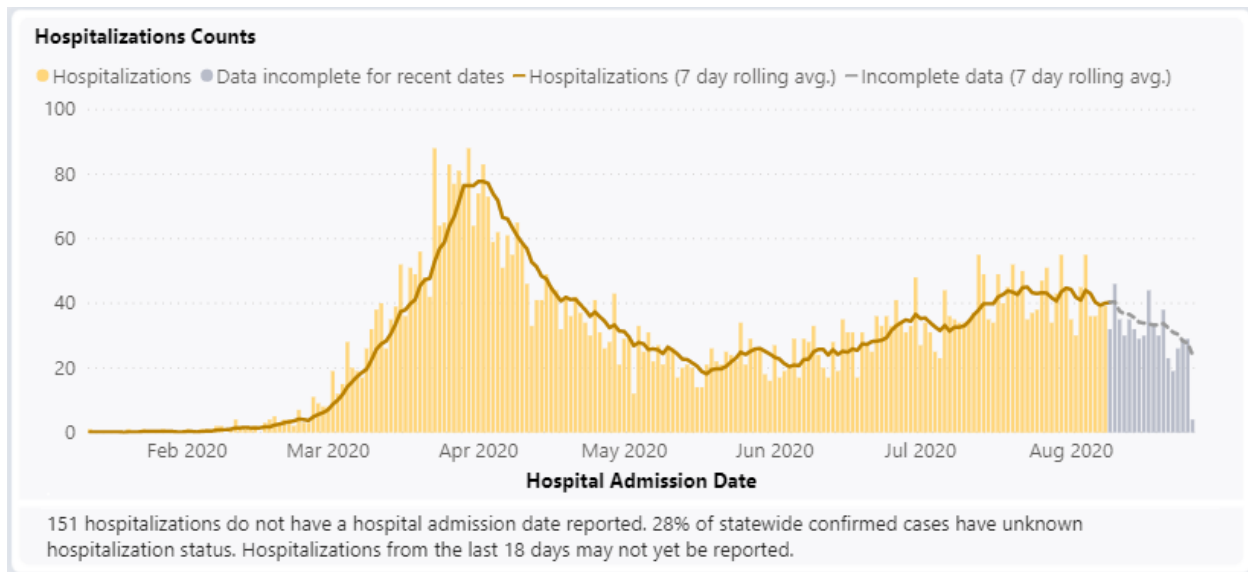


Figure 58) Daily total hospitalizations for COVID-19 for the State of Washington (Data are from the Washington State Department of Health COVID-19 Data Dashboard -January 21, 2020 through August 24, 2020).

As described earlier in this section, general health disparities between age groups have implications for outcomes and health impacts related to COVID-19. As of August 24, 2020, approximately 40% of all individuals with COVID-19 in Washington State were 20 to 39 years of age; however, hospitalizations were more heavily weighted towards older populations with individuals 60 years of age and older accounting for approximately 57% of all hospitalizations. While individuals 39 years of age and younger represent 53% of all COVID-19 cases in the state, individuals 40 years of age and older account for 85% of all hospitalizations (Figure 59).

In addition to symptoms from the disease, people who are infected with the disease may experience long-term health effects if they recover. If the disease is new and little is known about it, there may be very few options for prevention or treatment of symptoms or long-term health effects. This particular outcome of a pandemic may increase the number of individuals with chronic illness who require routine visits with a doctor or who may need to take medication for the rest of their lives. Some long-term health effects associated with COVID-19 are described above but a longitudinal study will be required to fully understand these health effects.

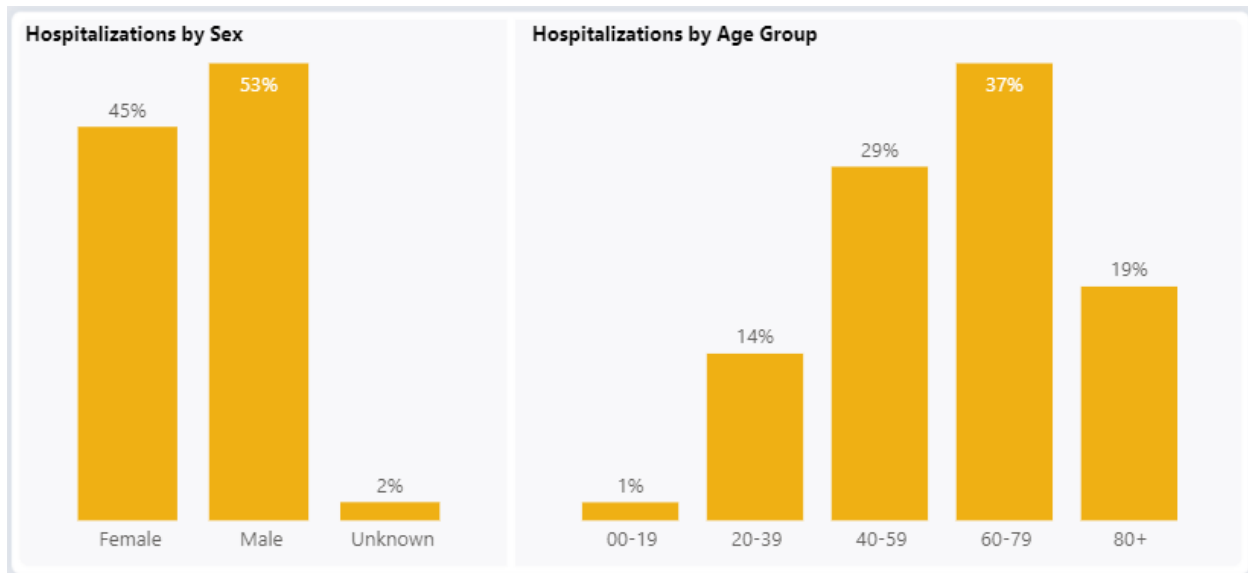


Figure 59) Total number of hospitalizations related to COVID-19 by age group and sex for the State of Washington (Data are from the Washington State Department of Health COVID-19 Data Dashboard -January 21, 2020 through August 24, 2020).

As has been observed with COVID-19, a pandemic can also cause a significant number of fatalities. Depending on the nature of the disease, individuals may die as a direct result of the disease or they may die from complications resulting from the disease. In combination with the disease itself, complications from other symptoms increases the complexity of treatment which may increase the likelihood of death amongst those who have the disease. Depending on the severity of the symptoms and the rate at which fatalities occur, hospitals and other facilities could reach and exceed their capacity for handling the deceased. Additional cold storage for the deceased may be required until other arrangements can be made by authorities or by family members. The availability of additional cold storage may be limited due to demand from other communities.

Between January 21, 2020 and August 24, 2020, nearly 1,900 people in Washington State died from COVID-19 and complications from COVID-19. This means that 2.6% of the 72,703 cases detected in the state during that period were fatal (Figure 60). Just like the other metrics, the greatest number of deaths occurred in the counties with the most cases, while some rural counties had zero deaths because of COVID-19. In Okanogan County there were six total deaths out of 971 detected cases which is a fatality rate of 0.6%.

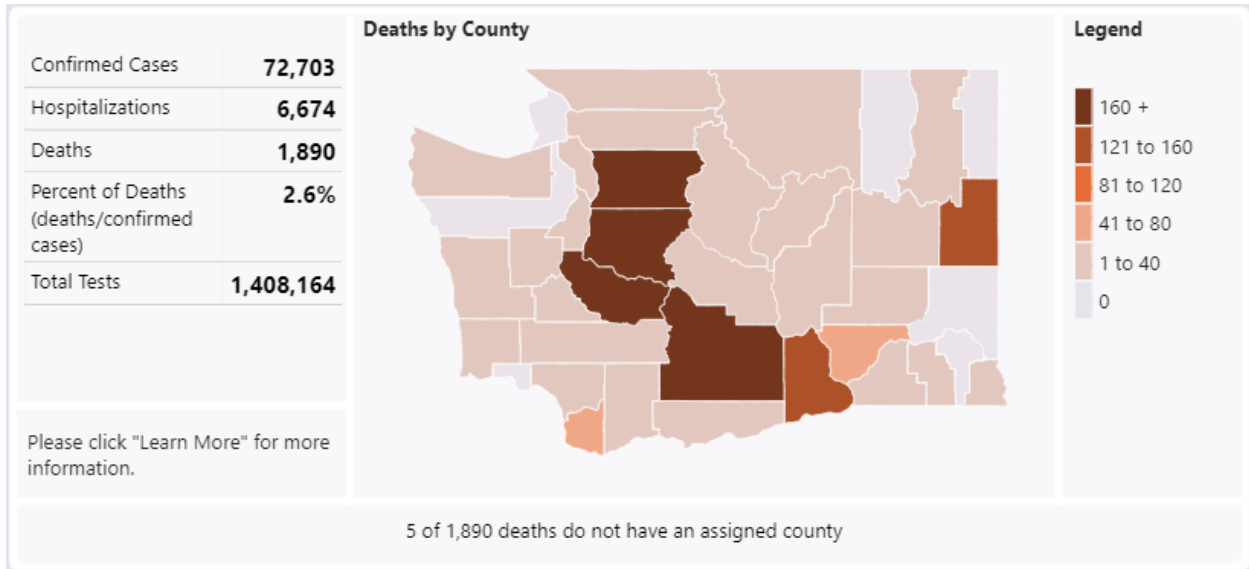


Figure 60) Total number of deaths related to COVID-19 reported by county for the State of Washington (Data are from the Washington State Department of Health COVID-19 Data Dashboard -January 21, 2020 through August 24, 2020).

In Washington State, the high rate for fatalities resulting from COVID-19 or complications from COVID-19 occurred at the end of March with 34 deaths in one day (the seven-day rolling average was 29). Since then, the average has dropped as low as five deaths per day in June and spiked around 15 deaths per day at the end of July. In the month following the spike in July, it appears that deaths have dropped off to the lowest rates since the pandemic began (Figure 61).

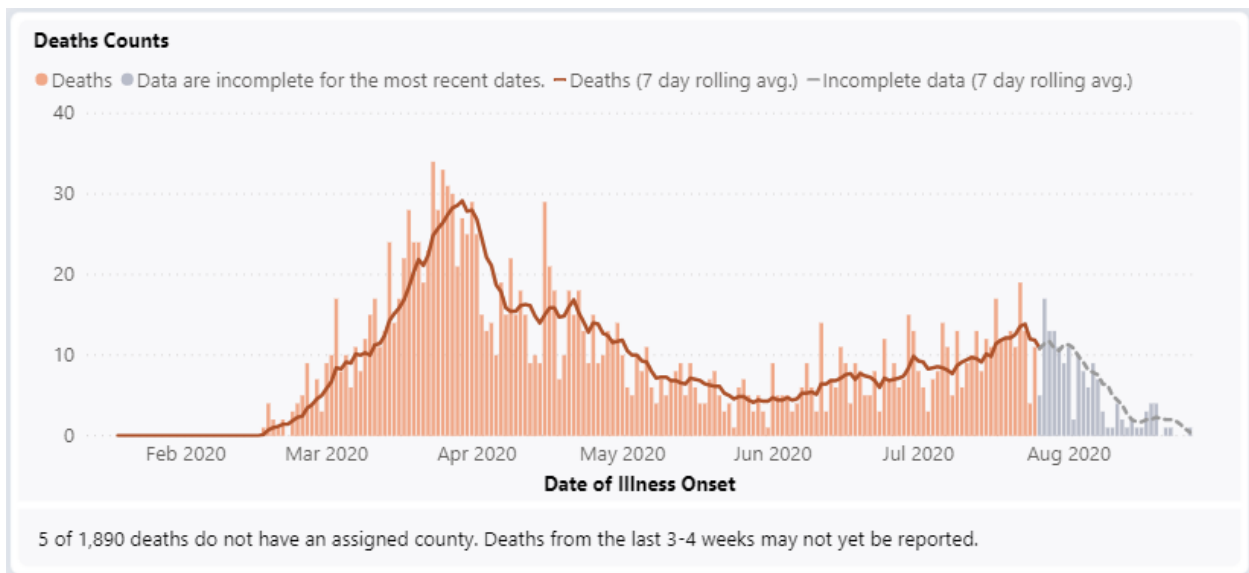


Figure 61) Daily reported deaths attributed to COVID-19 for the State of Washington (Data are from the Washington State Department of Health COVID-19 Data Dashboard -January 21, 2020 through August 24, 2020).

Deaths resulting from COVID-19 or complications from COVID-19 are distributed differently amongst age groups due to general health disparities, which was discussed earlier in this section, between those age

groups. Although 53% of all cases have been detected in individuals 0 to 39 years in age, individuals 80 years and older represent nearly 90% of all fatalities associated with COVID-19 (Figure 62). Because the health of older individuals is likely to be compromised prior to infection with COVID-19 they are much more susceptible to developing and succumbing to severe symptoms. Additionally, policy related to the handling of patients in nursing homes who tested positive for COVID-19 could have exposed other residents to the virus. In some states patients who were recovering from the virus were returned to nursing homes which contributed to the spread of the virus amongst older individuals.

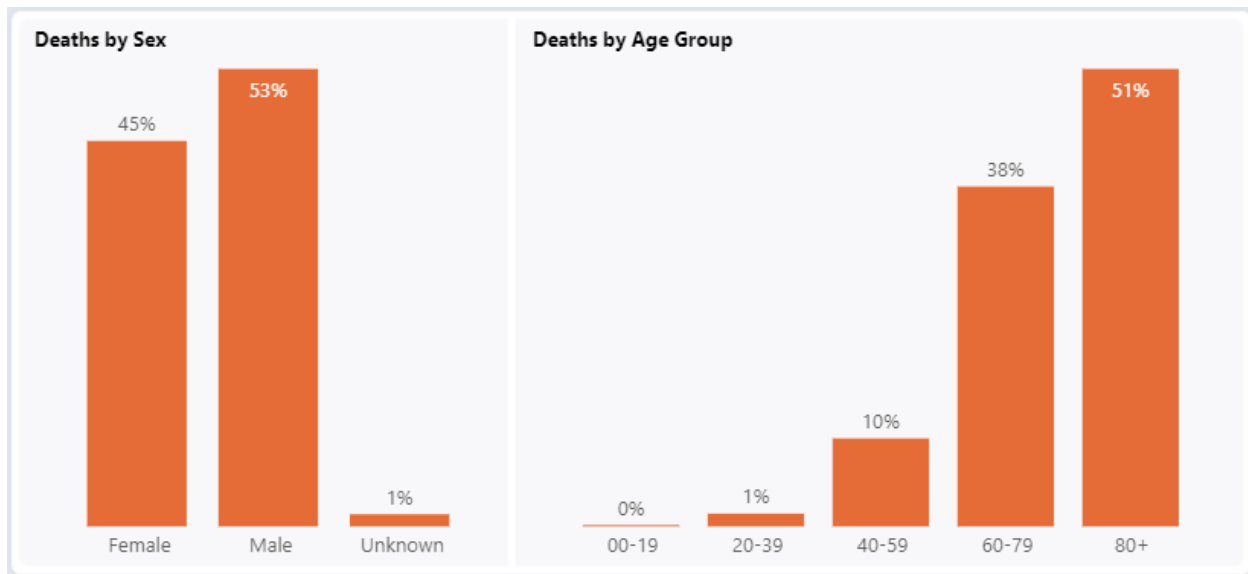


Figure 62) Total number of deaths related to COVID-19 by age group and sex for the State of Washington (Data are from the Washington State Department of Health COVID-19 Data Dashboard -January 21, 2020 through August 24, 2020).

One of the data visualizers/dashboards available to view COVID-19 data was produced by John Hopkins University. The COVID-19 Status Report included data related to the spread of the virus at infection rates at both the county and state level. Additional detailed information concerning local populations was also included in the report. According to the report that was run on September 18, 2020 there were 1,024 confirmed cases of COVID-19 and ten deaths resulting from the virus in the county (there were 81,198 cases and 2,031 deaths in Washington state at that same time). The data from September 18 indicate a fatality rate of approximately 0.98% which is up from the rate of 0.62% that was reported on August 24 (Figure 63).

The report also shows the distribution of age groups in the county which, as was discussed above, has implications for how a population will be affected by the virus overall. If older adults constitute a larger portion of the population then there could be more hospitalizations and fatalities resulting from an outbreak of COVID-19. The more people that require hospitalization, the more pressure there is on hospitals to keep pace with the rate of infection. According to the report, there are 71 staffed beds, 112 licensed beds, and 12 intensive care unit (ICU) beds in Okanogan County. The portion of beds not being used to care for patients with other conditions should be available for patients with COVID-19.

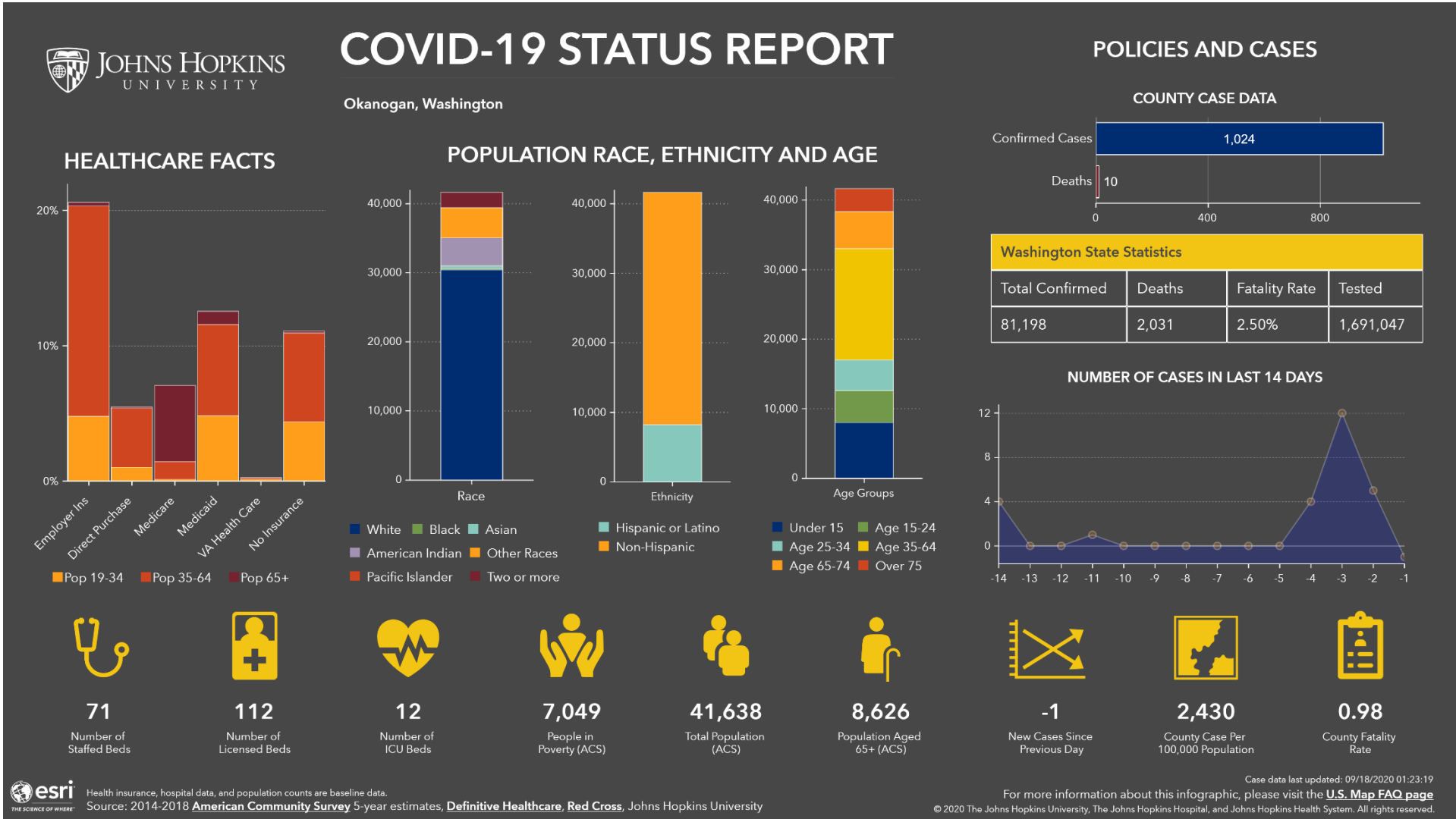


Figure 63) Okanogan County, WA COVID-19 Status Report for September 18, 2020. Infographic was produced and is updated by John Hopkins University.

The pandemic will undoubtedly be associated with secondary health impacts that are yet to be studied and fully understood. Mental health effects could include depression resulting from social isolation or relationship/marriage problems, increased levels of anxiety and fear associated with the disease, lockdown measures, or civil unrest, or regression with other mental health conditions resulting from changes in the availability and accessibility of healthcare professionals (For example, children with autism may experience difficulties associated with changes in routines and reduced face-to-face time with other people). Other health crises associated with a pandemic and lockdown measures could include increases in cases of domestic violence as people are forced to spend more time at home, incidents of suicide as people struggle with depression and anxiety, increased usage of drugs and other controlled substances, and other health impacts that may not yet be known.

SOCIAL ASPECTS

A pandemic can have far reaching social impacts on a community, especially if measures are taken to help reduce the spread of the disease. The presence of a communicable disease in a community can result in changes in social behavior as people may begin to avoid large gatherings or limit face-to-face encounters with other people over concern that they may be exposed to the disease. If a disease proves to be particularly dangerous governing bodies may introduce policy and regulations aimed at reducing the spread of the disease. Such measures can include restrictions on gatherings, business operations, public events, workplace activities, schooling, and other community aspects and functions.

Termed “lockdowns” or “lockdown measures”, many governing bodies implemented policies that regulated various activities within communities during the COVID-19 pandemic. For example, many people were required to work remotely from home and many schools switched to remote-learning in to avoid meeting in-person. Although these changes were intended to help reduce the spread of the disease, there may be other consequences, both positive and negative, associated with working, learning, or socializing remotely. As these other consequences could be far-reaching and long-lasting, they may not be fully understood until it is determined that the COVID-19 pandemic is over.

At the time that this section was written, the pandemic and ensuing lockdown measures had dramatically altered the way that people interact, travel, and function within their communities. The COVID-19 pandemic has been highly disruptive to what were considered typical community operations and human behaviors. The pandemic has also been a source of contention between people regarding politics and lockdown measures and the stress associated with the pandemic has likely contributed to other incidents of civil unrest, contention and confrontation, and polarization within communities.

ECONOMIC IMPACTS

A modern-day pandemic, such as the COVID-19 pandemic, can have far reaching impacts on the local, regional, national, and global economies. Even before lockdown measures are implemented, the rapid spread of disease within a community can have significant economic impacts that could result in reduced spending, the closure of businesses, lost jobs, etc. Businesses are likely to struggle if too many employees fall ill, are concerned about going to work because of the disease, or if people are reluctant to do any leisure shopping or make luxury purchases due to uncertainties over their own health and employment.

Additionally, if lockdown measures are implemented some businesses or industries may be required to close completely which could result in permanent closures or permanent loss of jobs.

Although not recognized by any agency or entity, business can essentially be sorted into three pandemic-status categories based on their services, clientele, standard operating practices, and ability to operate using technology. Those categories are:

- **Essential Businesses:** These businesses and industries provide services that are essential (including food, health care, finance, etc.) during the pandemic. Although there were some issues with adaptation initially, most of these businesses were able to adopt new workplace rules and policies aimed at protecting employees and customers so they could remain open.
- **Adaptable Businesses:** The services that these businesses provide may not be essential, but they are able to adapt to pandemic conditions quickly and create a relatively safe environment for both employees and clientele. Safety measures are achieved through changes in how in-person business is conducted and some aspects of the business are moved to web-based services. Some examples include restaurants, hobby stores, lawn and garden centers, etc.
- **Non-Essential/Non-Adaptable Businesses:** Most of these businesses are in industries such as hospitality, tourism, and entertainment; they tend to be businesses that primarily offer in-person services that people typically patronize using disposable income. Because of their non-essential status and dependence on providing in-person services, many of these businesses may be required to close during a pandemic due to the potential for the spread of disease. Examples include bars, movie theaters, theme parks, concerts, festivals, etc.

VALUES OF RESOURCES AT RISK

As this plan was updated during the COVID-19 pandemic a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that resulted from the pandemic. The pandemic resulted in hundreds of thousands of deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

OKANOGAN CONSERVATION DISTRICT ANNEX

As the Okanogan Conservation District (CD) office is in the City of Okanogan, the risk assessment for the CD will largely concern risk associated with CD assets and CD project areas in the county. This section is supplemental to, and setup differently from, the City of Okanogan annex which includes risk assessments that cover the whole city and, in some cases, the greater Okanogan area. Refer to the City of Okanogan annex for more information.

FLOOD HAZARDS

Determined by representatives of the District, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the Okanogan Conservation District. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the Okanogan Conservation District.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	9 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

Dam failure hazard ratings for the Okanogan Conservation District.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

The Okanogan Conservation District office is located 1 mile southwest of downtown Okanogan. The facility (rented), as well as assets owned by the District, are in a flood hazard area adjacent to the Okanogan River.

PROBABILITY OF FUTURE OCCURRENCE

CONSERVATION DISTRICT ASSETS

The City of Okanogan is at low to moderate risk to riverine flooding and low risk to dam failure flooding. In general, Okanogan CD assets in the city are at the same levels of risk for both types of flooding. However, because the CD office is located within zone AE of the 100-year flood plain it is at high risk to flooding *relative* to the rest of the city. Areas designated as Zone AE are subject to a one percent or greater annual chance of flooding in any given year.

CONSERVATION DISTRICT PROJECT AREAS

The risk rating for flood events in Okanogan County is high. Low magnitude flood events can be expected several times each year. However, due to the flat topography and drainage infrastructure, the impacts of these events are slight and usually amount to minor and temporary traffic issues throughout the County. Larger magnitude and high impact flood events have occurred but are not likely in any given year. These types of flood events have the highest probability of occurrence in the winter or early spring. Minor flash flood events are expected annually in the county because of summer thunderstorms or rain-on-snow events. Burns scars, in combination with high levels of runoff, also present significant flood/mudslide/landslide risk in the county. As such, it is likely that the Okanogan CD will perform work or address flood concerns in high risk flood areas in the county on an annual basis.

IMPACTS OF EVENTS

CONSERVATION DISTRICT ASSETS

The potential impacts to CD assets are the same as those described for the City of Okanogan and Okanogan County. Refer to those sections for more information about impacts from riverine flooding and flooding resulting from dam failure.

CONSERVATION DISTRICT PROJECT AREAS

The protection of lives and property, including municipal, recreational, and agricultural infrastructure, crops, and other property from the effects of flooding and erosion as a result of runoff is a primary objective for the District. Okanogan CD has assisted many cooperators on river and stream flood diversion and erosion mitigation projects, primarily on the Okanogan River and its tributaries. After extremely large and intense wildfires in 2014 and 2015, there is an increased flash flood and debris flow risk in Okanogan County. The district has convened two Interagency Burned Area Emergency Response teams (2014 and 2015) to identify areas most at risk for post-fire flash flooding and erosion. Details on the locations of these at-risk areas are available on the district website. Okanogan CD continues to work with the Natural Resource Conservation Service to install Emergency Watershed Protection structures for the most at-risk homes in and around the 2014 and 2015 burn scars. These efforts will be continued as residents in the county address various types of risk and impacts from future flood events.

VALUE OF RESOURCES AT RISK

CONSERVATION DISTRICT ASSETS

Okanogan Conservation District has direct risk of flood damage since its office, which is located 1 mile southwest of downtown Okanogan, is located within a flood hazard area adjacent to the Okanogan River. The District rents its office space; however, office and field equipment, vehicles, tools, files, and miscellaneous resources are at risk of loss due to flooding. Flooding, either seasonal riverine or storm- or snowmelt-triggered flash flooding, has the potential to impact the District’s functions by preventing staff from reaching the office or from reaching cooperators in the case of road closures due to washouts or landslide risk. Power and internet failures related to flooding at the office would interrupt district operations until these services could be restored.

CONSERVATION DISTRICT PROJECT AREAS

As stated above, lives and property, including municipal, recreational, and agricultural infrastructure, crops, and other property within the CD service area are all at risk to flooding. These assets/values are not owned by the conservation district; refer to the flood hazard sections of the other annexes in this plan for more information about the values of resources at risk to flooding in the county.

EARTHQUAKE HAZARDS

Determined by representatives of the District, the following table includes earthquake hazard ratings for the Okanogan Conservation District. The Okanogan Conservation District Office and jurisdiction do not have any differing issues or levels of risk associated with this hazard than the City of Okanogan or Okanogan, respectively. Refer to the Earthquake Hazards sections of the City of Okanogan and Okanogan County Annexes for more information.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	5 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

There are no recorded occurrences of earthquakes significantly impacting the Okanogan Conservation District. The Okanogan Conservation District (including both assets and the service area) have the same probability of experiencing an earthquake as the county and will be subjected to the same ground shaking intensity as the City of Okanogan. Refer to those two sections for more information about earthquakes.

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions in the Methow Valley have a slightly higher probability of experiencing an earthquake than those in the Okanogan River valley or on the eastern border of the County (10-15% probability versus 6-10% probability); however, no specific jurisdiction has more risk than another or than the County overall within these areas.¹⁴⁰

IMPACTS AND VALUE OF RESOURCES AT RISK

The building occupied by the Okanogan Conservation District was built in 1992 and has wood or steel framed exterior walls. Furniture and cabinets in the office are not secured with earthquake straps, therefore a significant quake could put staff at risk from falling objects. Power and internet failures related to an earthquake would interrupt district operations until these services could be restored.

The CD office building, unsecured furniture and fixtures within the building, and people occupying the building are all at risk in the event of an earthquake. Although it is unlikely that the building will be damaged, unsecured fixtures and furniture could be toppled and result in injuries to the occupants of the building.

LANDSLIDE HAZARDS

Determined by representatives of the District, the following table includes landslide hazard ratings for the Okanogan Conservation District. Refer to the Landslide Hazards sections of the City of Okanogan and Okanogan County Annexes for more information about landslide hazards that could affect the District office and jurisdiction, respectively.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

¹⁴⁰ USGS. 2008 United States National Seismic Hazard Maps. U.S. Geological Survey. U.S. Department of Interior. Available online at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>. October 2009.

There is a moderate probability that a landslide will occur within the Okanogan Conservation District. The District is in a relatively flat location and is at less risk from landslide than other areas of Okanogan County with steep slopes. However, the District may be involved in any cleanup efforts and slope stabilization projects following a landslide event in Okanogan County.

The CD office, or assets stored at the office, are not located in or adjacent to a landslide hazard area so it is highly unlikely that CD assets will be directly affected by a landslide. Conversely, as most of the District's project areas concern private landowners, landslide mitigation work performed by or supported by the district will likely be focused on landslide risk areas that are adjacent to private property. Although the District will not likely be working in the steeped terrain in the county, future work will concern the stabilization of slopes and rehabilitation of fire scars and other areas affected by wildfire that pose a direct landslide threat to homes and other property.

IMPACTS AND VALUE OF RESOURCES AT RISK

CONSERVATION DISTRICT ASSETS

Due to its location is a relatively flat area within the City of Okanogan, the District office has a very low risk of being directly impacted by a landslide. Landslides have the potential to impact the District's functions by preventing staff from reaching the office or from reaching cooperators in the case of road closures. Power and internet failures related to landslides damaging infrastructure away from the office would interrupt district operations until these services could be restored.

CONSERVATION DISTRICT PROJECT AREAS

The impacts from landslides in CD project areas are the same as those described for the county. Refer to the Landslides Hazards section of the Okanogan County Annex for more information. As stated above, lives and property that are within or adjacent to landslide hazard areas within the CD's jurisdiction are at risk to landslides. These assets/values are not owned by the conservation district; refer to the landslides hazard sections of the other annexes in this plan for more information about the values of resources at risk to landslide activity in the county.

SEVERE WEATHER HAZARDS

Determined by representatives of the District, the following table includes severe weather hazard ratings for the Okanogan Conservation District. Refer to the Severe Weather Hazards sections of the City of Okanogan and Okanogan County Annexes for more information about severe weather hazards that could affect the District office and jurisdiction, respectively.

The Okanogan Conservation District office does not have any differing levels of risk associated with this hazard from the City of Okanogan and the risk associated with the District's jurisdiction is the same as the County. The probability of a severe weather event affecting the Okanogan Conservation District is high; the impacts from the most severe events are usually widespread and can be moderate to severe in magnitude.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	4 – Highly Likely	90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year
Overall Significance	11 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

IMPACTS AND VALUE OF RESOURCES AT RISK

CONSERVATION DISTRICT ASSETS

The District’s office building and vehicles in Okanogan may be at risk from high wind events, hail damage, or significant snow accumulations. Severe weather has the potential to impact the District’s functions by preventing staff from reaching the office or from reaching cooperators in the case of road closures. Power and internet failures related to severe weather would interrupt district operations until these services could be restored.

CONSERVATION DISTRICT PROJECT AREAS

The impacts from severe weather in CD project areas are the same as those described for the county. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information.

The most significant impacts from severe weather in CD project areas include those related to heavy precipitation or runoff that result in flooding and/or landslides. Some of the work that the CD performs is related to slope stabilization in burn scars. The complete loss of vegetative cover and damage to soils by intense wildfire creates conditions where water is shed rapidly in burn scars. This can result in damaging flash floods and mudslides/landslides that threaten both lives and property. As stated previously, the at-risk assets/values in CD project areas are not owned by the conservation district; refer to the severe weather hazard sections of the other annexes in this plan for more information about the values of resources at risk to severe weather events in the county.

WILDLAND FIRE HAZARDS

Determined by representatives of the District, the following table includes wildland fire hazard ratings for the Okanogan Conservation District. Refer to the Wildland Fire Hazards sections of the City of Okanogan and Okanogan County Annexes for more information about wildland fire hazards that could affect the District office and jurisdiction, respectively.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	4 – Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events	4 – Highly Likely	90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year
Overall Significance	12 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

As the Okanogan Conservation District office is located 1 mile southwest of downtown Okanogan, the Wildland Fire Hazards section of the City of Okanogan Annex should be referenced for a more detailed analysis of risk and hazard areas in and around the city.

The District’s jurisdiction does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. However, the District would be heavily involved in landscape rehabilitation, erosion control, and agricultural infrastructure recovery following a wildland fire. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for a more detailed analysis of wildfire risk and wildfire hazards.

PROBABILITY OF FUTURE OCCURRENCE

CONSERVATION DISTRICT ASSETS

The probability that the Okanogan CD office and assets will be affected by future wildfires is the same as the City of Okanogan (medium). Refer to the wildfire section of the City of Okanogan Annex for more information.

CONSERVATION DISTRICT PROJECT AREAS

As the conservation district covers most of Okanogan County, the probability that wildfires will affect the district in the future is the same as what was assigned to the county (high). Refer to the wildland fire section of the Okanogan County Annex for more information.

IMPACTS OF EVENTS

CONSERVATION DISTRICT ASSETS

As the CD office and other assets are located within the City of Okanogan, the potential impacts from a wildfire that were described for the city also apply to the Okanogan CD. All fires burning within or in proximity to the city pose a threat to lives and property. Although it is highly unlikely that the building or assets will be directly threatened by wildfire, fires burning near the city could have indirect impacts on CD employees and residents in the city. Refer to the Wildland Fire Hazards section of both the City of Okanogan and Okanogan County Annexes for more detailed analysis of wildfire risk and hazard areas.

CONSERVATION DISTRICT PROJECT AREAS

As the conservation district covers most of Okanogan County, the wildfire impacts described in the Wildland Fire Hazards section of the Okanogan County annex also apply to the Okanogan CD. Even though the impacts from wildfire within the district do not affect property owned by the Okanogan CD, the CD will be heavily involved in the recovery and rehabilitation of natural resources (including soils, waterways, vegetative cover, and agriculture) that have been damaged or destroyed by wildfire. Refer to the wildland fire section of the Okanogan County Annex for more information.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Okanogan would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

CONSERVATION DISTRICT ASSETS

The Conservation District office in Okanogan has a low risk of being directly impacted by wildland fire. Wildfire has the potential to impact the District's functions by forcing staff to evacuate their homes, and/or preventing staff from reaching the office or from reaching cooperators in the case of road closures. Power and internet failures related to wildfire would interrupt district operations until these services could be restored.

CONSERVATION DISTRICT PROJECT AREAS

The impacts from wildland fire in CD project areas are the same as those described for the county. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information.

The most significant impacts in CD project areas from wildfire include those that concern severe natural resource damage and post-fire hazards that threaten life and property. Some of the work that the CD performs is related to post-wildfire rehabilitation which often concerns slope stabilization in burn scars. The complete loss of vegetative cover and damage to soils within burn scars often produces conditions that are conducive to high levels of runoff (from either heavy precipitation or rapid snowmelt). This can result in damaging flash floods and mudslides/landslides that threaten both life and property. The CD assists landowners with mitigation efforts that reduce risk related to post-wildfire hazards, including slope failure. As stated previously, the at-risk assets/values in CD project areas are not owned by the conservation district; refer to the wildland fire hazard sections of the other annexes in this plan for more information about the values of resources at risk to severe weather events in the county.

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that the Okanogan Conservation District will be affected by volcanic activity in a similar manner as the rest of the county. Determined by representatives of the District, the following

table includes volcano hazard ratings for the Okanogan Conservation District. Refer to the Volcano Hazards sections of the City of Okanogan and Okanogan County Annexes for more information about volcano hazards that could affect the District office and jurisdiction, respectively.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	5 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area

As the Okanogan Conservation District office is located 1 mile southwest of downtown Okanogan, risk associated with volcanic activity is the same as what was described for the City of Okanogan. Additionally, the District’s jurisdiction does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. In response to volcanic activity, the District could be heavily involved in recovery efforts that concern natural resource damage and hazards that threaten life and property.

PROBABILITY OF FUTURE OCCURRENCE

CONSERVATION DISTRICT ASSETS

As it is located within Okanogan city limits, the Okanogan Conservation District office has the same probability of being exposed to volcanic hazards as the City of Okanogan. Given the frequency of volcanic eruptions in North America, it is unlikely that Conservation District assets will be affected by volcanic hazards.

CONSERVATION DISTRICT PROJECT AREAS

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that falls in different parts of the county. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

CONSERVATION DISTRICT ASSETS

The impacts to the Okanogan Conservation District office and assets will be similar to what was described in both the City of Okanogan and Okanogan County Volcano Hazard Annexes. It is unlikely that ashfall will cause structural damage to the office building, but poor air quality and hazardous driving conditions could

pose a risk to employee health and safety. Although ash may not damage vehicles or other District assets, employees will need to clean and perform additional maintenance on vulnerable equipment or assets in order to prevent damage.

CONSERVATION DISTRICT PROJECT AREAS

General impacts to the Okanogan Conservation District are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and seismic activity are expected to have the greatest impact on the towns, communities, and other property owners within the District.

The greatest impacts from ashfall will likely concern natural resources and emergency response. Ashfall will have a significant impact on waterways, agriculture, livestock, and other natural resources in the county, threatening both the health and value of these resources. In the event of an eruption, the Okanogan Conservation District will be heavily involved in the protection and recovery of these resources. Additionally, light ashfall is not expected to cause any major damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents.

VALUES OF RESOURCES AT RISK

CONSERVATION DISTRICT ASSETS

It is unlikely that any assets or resources at the CD office would be damaged beyond repair because of volcanic ashfall. Most assets that are exposed to ash will require cleaning and maintenance while more sensitive equipment, such as electronics or electronic components, may need to be repaired. Volcanic ash will also pose health risks to employees as air quality and driving conditions will be poor.

CONSERVATION DISTRICT PROJECT AREAS

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the Okanogan Conservation District. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

As stated previously, the at-risk assets/values in CD project areas are not owned by the conservation district; however, the CD will likely be recruited by landowners and other entities in the county to assist with natural resource (e.g. water, agriculture, livestock, etc.) protection and recovery. Although a dollar value cannot be assigned to resources, damage resulting from ashfall will have major implications on the local economy and local business/industries related to agriculture, livestock, and other natural resources.

HAZARDOUS MATERIALS HAZARDS

Due to data limitations, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. The Okanogan Conservation District office does not have any differing levels of risk associated with this hazard from the City of Okanogan and the risk associated with the CD's jurisdiction is the same as the County.

Determined by representatives of the District, the following table includes hazardous materials hazard ratings for the Okanogan Conservation District. Refer to the Hazardous Materials Hazards sections of the City of Okanogan and Okanogan County Annexes for more information about hazards related to hazardous materials that could affect the District office and jurisdiction, respectively.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 –Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

PROBABILITY OF FUTURE OCCURRENCE

CONSERVATION DISTRICT ASSETS

Unless hazardous materials are stored or handled at the CD office, it is unlikely that employees will be exposed to a hazardous materials spill or release at the office. Employees could also be affected by a hazardous materials spill or release within or near the City of Okanogan, but this is also unlikely.

CONSERVATION DISTRICT PROJECT AREAS

Given the type of work that CD employees perform within the county it is probable that employees could be exposed to hazardous materials while evaluating or performing work on private property. For example, it is common for hazardous materials, such as fuels, fertilizers, pesticides, etc., to be stored on farms in the county. Other than the possibility of exposure to hazardous materials via storage facilities (e.g. fuel tanks) or application processes (e.g. fertilization) on private property, probability of exposure to the release of hazardous materials is no different for the CD than it is for the County.

IMPACTS OF EVENTS

CONSERVATION DISTRICT ASSETS

It is unlikely that the CD office will be directly affected by the release of hazardous materials, but employees and other office operations could be indirectly affected by a spill in the City of Okanogan or elsewhere in the county.

CONSERVATION DISTRICT PROJECT AREAS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUE OF RESOURCES AT RISK

CONSERVATION DISTRICT ASSETS

It is unlikely that the CD office will be directly affected by the release of hazardous materials into the environment. Other than the health of employees at the office, there are very few resources, if any, that would be at risk to an incident involving hazardous materials.

CONSERVATION DISTRICT PROJECT AREAS

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified, other costs could include medical treatment for people have been exposed to hazardous materials, environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

As stated previously, the at-risk assets/values in CD project areas are not owned by the conservation district; however, the CD could be recruited by landowners and other entities in the county to assist with natural resource (e.g. water, agriculture, livestock, etc.) protection and recovery. Although a total dollar value cannot be assigned to the natural resources at risk to a hazardous materials incident, some level of natural resource damage should be expected.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the Okanogan Conservation District. Therefore, the following table, which is representative of the CD, displays the pandemic hazard ratings that were selected by the Planning Team for Okanogan County. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

The CD has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The CD has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to both the CD; virus transmission and mitigation efforts will need to be addressed with employees at the CD office and in the field where they are interacting with county residents. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for the City of Okanogan was 54 (5.2% of total county cases) and the virus had caused one death (7.7% of total deaths in the county). For the entire county, there were 1,042 total cases and 13 deaths recorded by that same date.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the City of Okanogan. Nationwide, the pandemic will have resulted in hundreds of thousands of deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

CITY OF OMAK ANNEX

FLOOD HAZARDS

Determined by representatives of the city, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the City of Omak. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the City of Omak.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

Dam failure hazard ratings for the City of Omak.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	5 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

RIVERINE FLOODING

The city of Omak is located on the west side of the Okanogan River. Even though the population center has residences, commercial, industrial, and agricultural areas located near the river’s edge, the community has a minimal number of properties that are within the 100-year flood zone. This is largely due to levees (in Omak only) and the steeper banks along this stretch of the river.

Floods in the area are the result of two different types of weather events: rain-on-snow and thunderstorms. Rain-on-snow events that affect Omak occur when significant snowpack exists in the

upper reaches of the foothills and beyond in the Okanogan and Wenatchee National Forest. Warm rains falling on the snowpack result in a significantly increased rate of snowmelt. Often this melting occurs while the ground is frozen and the water cannot be absorbed into the soil, resulting in increased overland flows. Flood waters recede slowly as rain-on-snow weather events tend to last for several days.

Low velocity flooding occurs in several of the nearby tributaries almost annually during the spring runoff period. The main tributaries that empty into the Okanogan River within or near Omak include Salmon Creek and Omak Creek. Rural residences, ranches, farms, and roadways located near these smaller waterways may be at significant flood risk. The onset of flooding in the smaller drainages can range from extremely slow to very fast. This variability depends on the cause of flooding and other factors such as rainfall intensity, the areas receiving the rain, temperature, and the condition of the soil. Floods that occur quickly are usually caused by thunderstorms, while floods that occur more slowly are often the result of moderate, but prolonged rainfall, snowmelt, or a combination of both. In the case of intensive rainfall immediately above developed areas, the onset of flooding may occur in a matter of minutes.

Soils with low permeability and sparse vegetation combine to foster flash flooding when intense thunderstorms hit the Omak area. Flash floods from thunderstorms do not occur as frequently as those from general rain and snowmelt conditions but they can be more severe. The possibility for injury and death from flash floods is heightened because they occur very rapidly, and they are so uncommon that people do not recognize the potential danger.

Warm weather or rain after a heavy snowfall is responsible for high flows in the Okanogan River. A high level of sediment is prevalent during periods of intense runoff. This sediment tends to cause a deteriorating condition in streambeds and channels through deposition. Natural obstructions to flood waters include trees, brush, and other vegetation along the stream banks in the floodplain area. Considerable debris is allowed to accumulate in these channels, plugging culverts and bridges at several locations throughout the County.

DAM FAILURE

Omak is located on the Okanogan River but there are no high impact dams located near the city. The closest high impact dams are those located near Conconully, but the confluence of Salmon Creek and the Okanogan River is downstream from Omak. There are at least five high-impact dams located upstream from Omak, but the closest one is at least 20 miles away from the city and only one of them, Zosel Dam, is on the Okanogan River.

The failure of a dam could result in the release of a relatively large volume of water, especially if its purpose is water retention (i.e. a reservoir or impoundment), and cause sedimentation and erosion. Flood waters carrying sediment, which builds up behind a dam over time, follow natural and man-made drainage features after being released by a dam failure. Sediment deposition and erosion are common in the paths/drainages that flood waters follow which can cause extensive damage to both the natural environment and human development. In general, the damage will be the greatest at the point of release (at the dam) and more subtle downstream, especially if flood waters enter a larger river system or water body with a higher carrying capacity. Upon entering a larger river or larger body of water, flood waters

lose momentum and disperse. The most notable change downstream may be rising water levels, which could approach flood stage, especially if a large volume of water was released rapidly by the failure.

Once the impoundment or reservoir is drained, flood waters downstream from the dam will recede and resemble pre-failure flows levels. The most significant changes will be above the dam where water was impounded. After the dam failure, water levels could resemble a natural flow-pattern which was altered when the dam was constructed. Water levels above the dam will be permanently reduced unless the dam is rebuilt or replaced.

PROBABILITY OF FUTURE OCCURRENCE

RIVERINE FLOODING

The probability of flood events occurring in Omak is low to moderate. Low magnitude flood events can be expected several times each year. However, due to the levee and drainage infrastructure, the impacts of these events are slight and will usually amount to minor and temporary traffic issues. Larger magnitude and high impact flood events have occurred but are not likely in any given year. These types of flood events have the highest probability of occurrence in the winter or early spring in Omak. Minor flash floods are common on the numerous small tributaries feeding the Okanogan River near the community but are not likely to have an impact on the Okanogan River channel within the city center.

In 1979, 14,000 lineal feet of levee (7,700 feet on the west bank and 6,400 feet on the east bank) were completed along the Okanogan River through Omak. These levees provide 100-year flood protection with three feet of freeboard. Federal expenditures on this project totaled \$2,231,030 while local cooperation costs were estimated at \$260,000.

DAM FAILURE

Given the low number of high-risk dams located upstream, the City of Omak, which is located along the Okanogan River, is at low risk to a dam failure. The only high-impact dam located upstream on the Okanogan River is the Zosel Dam in Oroville. Although Osoyoos Lake is behind Zosel Dam, which has partially failed in the mid-1970's, there are more than 40 miles of Okanogan River between Omak and the Zosel Dam which should effectively buffer the sudden release of water resulting from a failure. There are several other high-impact dams located on tributaries to the Okanogan River, but they are also far from Omak and are a component of reservoirs or impoundments that are relatively small.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

The potential impacts from flooding in Omak are very similar to the impacts described for Okanogan County as a whole. First responders and other volunteers aiding with emergency flood control or cleanup efforts are potentially at risk of injury due to accidents or possibly exposure to contaminated water. Although unlikely, the city's water supply could be affected by contaminated flood waters entering the groundwater supply. Refer to Figure 64 for a map of NFIP flood zones in the City of Omak.

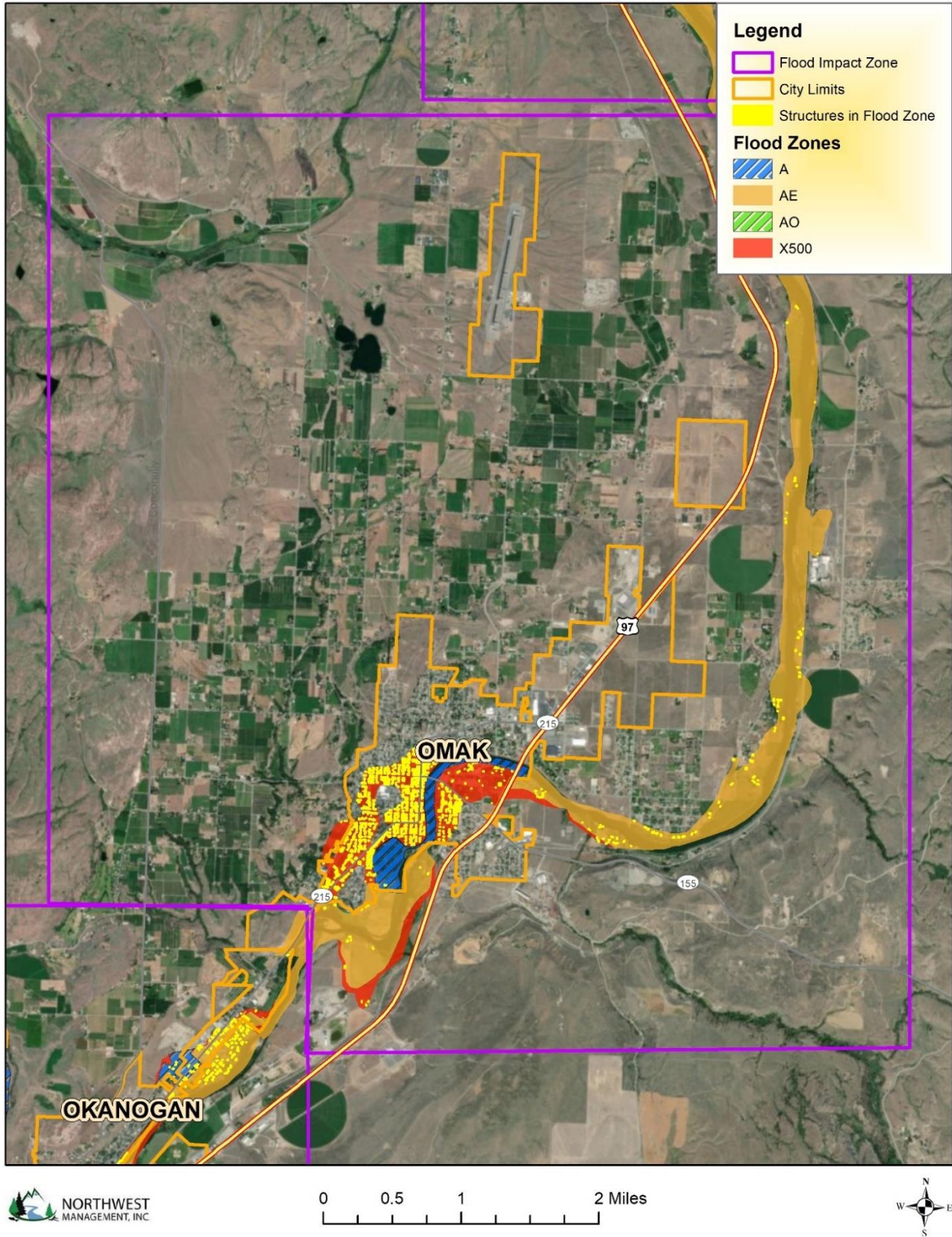


Figure 64) FEMA National Flood Insurance Program Flood Zone map of Omak, WA. Refer to Table 102 (below) for definitions of the NFIP flood zones identified on the map. Note: Okanogan County regulatory flood maps are currently being updated; the final drafts will be available by winter 2023/2024.

Table 102) Definitions of NFIP flood zones identified in Okanogan County, WA.

ZONE	FLOOD TYPE	DESCRIPTION
A	100-Year	High Risk: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	100-Year	High Risk: Areas subject to a one percent or greater annual chance of flooding in any given year. Base flood elevations are shown as derived from detailed hydraulic analyses (Zone AE is used on new and revised maps in place of Zones A1-A30)
AO	100-Year	High Risk: River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
X500	500-Year	Low to Moderate Risk: Areas of moderate flood hazard from the principal source of flood in the area, determined to be within the limits of one percent and 0.2 percent annual chance floodplain. (Shaded Zone X is used on new and revised maps in place of Zone B.)

The major impacts from flooding in the Omak area are the restricted use of several streets, highways, railroad lines, commercial, industrial, and residential areas. There are numerous bridge and culvert crossings over both the Okanogan River and several of the tributaries and irrigation canals throughout their extents within the cities and the surrounding area.

The availability of food and other supplies is not likely to be impacted or interrupted by a flood event. Furthermore, the delivery of community services such as postal services, health care, law enforcement, and emergency response is also not likely to be impacted by flood events in Omak. While individual homes and businesses may incur damages as a result of a flood, the economy of the community will not be impacted by this type of hazard.

Environmental damages resulting from a flood event are also unlikely. The Okanogan River occupies a relatively wide floodplain except for a short segment that has been channeled through the community. Scouring and erosion along the banks of the stream along this narrow section is possible, but due to grass and other vegetation, these impacts will most likely be minimal and localized. Contamination of the riparian area by floodwaters containing chemicals or other pollutants is a possibility but is more likely to be realized in the surrounding areas than within the community due to the hydrologic profile of the floodplain.

DAM FAILURE

There are only a few high impact dams upstream from the City of Omak, with the closest dam located more than 20 miles away, so it is unlikely that a dam failure will have a direct impact on the city. However, there could be indirect consequences that result from a dam failure which would largely be related to the economy. For example, direct economic consequences include the costs of repairing damage and replacing lost items while indirect economic consequences include the loss of jobs, the loss of sales, and the cost of securing alternative space for residential or business purposes.

Economic impacts in surrounding areas, especially those close to the dam failure, may not be limited to assets in the inundation area but may extend to infrastructure and resources that serve a much broader area, including Omak. In addition to direct damage from dam failure, economic impacts include the amount of time required to repair or replace and reopen businesses, governmental and nonprofit agencies, and industrial facilities damaged by the dam failure.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

The following table summarizes the number of structures, number of parcels, number of improvements made to those properties, and total and average value of improvements in the 100-year and 500-year flood zones within the City of Omak.

Omak	No. Structures	No. Parcels	No. Improv.	Improv. Value	Avg. Improv. Value
100 Yr FZ	114	226	107	\$16,523,000	\$154,421
500 Yr FZ	942	1055	761	\$104,018,600	\$136,687

Although Okanogan County Fire District #3 and the Okanogan County Public Utilities District provide service to areas within the Omak floodplain, they do not have any facilities or assets located within the identified floodplain. Nevertheless, these districts could be impacted due to emergency calls or limited access caused by flooding.

There is very little critical infrastructure for the city of Omak located within the floodplain. All major city and county services, office buildings, emergency response equipment and communications equipment are located outside of the floodplain and are not at direct risk of damage. Additionally, none of the cities' well heads are within the floodplain.

Roads and bridges are the major infrastructural element that is affected by flooding. Alternative routes to all parts of county are limited during most major flood events. Bridges and culverts have been repeatedly compromised by historical flood events causing major long-term damage to road systems.

Local power distribution systems may be compromised when power poles are undermined by flood waters. This is not a common occurrence as most of the power grid is located outside of flood areas.

The City of Okanogan's sewer lagoons are located near the 100-year flood plain but are at a low risk to being compromised. Contamination of the water supply or backup of sewer water into structures could occur if flood waters did overtop the lagoons or the levee walls were damaged.

DAM FAILURE

It is highly unlikely that the City of Omak will be affected by a dam failure. As stated previously, there are only a few high-impact dams that could affect the City of Omak. Because of the distance of these dams from the city, direct impacts from an upstream failure should be negligible. Even if there are indirect economic impacts from a failure it is unlikely that any of those costs will be significant or have a major

impact on Omak’s economy. Specific values could not be totaled as the inundation zones associated with the dams discussed earlier in this section are unknown.

EARTHQUAKE HAZARDS

Determined by representatives of the city, the following table includes earthquake hazard ratings for the City of Omak. Omak does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole; refer to the Earthquake Hazards section of the Okanogan County Annex for more information.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

PROBABILITY OF FUTURE OCCURRENCE

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions in the Methow Valley have a slightly higher probability of experiencing an earthquake than those in the Okanogan River valley or on the eastern border of the County (10-15% probability versus 6-10% probability); however, no specific jurisdiction has more risk than another or than the County overall within these areas.¹⁴¹

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no recorded occurrences of earthquakes significantly impacting the city of Omak; however, some minimal shaking has been felt as a result of larger earthquakes elsewhere.

Unreinforced masonry (URM) structures and unreinforced chimneys of homes will likely be damaged in the event of an earthquake. There are several publicly accessible unreinforced masonry structures in Omak in addition to the numerous homes and other buildings throughout the Cities with unreinforced chimneys. Damaged or collapsed chimneys could result in the secondary hazard of fire. Nonstructural damage caused by falling and swinging objects may be considerable after any magnitude earthquake.

¹⁴¹ USGS. 2008 United States National Seismic Hazard Maps. U.S. Geological Survey. U.S. Department of Interior. Available online at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>. October 2009.

Damage to some older, more fragile bridges and land failure causing minor slides along roadways may isolate some residents.

In Omak, approximately 50 of the downtown structures are unreinforced. These structures were built prior to the inclusion of articles for seismic stability in the Uniform Building Codes in 1972. The number and value of unreinforced masonry homes or homes with masonry chimneys in Omak are unknown but estimated to include at least 100 buildings.

LANDSLIDE HAZARDS

The city of Omak has very low probabilities of experiencing damaging landslides. The few slopes in and around the community are generally less than 20%. While small, low angle slumps may occur on eyebrows of the surrounding rolling hills, these will be infrequent and likely the result of water saturation or a major disturbance such as an earthquake or road construction.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no structures or infrastructure directly at risk from landslides within the city of Omak.

SEVERE WEATHER HAZARDS

Determined by representatives of the city, the following table includes severe weather hazard ratings for the City of Omak. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information about severe weather risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

The city of Omak does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. The probability of a severe weather event occurring in Omak on an annual basis is moderate. However, the impacts to these communities are usually minimal and are the same as those described for Okanogan County as a whole.

IMPACTS AND VALUE OF RESOURCES AT RISK

Winter Storms

It is difficult to estimate the cost of potential winter storm damages to structures and the economy in Omak. Damage to roofs by heavy snow accumulations depends on the moisture content of the snow and the structural characteristics of the buildings. In general, snow in this region tends to have low moisture content because of the low temperatures and arid environment. Frozen water pipes are the most common damage to residential and business structures. Older homes tend to be at a higher risk to frozen water pipes than newer ones. Snow plowing in within the city limits is accomplished by the city's public works department. Private landowners are responsible for maintaining their own driveways or other private roads. Utility supplies are impacted during severe winter storms as power is lost on a regional basis. This has a two-fold impact on residents as not only is power cut to homes and businesses, but primary heating is lost for many residents. Gas furnaces and wood stoves supplement electrical heating, but with wood heating the senior population is at a disadvantage. Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for several days and businesses may not open. Damages are seen in the form of structural repair and loss of economic activity. Okanogan County schools are occasionally closed during and right after a severe winter storm because of cold temperatures and snow-covered roads.

Thunderstorms

Thunderstorms are not likely to be severe enough in Omak to cause significant damages. However, the loss potential from flooding that result from severe thunderstorms could be significant.

Hail

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property within Omak. Homeowners in Omak rarely incur severe damage to structures (roofs); however, hail damage to vehicles is not uncommon. The damage to vehicles is difficult to estimate because the number of vehicles impacted by a specific ice storm is unknown. Additionally, most hail damage records are kept by various insurance agencies.

Windstorms and Tornadoes

It is difficult to estimate potential losses in Omak due to windstorms and tornadoes. Construction throughout the County has been implemented in the presence of high wind events, and therefore, the

community is at a higher level of preparedness to high wind events than many other areas experiencing lower average wind speeds.

We have estimated losses based on wind and tornado damage as follows:

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)
- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 2,283 total parcels with 1,786 improvements in the City of Omak worth almost \$283.2 million. Using the criteria outlined above an estimate of the impact of high winds on the city has been made. The potential wind and tornado impact on improvements values is estimated at approximately \$4.2 million in damage. The estimated damage to roofs (on parcels with improvements) is approximately \$267,900.

Power failure often accompanies severe storms. Prolonged failure, especially during cold winter temperatures can have disastrous effects. All communities should be prepared to deal with power failures. Community shelters equipped with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water.

WILDLAND FIRE HAZARDS

Determined by representatives of the city, the following table includes wildland fire hazard ratings for the City of Omak. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information about wildfire risk in the county.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	7 – Moderate	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

Distribution of Fuels

Most of the neighborhoods in Omak are heavily developed for residential, commercial, or agricultural use. Orchards, livestock pasture, hay, or other crops are grown on nearly every available acre that has access to irrigation water. During the summer and fall, this creates a mosaic of lush green vegetation where there is irrigation and cured sage and grass in areas where there isn't.

Wildland fuels within Omak are fairly limited to ditches, empty lots, and the riverbanks due to extensive urban and agricultural development. The surrounding foothills are vegetated primarily by sagebrush and various lower growing grasses. Sparse ponderosa pine can be found in a few of the nearby draws. The slope rising from the east side of the river near Omak is steep, almost vertical in some places; however, it appears to be nearly solid rock with little soil available for plant growth.

Wildfire potential in the agricultural fields near Omak is high. Farming and ranching activities have the potential to increase the risk of a human-caused ignition. Large expanses of crops, CRP, rangeland or pasture provide areas of continuous fuels that may threaten homes and farmsteads near Omak. Under extreme weather conditions, escaped fires in these fuels could threaten individual homes or the community; however, this type of fire is usually quickly controlled. Clearings and fuel breaks disrupt a slow-moving wildfire enabling suppression before a fire can ignite heavier fuels. High winds increase the rate of fire spread and intensity of crop and rangeland fires. It is imperative that homeowners implement fire mitigation measures to protect their structures and families prior to a wildfire event.

Fire Risk

Wildfire risk in the agricultural landscape is at its highest during late summer and fall when crops are cured, and daily temperatures are at their highest. A wind-driven fire in agricultural fuels or dry native fuel complexes would produce a rapidly advancing, but variable intensity fire. Fires burning in some types of unharvested fields would be expected to burn more intensely with larger flame lengths due to the greater availability of fuels resulting from the higher productivity of the vegetation. Fields enrolled in the CRP or set aside for wildlife habitat can burn very intensely due to an increased amount of fuel build-up from previous years' growth. Fires in these types of fuels are harder to extinguish completely due to the dense duff layer, often leading to hold over fires that may reemerge at a later date causing additional fire starts.

Residents living in Omak have access to the municipal water supply system and public fire hydrants. Outside these areas, development relies on individual, co-op, or multiple-home well systems. Creeks, ponds, and developed drafting areas provide water sources for emergency fire suppression in the rural areas to a limited extent. Irrigation systems are capable of providing additional water supply for suppression equipment on a limited basis. Additional water resources distributed and documented throughout the agricultural landscape are needed to provide water for fire suppression.

Above ground, high voltage transmission lines cross the planning area in many directions in corridors cleared of most vegetation, which provides for a defensible space around the power line infrastructure and may provide a control point for fire suppression, if well maintained. Local public electrical utility lines

are both above and below ground traveling through back yards and along roads and highways. Many of these lines are exposed to damage from falling trees and branches. Power and communications may be cut to some of these during a wildfire event.

Local Fire Protection

The City of Omak Fire Department provides fire protection for the city. The department provides structural fire protection as well as wildland fire protection. All of the Okanogan County fire districts have signed a “Memorandum of Understanding” to assist any of the other districts in the County with fire suppression to the utmost of their abilities.

State lands are the sole responsibility of the Washington Department of Natural Resources (suppression & reciprocal agreements may apply). Federal lands are the sole responsibility of the Federal management agency (reciprocal agreement may apply). Much of the private lands in Okanogan County are within joint jurisdiction between the County fire protection districts and the WA DNR.

The DNR provides wildfire protection during the fire season between April and October with a varying degree of resources available in the early spring and late autumn months. The DNR does not provide structural fire suppression but does provide wildfire protection on non-forested land that threatens DNR-protected lands. The U.S. Forest Service seasonally responds to all wildland fires on their jurisdiction and may also respond to wildland fires on private lands based on a reciprocal agreement with the DNR. The BLM provides wildfire protection on their ownership within Okanogan County and has mutual aid agreements with the DNR for protection of forested land. BLM also does not provide structural fire suppression.

PROBABILITY OF FUTURE OCCURRENCE

The area surrounding Omak utilizes irrigation for landscaping and agricultural crops, which not only helps keep the vegetation green and at lower propensity for ignitions, but also gives firefighters abundant access to water resources for suppression purposes. As crop production slows in the fall, the irrigation pressure tends to taper off, leaving previously lush grasses and other vegetation to dry out and become a potential fire hazard.

The sagebrush and grassland fuels that dominant the area near Omak usually becomes available to burn fairly early in the summer. The growth of a productive orchard takes many years and is, therefore, a long-term investment. The potential loss of these orchards and the surrounding structures to fire would severely damage the local economy as well as change the way of life for many residents.

IMPACTS OF WILDLAND FIRE EVENTS

The potential impacts from a wildfire in Omak are very similar to the impacts described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel. Individual structures, property, and livelihoods could be severely damaged or lost as a result of a fire; however, the community is not likely to suffer severe or long-term economic losses.

Low frequency fires in the shrublands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

Smoke from a nearby wildland fire may impact sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Omak to other communities; thus, travel and commerce may be interrupted.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Omak from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Omak would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that Omak will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county. Determined by representatives of the town, the following table includes volcano hazard ratings for the City of Omak. Refer to the Volcano Hazards section of the Okanogan County Annex for more information about volcano risk in the county.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that could fall on the City of Omak. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

General impacts to the City of Omak are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and seismic activity are expected to have the greatest impact on the small rural cities and communities of Okanogan County.

The greatest impacts from Ashfall will likely concern water quality and emergency response. Ashfall will have a significant impact on the Okanogan River which could affect the four wells that supply drinking water to the city and other water systems. Light ashfall is not expected to cause any major damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the municipality. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the general public.

HAZARDOUS MATERIALS HAZARDS

Due to data limitations, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. Refer to the county section for a more complete analysis of hazardous materials. Determined by representatives of the city, the following table includes hazardous materials hazard ratings for the City of Omak.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

LOCAL EVENT HISTORY

There are 13 cleanup sites on record with the Washington Department of Ecology. There are three sites that are awaiting cleanup, three on which cleanup has started, and seven have been cleaned up and require no further action (Table 103).

Table 103) Hazardous waste clean-up sites in Omak, WA. Sites highlighted in blue are still active. Data is from the Washington State Department of Ecology Cleanup Site Search.

Cleanup Site ID	Site Name	Site Status	Site Rank
3986	Brook Mine	Awaiting Cleanup	2 - Moderate-High Risk
11392	Taplett Farms	Awaiting Cleanup	4 - Low-Moderate Risk
12422	Choice Automotive	Awaiting Cleanup	NA
6263	Chevron Omak	Cleanup Started	NA
4913	Coca Cola Distribution Co	Cleanup Started	2 - Moderate-High Risk
5684	Omak Gull 611	Cleanup Started	2 - Moderate-High Risk
872	Johnson Creek Mine	No Further Action	NA
3361	Pogue Flat Mine	No Further Action	NA
4016	North Omak Elementary	No Further Action	NA
4193	APPLE PROCESSING US BANCORP	No Further Action	NA
4751	US West Omak Business Office	No Further Action	NA
4091	TURNER PESTICIDE DUMP	No Further Action	NA
4910	UNOCAL 0855	No Further Action	2 - Moderate-High Risk

PROBABILITY OF FUTURE OCCURRENCE

The probability of a large release of hazardous materials into the environment is low as there are no major processing facilities or transportation infrastructure that are set up specifically for hazardous materials. Operations that are most likely to be associated with larger spills or releases of hazardous materials into the environment include mining, farming, and fuel stations. The probability of the release of small quantities of hazardous substances is low to moderate; typically, releases become less likely as the quantity or volume released increases.

IMPACTS OF HAZARDOUS MATERIALS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUES OF RESOURCES AT RISK

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified, other costs could include medical treatment for people have been exposed to hazardous materials,

environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the City of Omak. Therefore, the following table, which is representative of the City of Omak, displays the pandemic hazard ratings that were selected by the Planning Team for Okanogan County. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

The city has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The city has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to the City of Omak. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for the City of Omak was 164 (15.7% of total county cases) and the virus had caused one death (7.7% of total deaths in the county). For the entire county, there were 1,042 total cases and 13 deaths recorded by that same date.

There is one hospital in the City of Omak. Mid-Valley Hospital is located at the southern end of the city near the Okanogan River. According to the Washington State Hospital Association there are 25 general

hospital beds available for patient care. Visit <https://www.mvhealth.org/www.mvhealth.org> for more information about Mid-Valley Hospital's services, capabilities, and response to COVID-19.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the City of Omak. Nationwide, the pandemic will have resulted in hundreds of thousands of deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

CITY OF TONASKET ANNEX

FLOOD HAZARDS

Determined by representatives of the city, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the City of Tonasket. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the City of Tonasket.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	9 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

Dam failure hazard ratings for the City of Tonasket.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

RIVERINE FLOODING

The majority of the Tonasket community is located along the east bank of the Okanogan River. Bonaparte Creek, a tributary to the Okanogan River, runs along the south side of town. The Tonasket Flood Impact Zone is the area within the city limits between the Cascade and Columbia River railway and the Okanogan riverbank and is a mixture of residential, commercial, and agricultural.

In addition to the potential flood hazard of the Okanogan River, Bonaparte Creek and, to a lesser extent, Siwash Creek, which drain several small tributaries out of the foothills to the east, empty into the Okanogan River on the south and north ends of Tonasket. Although the Bonaparte Creek does not have

FEMA identified floodplain, a flash flood or blockage could cause the stream to breach its banks resulting in severe damage to many homes and businesses in Tonasket. This creek has historically been prone to flash flooding due to low soil permeability upstream; however, this type of event does not occur very frequently in Okanogan County. There are currently no flood control features on Bonaparte Creek.

High water events on the Okanogan River are typically the result of rain-on-snow events or heavy spring runoff. Warm weather or rain after a heavy snowfall is called a rain-on-snow event. Warm rains falling on the snowpack result in a significantly increased rate of snowmelt. Often the melting occurs when the ground is frozen and the water cannot be absorbed fast enough, resulting in increased overland flows. Flood waters recede slowly as the weather events tend to last for several days. The Similkameen River, which as the largest tributary contributes about 70% of the water in the Okanogan River, has the most immediate impact on the Okanogan River water levels near Tonasket.

There is one main bridge across the Okanogan River at Tonasket. Bridge abutments are notorious for causing ice jams and debris blockage during flood events. Due to the bridge's location near the middle of town, a blockage could cause water to back up into the Riverview Trailer Court and adjacent farm ground.

Thunderstorms are localized summer events that can also have an impact on the flooding potential of Tonasket. Flooding due to a thunderstorm can occur rapidly, overwhelming the carrying capacity of channels or the cities storm drainage system in a short time. The duration of this type of flooding tends to be a matter of hours and is usually associated with localized thunderstorms in which the ground cannot absorb moisture as quickly as it is coming down. Bonaparte Creek, Siwash Creek, and other smaller channels are generally more prone to the effects of flooding during a thunderstorm than a river system.

Several streets and road shoulders could potentially erode under flood conditions near Tonasket. Many secondary routes are not paved, which results in gravel washing down-slope potentially clogging drainage systems or directing water to places that were not intended.

Rural residences, ranches, farms, and roadways located near smaller waterways may be at significant flood risk. The onset of flooding in the smaller drainages can range from extremely slow to very fast. This variability depends on the cause of flooding and other factors such as rainfall intensity, the areas receiving the rain, temperature, and the condition of the soil. Floods that occur quickly are usually caused by thunderstorms, while floods that occur more slowly are often the result of moderate, but prolonged rainfall, snowmelt, or a combination of both. In the case of intense rainfall immediately above developed areas, the onset of flooding may occur in a matter of minutes.

A high level of sediment is prevalent during periods of intense runoff. This sediment tends to cause a deteriorating condition in streambeds and channels through deposition. Natural obstructions to flood waters include trees, brush, and other vegetation along the stream banks in the floodplain area. Considerable debris has been allowed to accumulate in these channels, plugging culverts and bridges at several locations throughout the county.

DAM FAILURE

Tonasket is located on the Okanogan River and it is downstream from several dams that are categorized as high impact. Of those high impact dams, Zosel dam is likely the only one that could affect Tonasket given the volume of water stored in Lake Osoyoos. However, Zosel dam is at least 20 miles upstream from Tonasket so the overall risk is low. The closest dam to Tonasket that has a Downstream Hazard risk rating is Spectacle Lake Dike. Spectacle Lake is only a little more than 10 miles upstream from Tonasket; however, it has a low Downstream risk rating as a failure would not threaten any lives.

The failure of a dam could result in the release of a relatively large volume of water, especially if its purpose is water retention (i.e. a reservoir or impoundment), and cause sedimentation and erosion. Flood waters carrying sediment, which builds up behind a dam over time, follow natural and man-made drainage features after being released by a dam failure. Sediment deposition and erosion are common in the paths/drainages that flood waters follow which can cause extensive damage to both the natural environment and human development. In general, the damage will be the greatest at the point of release (at the dam) and more subtle downstream, especially if flood waters enter a larger river system or water body with a higher carrying capacity. Upon entering a larger river or larger body of water, flood waters lose momentum and disperse. The most notable change downstream may be rising water levels, which could approach flood stage, especially if a large volume of water were released rapidly by the failure.

Once the impoundment or reservoir is drained, flood waters downstream from the dam will recede and resemble pre-failure flows levels. The most significant changes will be above the dam where water was impounded. After the dam failure, water levels could resemble a natural flow-pattern which was altered when the dam was constructed. Water levels above the dam will be permanently reduced unless the dam is rebuilt or replaced.

PROBABILITY OF FUTURE OCCURRENCE

RIVERINE FLOODING

The probability of flood events occurring in Tonasket is high. Low magnitude flood events can be expected several times each year. However, due to the flat topography and drainage infrastructure, the impacts of these events are slight and will usually amount to minor and temporary traffic issues. Larger magnitude and high impact flood events have occurred but are not likely in any given year. These types of flood events have the highest probability of occurrence in the winter or early spring in Tonasket as a result of rain-on-snow events or rapid runoff. Minor flash floods are also common on Okanogan River and several of the small tributaries feeding the main channel near the community.

DAM FAILURE

Given the low number of high-risk dams located upstream, the City of Tonasket is at low risk to a dam failure. The only high-impact dam located upstream on the Okanogan River is the Zosel Dam in Oroville. Although Osoyoos Lake is behind Zosel Dam, which has partially failed in the mid-1970's, there is approximately 20 miles of Okanogan River between Tonasket and the Zosel Dam which should, at the very least, buffer the sudden release of water resulting from a failure. There are several other high-impact dams located on tributaries to the Okanogan River, but they are either associated with small

impoundments or they are located at least 20 miles from Tonasket so it is unlikely that they will have a significant impact on the city if they were to fail. Spectacle Lake Dike is the closest dam to Tonasket that has a Downstream Hazard rating. However, it is more than 10 miles from the city and it has been given a low risk rating as no lives would be threatened if it were to fail.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

The potential impacts from flooding in Tonasket are very similar to the impacts described for Okanogan County as a whole. First responders and other volunteers aiding with emergency flood control or cleanup efforts are potentially at risk of injury due to accidents or possibly exposure to contaminated water. Although unlikely, the city's water supply could be affected by contaminated flood waters entering the groundwater supply. Refer to Figure 65 for a map of NFIP flood zones in the City of Tonasket.

The major impacts from flooding in Tonasket are the restricted use of several streets, commercial, and residential areas. There are numerous bridge and culvert crossings over the Okanogan River and Bonaparte creek throughout the surrounding area.

The availability of food and other supplies is not likely to be impacted or interrupted by a flood event. Furthermore, the delivery of community services such as postal services, health care, law enforcement, and emergency response is also not likely to be impacted by flood events in Tonasket except under extreme (100 year plus floods) circumstances. While individual homes and businesses may incur damages as a result of a flood, the economy of the community will not be impacted by this type of hazard.

Table 104) Definitions of NFIP flood zones identified in Okanogan County, WA.

ZONE	FLOOD TYPE	DESCRIPTION
A	100-Year	High Risk: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	100-Year	High Risk: Areas subject to a one percent or greater annual chance of flooding in any given year. Base flood elevations are shown as derived from detailed hydraulic analyses (Zone AE is used on new and revised maps in place of Zones A1-A30)
AO	100-Year	High Risk: River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
X500	500-Year	Low to Moderate Risk: Areas of moderate flood hazard from the principal source of flood in the area, determined to be within the limits of one percent and 0.2 percent annual chance floodplain. (Shaded Zone X is used on new and revised maps in place of Zone B.)

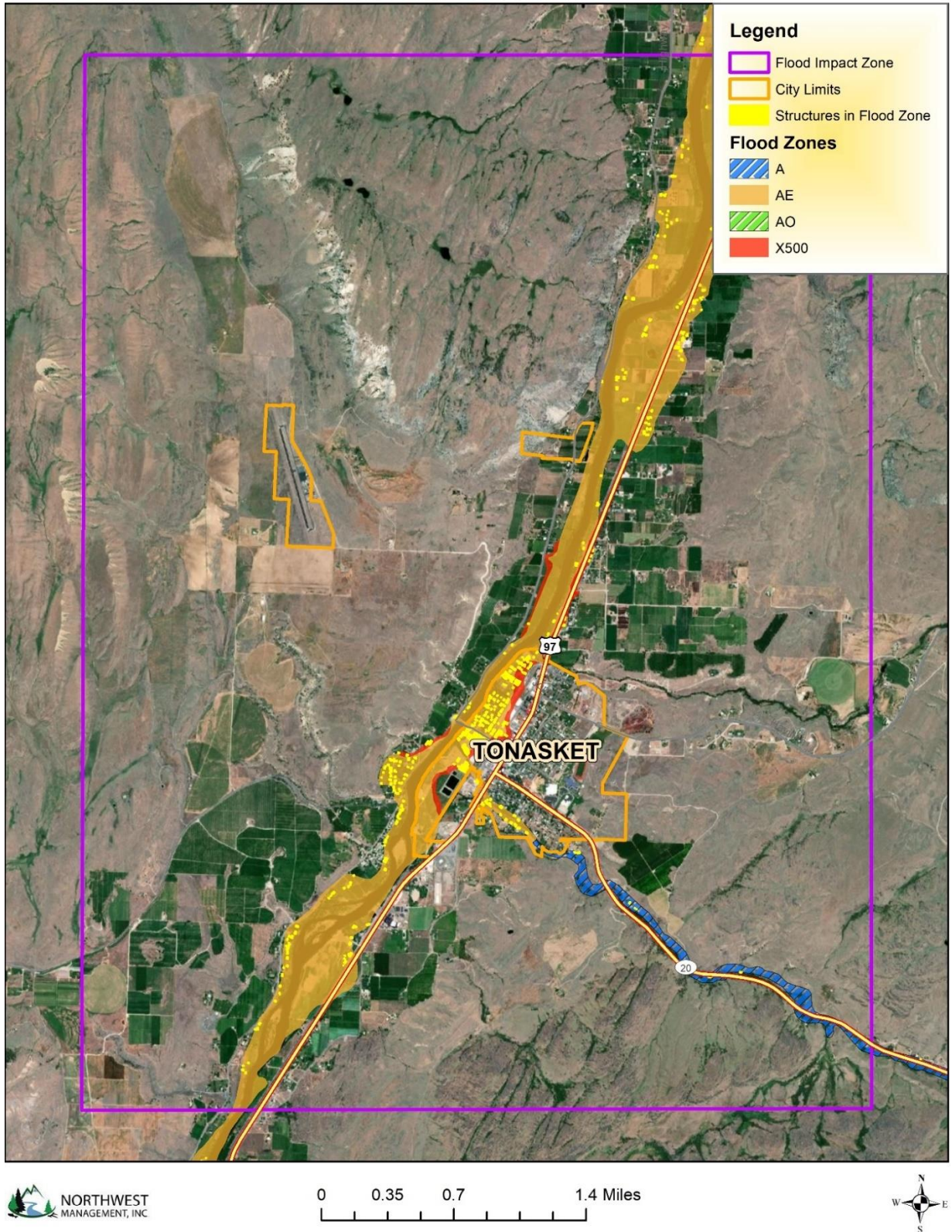


Figure 65) FEMA National Flood Insurance Program Flood Zone map of Tonasket, WA. Refer to Table 104 (above) for definitions of the NFIP flood zones identified on the map. *Note: Okanogan County regulatory flood maps are currently being updated; the final drafts will be available by winter 2023/2024.*

Environmental damages resulting from a flood event are also unlikely. Scouring and erosion along the banks of the Okanogan River and Bonaparte Creek in the Tonasket area is possible, but due to grass and other vegetation on the stream banks, these impacts will most likely be minimal and localized. Contamination of the riparian area by floodwaters containing chemicals or other pollutants is also a possibility.

DAM FAILURE

There are only a few high impact dams upstream from the City of Tonasket; with the closest dam located more than 20 miles away It is unlikely that a dam failure will have any significant impacts on the city. If enough water is released by a dam failure, the level of the Okanogan River may rise temporarily which could be problematic if water levels are already high. Additionally, there could be indirect consequences that result from a dam failure which would largely be related to the economy. For example, direct economic consequences include the costs of repairing damage and replacing lost items while indirect economic consequences include the loss of jobs, the loss of sales, and the cost of securing alternative space for residential or business purposes.

Economic impacts in surrounding areas, especially those close to the dam failure, may not be limited to assets in the inundation area but may extend to infrastructure and resources that serve a much broader area, including Tonasket. In addition to direct damage from dam failure, economic impacts include the amount of time required to repair or replace and reopen businesses, governmental and nonprofit agencies, and industrial facilities damaged by the dam failure.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

The following table summarizes the number of structures, number of parcels, number of improvements made to those properties, and total and average value of improvements in the 100-year and 500-year flood zones within the Town of Tonasket.

Tonasket	No. Structures	No. Parcels	No. Improv.	Improv. Value	Avg. Improv. Value
100 Yr FZ	350	449	297	\$23,630,100	\$79,563
500 Yr FZ	389	509	476	\$42,313,500	\$88,894

Although Okanogan County Fire District #4 and the Okanogan County Public Utilities District provide service to areas within the Tonasket floodplain, they do not have any critical facilities or assets located within the identified floodplain. Nevertheless, these districts could be impacted due to emergency response calls or limited access caused by flooding.

DAM FAILURE

It is highly unlikely that the City of Tonasket will be affected by a dam failure. As stated previously, there are only a few high-impact dams that could affect the city. Because of the distance of these dams from the city, direct impacts from an upstream failure should be negligible. Even if there are indirect economic impacts from a failure it is unlikely that any of those costs will be significant or have a major impact on

Tonasket’s economy. Specific values could not be totaled as the inundation zones associated with the dams discussed earlier in this section are unknown.

EARTHQUAKE HAZARDS

Determined by representatives of the city, the following table includes earthquake hazard ratings for the City of Tonasket. Tonasket does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole; refer to the Earthquake Hazards section of the Okanogan County Annex for more information.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	4 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area

PROBABILITY OF FUTURE OCCURRENCE

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions in the Methow Valley have a slightly higher probability of experiencing an earthquake than those in the Okanogan River valley or on the eastern border of the County (10-15% probability versus 6-10% probability); however, no specific jurisdiction has more risk than another or than the County overall within these areas.¹⁴²

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no recorded occurrences of earthquakes significantly impacting the city of Tonasket; however, some minimal shaking has been felt as a result of larger earthquakes elsewhere.

Unreinforced masonry (URM) structures and unreinforced chimneys of homes will likely be damaged in the event of an earthquake. There are several publicly accessible unreinforced masonry structures in Sprague in addition to the numerous homes and other buildings throughout the City with unreinforced chimneys. Damaged or collapsed chimneys could result in the secondary hazard of fire. Nonstructural damage caused by falling and swinging objects may be considerable after any magnitude earthquake.

¹⁴² USGS. 2008 United States National Seismic Hazard Maps. U.S. Geological Survey. U.S. Department of Interior. Available online at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>. October 2009.

Damage to some older, more fragile bridges and land failure causing minor slides along roadways may isolate some residents.

In Tonasket, approximately 26 downtown structures are assumed to be unreinforced masonry. These structures were built prior to the inclusion of articles for seismic stability in the Uniform Building Codes in 1972. The number and value of unreinforced masonry homes or homes with masonry chimneys in Tonasket is unknown but estimated to include at least 20 buildings.

LANDSLIDE HAZARDS

The city of Tonasket has a very low probability of experiencing damaging landslides. The few slopes in and around the community are generally less than 20%. While small, low angle slumps may occur on eyebrows of the surrounding rolling hills, these will be infrequent and likely the result of water saturation or a major disturbance such as an earthquake or road construction.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

IMPACTS AND VALUE OF RESOURCES AT RISK

The community of Tonasket is at a low risk of direct impacts from landslides. There is a moderate risk of landslide activity along the major travel corridors that access these communities, which could hinder response by various fire protection districts (Okanogan County Fire Districts #1, 3, 4, 7, 8, and 15) and public utilities districts (Okanogan County PUD) during emergencies. The impact of landslides on roads and the power supply has and will continue to affect the people living in this area. These impacts have historically been minor, resulting in limited vehicle access or a temporary loss of power.

SEVERE WEATHER HAZARDS

Determined by representatives of the city, the following table includes severe weather hazard ratings for the City of Tonasket. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information about severe weather risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

The city of Tonasket does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. The probability of a severe weather event occurring in Tonasket on an annual basis is high. However, the impacts to the community are usually minimal and are the same as those described for Okanogan County as a whole.

IMPACTS AND VALUE OF RESOURCES AT RISK

Winter Storms

It is difficult to estimate the cost of potential winter storm damages to structures and the economy in Tonasket. Damage to roofs by heavy snow accumulations depends on the moisture content of the snow and the structural characteristics of the buildings. In general, snow in this region tends to have low moisture content because of the low temperatures and arid environment. Additionally, snow rarely accumulates for long periods of time due to regular wind events. Frozen water pipes are the most common damage to residential and business structures. Older homes tend to be at a higher risk to frozen water pipes than newer ones. Snow plowing in within the city limits is accomplished by the city’s public works department. Private landowners are responsible for maintaining their own driveways or other private roads. Utility supplies are impacted during severe winter storms as power is lost on a regional basis. This has a two-fold impact on residents as not only is power cut to homes and businesses, but primary heating is lost for many residents. Gas furnaces and wood stoves supplement electrical heating, but with wood heating the senior population is at a disadvantage. Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for several days and businesses may not open. Damages are seen in the form of structural repair and loss of economic activity. Tonasket schools are occasionally closed during and right after a severe winter storm because of cold temperatures and snow-covered roads.

Thunderstorms

Thunderstorms are not likely to be severe enough in Tonasket to cause significant damages. However, the loss potential from flooding that result from severe thunderstorms could be significant.

Hail

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property within Tonasket. Homeowners in Tonasket rarely incur severe damage to structures (roofs); however, hail damage to vehicles is not uncommon. The damage to vehicles is difficult to estimate because the number of vehicles impacted by a specific ice storm is unknown. Additionally, most hail damage records are kept by various insurance agencies.

Windstorms and Tornadoes

It is difficult to estimate potential losses due to windstorms and tornadoes in Tonasket. Structures have always been constructed throughout the County in the presence of high wind events, and therefore, the community is at a higher level of preparedness to high wind events than many other areas experiencing lower average wind speeds.

We have estimated losses based on wind and tornado damage as follows:

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)
- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 674 total parcels with 468 improvements in the City of Tonasket worth almost \$81 million. Using the criteria outlined above an estimate of the impact of high winds on the city has been made. The potential wind and tornado impact on improvements values is estimated at approximately \$1.2 million in damage. The estimated damage to roofs (on parcels with improvements) is approximately \$70,000.

Power failure often accompanies severe storms. Prolonged failure, especially during cold winter temperatures can have disastrous effects. All communities should be prepared to deal with power failures. Community shelters equipped with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water.

WILDLAND FIRE HAZARDS

Determined by representatives of the city, the following table includes wildland fire hazard ratings for the City of Tonasket. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information about wildfire risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 or 4 – Likely or Highly Likely	Likely: 10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years Highly Likely: 90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year
Overall Significance	9 or 10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

Distribution of Fuels

Wildland fuels within the community of Tonasket is limited to ditches or small bare lots due to the existence of numerous structures and agricultural facilities. The foothills and some non-irrigated areas along Highway 97 tend to be vegetated by sagebrush and lower growing grasses, particularly bunchgrasses. These fuels form a continuous fuel bed with similar fuels on the mid and upper slopes surrounding the valley.

Wildfire potential in the agricultural fields near Tonasket is high. Farming and ranching activities have the potential to increase the risk of a human-caused ignition. Large expanses of crops, rangeland, or pasture provide areas of continuous fuels that may threaten homes and farmsteads near Tonasket. Under extreme weather conditions, escaped fires in these fuels could threaten individual homes or the community; however, this type of fire is usually quickly controlled. Clearings and fuel breaks disrupt a slow moving wildfire enabling suppression before a fire can ignite heavier fuels. High winds increase the rate of fire spread and intensity of crop and rangeland fires. It is imperative that homeowners implement fire mitigation measures to protect their structures and families prior to a wildfire event.

Fire Risk

Residents living in Tonasket have access to the municipal water supply system and public fire hydrants. Outside these areas, development relies on individual, co-op, or multiple-home well systems. Creeks, ponds, and developed drafting areas provide water sources for emergency fire suppression in the rural areas to a limited extent. Irrigation systems are capable of providing additional water supply for suppression equipment on a limited basis. The development of additional water resources distributed and documented throughout the agricultural landscape are needed to assist with fire suppression efforts.

Above ground, high voltage transmission lines cross the planning area in many directions in corridors cleared of most vegetation, which provides for a defensible space around the power line infrastructure and may provide a control point for fire suppression, if well maintained. Local public electrical utility lines are both above and below ground traveling through back yards and along roads and highways. Many of

these lines are exposed to damage from falling trees and branches. Power and communications may be cut to some of these during a wildfire event.

Fire Protection

Okanogan County Fire District #4 protects the community of Tonasket. The fire district provides structural fire protection as well as wildland fire protection. All of the Okanogan County fire districts have signed a “Memorandum of Understanding” to assist any of the other districts in the County with fire suppression to the utmost of their abilities.

State lands are the sole responsibility of the Washington Department of Natural Resources (suppression & reciprocal agreements may apply). Federal lands are the sole responsibility of the Federal management agency (reciprocal agreement may apply). Much of the private lands in Okanogan County are within joint jurisdiction between the County fire protection districts and the WA DNR.

The DNR provides wildfire protection during the fire season between April and October with a varying degree of resources available in the early spring and late autumn months. The DNR does not provide structural fire suppression but does provide wildfire protection on non-forested land that threatens DNR-protected lands. The U.S. Forest Service seasonally responds to all wildland fires on their jurisdiction and may also respond to wildland fires on private lands based on a reciprocal agreement with the DNR. The BLM provides wildfire protection on their ownership within Okanogan County and has mutual aid agreements with the DNR for protection of forested land. BLM also does not provide structural fire suppression.

PROBABILITY OF FUTURE OCCURRENCE

Tonasket allows for irrigation of landscaping and agricultural crops, which not only helps keep the vegetation green and at lower propensity for ignitions, but also gives firefighters abundant access to water resources for suppression purposes.

The sagebrush and grassland fuels that dominant the area around Tonasket usually becomes available to burn fairly early in the summer. The growth of a productive orchard takes many years and is, therefore, a long-term investment. The potential loss of these orchards and the surrounding structures to fire would severely damage the local economy as well as change the way of life for many residents.

IMPACTS OF WILDLAND FIRE EVENTS

The potential impacts from a wildfire in Tonasket are very similar to the impacts described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel. Individual structures, property, and livelihoods could be severely damaged or lost as a result of a fire; however, the community is not likely to suffer severe or long-term economic losses.

Low frequency fires in the shrublands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

Smoke from a nearby wildland fire may impact sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Tonasket to other communities; thus, travel and commerce may be interrupted.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Tonasket from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Tonasket would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that Tonasket will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county. Determined by representatives of the town, the following table includes volcano hazard ratings for the City of Tonasket. Refer to the Volcano Hazards section of the Okanogan County Annex for more information about volcano risk in the county.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that could fall on the City of Tonasket. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

General impacts to the City of Tonasket are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and seismic activity are expected to have the greatest impact on the small rural cities and communities of Okanogan County.

The greatest impacts from ashfall will likely concern water quality and emergency response. Ashfall will have a significant impact on the Okanogan River which could affect the systems that supply drinking water to the city and other water systems. Light ashfall is not expected to cause any major damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the municipality. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the general public.

HAZARDOUS MATERIALS HAZARDS

Due to data limitations, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. Refer to the county section for a more complete analysis of hazardous materials. Determined by representatives of the city, the following table includes hazardous materials hazard ratings for the City of Tonasket.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	6 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

LOCAL EVENT HISTORY

There are 14 cleanup sites on record with the Washington Department of Ecology. There are four sites that are awaiting cleanup, two on which cleanup has started, and eight have been cleaned up and require no further action (Table 105). The Kenneth Sasse Property diesel spill is the only site ranked as a Level-1.

Table 105) Hazardous waste clean-up sites in Tonasket, WA. Sites highlighted in blue are still active. Data is from the Washington State Department of Ecology Cleanup Site Search.

Cleanup Site ID	Site Name	Site Status	Site Rank
3661	Tonasket Post & Rail	Awaiting Cleanup	5 - Lowest Assessed Risk
4122	Starr Mine	Awaiting Cleanup	NA
1670	Montanye Property	Awaiting Cleanup	4 - Low-Moderate Risk
4784	Pacific Calcium Yard	Awaiting Cleanup	NA
11805	Kenneth Sasse Property	Cleanup Started	1 - Highest Assessed Risk
12053	Atchison Logging & Lumber Co	Cleanup Started	NA
708	Havillah Rd Oil Dumping	No Further Action	5 - Lowest Assessed Risk
773	US DA FSA Whiteaker Farm	No Further Action	NA
6671	TONASKET SCHOOL DISTRICT 404	No Further Action	NA
3663	LEMANASKY RD DRUG LAB	No Further Action	NA
4113	ULRICH FARMS	No Further Action	NA
4908	GAVIN PETROLEUM	No Further Action	NA
6296	WA DOT TONASKET MAINTENANCE SITE	No Further Action	NA
15082	Moonlight Oil	No Further Action	NA

PROBABILITY OF FUTURE OCCURRENCE

The probability of a large release of hazardous materials into the environment is low as there are no major processing facilities or transportation infrastructure that are set up specifically for hazardous materials. Operations that are most likely to be associated with larger spills or releases of hazardous materials into the environment include mining, farming, and fuel stations. The probability of the release of small quantities of hazardous substances is low to moderate; typically, releases become less likely as the quantity or volume released increases.

IMPACTS OF HAZARDOUS MATERIALS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUES OF RESOURCES AT RISK

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified, other costs could include medical treatment for people have been exposed to hazardous materials, environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the City of Tonasket. Therefore, the following table, which is representative of the City of Tonasket, displays the pandemic hazard ratings that were selected by the Planning Team for Okanogan County. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

The city has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The city has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to the City of Tonasket. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for the City of Tonasket was 54 (5.3% of total county cases) and the virus had caused zeros death. For the entire county, there were 1,042 total cases and 13 deaths recorded by that same date.

There is one hospital in the City of Tonasket. North Valley Hospital is centrally located in the city. According to the Washington State Hospital Association there are 25 general hospital beds available for patient care. Visit <https://www.mvhealth.org/www.nvhospital.org> for more information about North Valley Hospital's services, capabilities, and response to COVID-19.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the City of Tonasket. Nationwide, the pandemic will have resulted in hundreds of thousands of deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

CITY OF OKANOGAN ANNEX

FLOOD HAZARDS

Determined by representatives of the city, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the City of Okanogan. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the City of Okanogan.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

Dam failure hazard ratings for the City of Okanogan.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

RIVERINE FLOODING

The city of Okanogan is located on the west side of the Okanogan River. Even though the population center has residences, commercial, industrial, and agricultural located near the river’s edge, only a small portion of downtown Okanogan is within the 100-year flood zone (this includes parts of 1st and 2nd Avenue North and 1st and 2nd Avenue South). In addition to uncontrolled flooding, controlled flooding may also occur within city limits as a result of measures taken to relieve stress on water control infrastructure and reduce the risk of catastrophic flooding.

Floods in the area are the result of two different types of weather events, rain-on-snow and thunderstorms. Rain-on-snow events that affect Okanogan occur when significant snowpack exists in the upper reaches of the foothills and beyond in the Okanogan and Wenatchee National Forest. Warm rains falling on the snowpack result in a significantly increased rate of snowmelt. Often this melting occurs while the ground is frozen and the water cannot be absorbed into the soil, resulting in increased overland flows. Flood waters recede slowly as rain-on-snow weather events tend to last for several days.

Low velocity flooding occurs in several of the nearby tributaries almost annually during the spring runoff period. Salmon Creek and Elgin Creek are two tributaries of the Okanogan River that are within or near the City of Okanogan. Salmon Creek does pose a flood risk to residential areas within Okanogan city limits; the flood-risk area associated with Salmon Creek extends from 10th Street down to the mouth of Salmon Creek and includes single family and multi-family homes, a school, and a limited number of commercial businesses. Rural residences, ranches, farms, and roadways located near other small waterways may also be at risk to seasonal flooding. The onset of flooding in smaller drainages can range from extremely slow to very fast; this variability depends on the cause of flooding and other factors such as rainfall intensity, characteristics of the surrounding terrain, temperature, and the condition of the soil. Floods that occur quickly are usually caused by thunderstorms, while floods that occur more slowly are often the result of moderate, but prolonged rainfall, snowmelt, or a combination of both. The greatest flood risk posed by Salmon Creek is related to releases of water from the dams in Conconully which is discussed further in the following section.

Low water permeability soils and sparse vegetation combine to foster flash flooding when intense thunderstorms hit the Okanogan area. Flash floods from thunderstorms do not occur as frequently as those from general rain and snowmelt conditions but can be more severe. The possibility for injury and death from flash floods is heightened because they occur very rapidly, and they are so uncommon that people do not recognize the potential danger.

Warm weather or rain after a heavy snowfall is responsible for high flows in the Okanogan River. A high level of sediment is prevalent during periods of intense runoff. Excessive sedimentation, such as what may be produced by runoff in a burn scar, tends to cause a deteriorating condition in streambeds and channels through deposition. Natural obstructions to flood waters include trees, brush, and other vegetation along the stream banks in the floodplain area.

To protect against flooding, the City of Okanogan does have a system of levees. The levee by the water treatment plant was recently improved and has since been approved by the Army Corps of Engineers. However, two other levees in the city do not provide adequate flood protection. The 2nd North levee is in poor condition and offers little protection above low to moderate events and the 1st South levee is in moderate condition and only provides moderate protection. The city has since received funding from WA CDBG to complete a planning grant, which will identify deficiencies with the levees and potential actions that can be taken to make improvements

DAM FAILURE

Okanogan is located on the Okanogan River but there are no high impact dams located within or immediately adjacent to the city. The closest high impact dams are the Salmon Lake Dam and the Conconully Dam located near Conconully. Water drains from behind the dams and follows Salmon Creek to the Okanogan River; the confluence of Salmon Creek and the Okanogan River is within Okanogan city limits. The dams near Conconully are approximately 15 miles upstream from Okanogan making them the closest high impact dams to the city. The other high impact dams are either associated with smaller impoundments or they are at least 30 to 40 miles upstream from Okanogan. Given the extremely low probability of a significant breach, it is much more likely that Okanogan will be affected by an emergency release of water from behind the two dams in Conconully. Emergency releases have been conducted multiple times with some resulting in damage to the city.

A dam failure could result in the release of a significant volume of water, especially if the purpose of the dam is water retention (i.e. a reservoir or impoundment), and cause sedimentation and erosion. Flood waters carrying sediment, which builds up behind a dam over time, follow natural and man-made drainage features after being released by a dam failure. Sediment deposition and erosion are common in the paths/drainages that flood waters follow which can cause extensive damage to both the natural environment and human development. If there is a breach of the Conconully Reservoir Dam, it is possible that water could overtop the banks of Salmon Creek and cause significant impacts to nearby structures and infrastructure. Depending on the rate of flow and volume of water moving down Salmon Creek, localized flooding along the Okanogan River may also occur if the discharge from Salmon Creek is significant.

Once the impoundment or reservoir is drained, flood waters downstream from the dam will recede and resemble pre-failure flows levels. The most significant changes will be above the dam where water was impounded. After the dam failure, water levels could resemble a natural flow-pattern which was altered when the dam was constructed. Water levels above the dam will be permanently reduced unless the dam is rebuilt or replaced.

PROBABILITY OF FUTURE OCCURRENCE

RIVERINE FLOODING

The probability of flood events occurring along the Okanogan River is moderate; however, the levee and drainage infrastructure within Okanogan limits the impacts of these events. When flooding does occur, the impacts tend to be moderate in severity, but they are often localized. Basement seepage is the most common impact from low impact, high frequency flood events. Larger magnitude and high impact flood events have occurred but are not likely in any given year. These types of flood events have the highest probability of occurrence in the winter or early spring in Okanogan. Minor flash floods are common on the numerous small tributaries feeding the Okanogan River near the community but are not likely to have an impact on the Okanogan River channel within the city center.

DAM FAILURE

The Conconully Lake Dam presents a moderate level of risk to the City of Okanogan as the probability of a breach is low, but the potential impacts to structures and infrastructures downstream could be significant. Although they are uncommon, the emergency release of water from behind the dam has a higher probability of taking place. Emergency releases have occurred and will probably need to be conducted again in the future under extreme conditions. Previous emergency releases have caused damage to structures and infrastructure in the city.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

The potential impacts from flooding in Okanogan are very similar to the impacts described for Okanogan County as a whole. First responders and other volunteers aiding with emergency flood control or cleanup efforts are potentially at risk of injury due to accidents or possibly exposure to contaminated water. Although unlikely, the city's water supply could be affected by contaminated flood waters entering the groundwater supply.

The major impacts from flooding in Okanogan are the restricted use of several streets, commercial, and residential areas due to overburden of existing drainage facilities (some impacts in these areas were independent of storm water issues). Refer to Figure 66 for a map of NFIP flood zones in the City of Okanogan and the footprints of structures located within the flood zones.

The availability of food and other supplies is not likely to be impacted or interrupted by a flood event. Furthermore, the delivery of community services such as postal services, health care, law enforcement, and emergency response is also not likely to be impacted by flood events in Okanogan. While individual homes and businesses may incur damages as a result of a flood, the economy of the community will not be impacted by this type of hazard.

Table 106) Definitions of NFIP flood zones identified in Okanogan County, WA.

ZONE	FLOOD TYPE	DESCRIPTION
A	100-Year	High Risk: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	100-Year	High Risk: Areas subject to a one percent or greater annual chance of flooding in any given year. Base flood elevations are shown as derived from detailed hydraulic analyses (Zone AE is used on new and revised maps in place of Zones A1-A30)
AO	100-Year	High Risk: River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
X500	500-Year	Low to Moderate Risk: Areas of moderate flood hazard from the principal source of flood in the area, determined to be within the limits of one percent and 0.2 percent annual chance floodplain. (Shaded Zone X is used on new and revised maps in place of Zone B.)

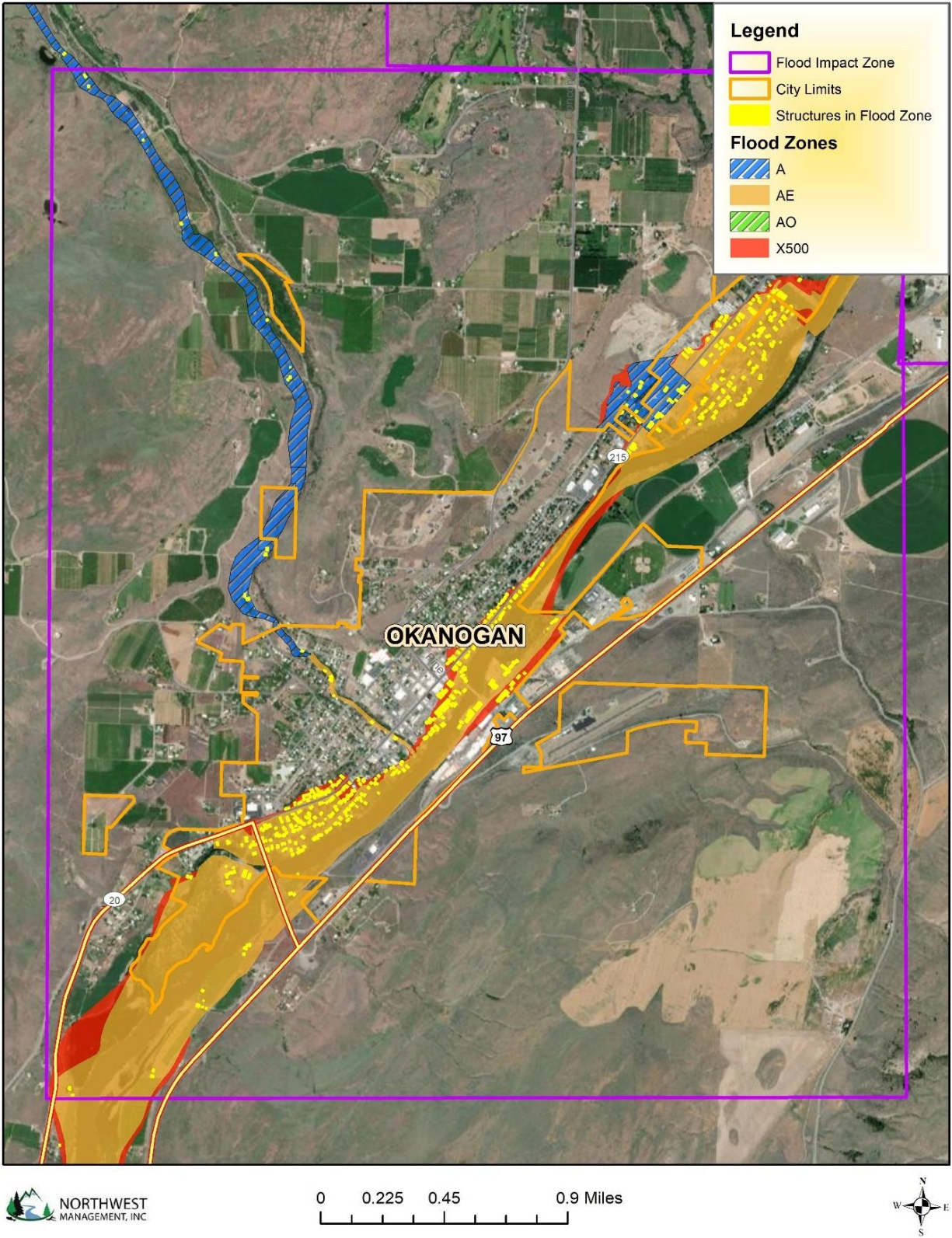


Figure 66) FEMA National Flood Insurance Program Flood Zone map of Okanogan, WA. Refer to Table 106 (above) for definitions of the NFIP flood zones identified on the map. *Note: Okanogan County regulatory flood maps are currently being updated; the final drafts will be available by winter 2023/2024.*

Environmental damages resulting from a flood event are also unlikely. The Okanogan River occupies a relatively wide floodplain except for a short segment that has been channeled through the community. Scouring and erosion along the banks of the stream along this narrow section is possible, but due to grass and other vegetation, these impacts will most likely be minimal and localized. Contamination of the riparian area by floodwaters containing chemicals or other pollutants is a possibility, especially if sewer systems are inundated, but is more likely to be realized in the surrounding areas than within the community due to the hydrologic profile of the floodplain.

DAM FAILURE

Of the high impact dams located upstream from the City of Okanogan, the dams near Conconully are the closest to the city; they are approximately 15 miles up Salmon Creek from Okanogan. Although the probability is low, a major breach of either dam would have both direct and indirect impacts on the city. For example, direct impacts would include physical damage and losses related to the incident while indirect consequences may be related to the local economy and include the loss of jobs, the loss of sales, and the cost of securing alternative space for residential or business purposes.

Economic impacts in surrounding areas, especially those close to the dam failure, may not be limited to assets in the inundation area. For example, if a large dam was to fail the impacts may extend to infrastructure and resources that serve a much broader area, including the City of Okanogan. In addition to direct damage from a dam failure, economic impacts could include the amount of time required to repair, replace, or reopen businesses, governmental and nonprofit agencies, industrial facilities, and road, bridge, water, and sewer infrastructure damaged by the dam failure.

Failure of the Conconully dams is unlikely, but if it occurred, the mapped floodway would impact multiple residential, commercial, and institutional properties in Okanogan. Flooding from failure would also likely result in damage to city road, bridge, and sewer infrastructure within the floodway. The more likely flooding risk would be related to emergency releases of waters needed to protect either of the impoundment dams. During past emergency releases, multiple properties within the city were impacted by flood water erosion damages. Damage to city infrastructure also occurred at the Mill Street Bridge and sewer crossing.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

The following table summarizes the number of structures, number of parcels, number of improvements made to those properties, and total and average value of improvements in the 100-year and 500-year flood zones within the City of Okanogan.

Okanogan	No. Structures	No. Parcels	No. Improv.	Improv. Value	Avg. Improv. Value
100 Year FZ	399	528	350	\$40,873,400	\$116,781
500 Year FZ	480	619	595	\$65,540,900	\$110,153

Although Okanogan County Fire District #3 and the Okanogan County Public Utilities District provide service to areas within the Okanogan floodplains, they do not have any facilities or assets located within the identified floodplain. Nevertheless, these districts could be impacted due to emergency calls or limited access caused by flooding.

Most critical infrastructure in the City of Okanogan is located outside of the floodplain. Excluding the sewage treatment plant, which is fully within the 100-year floodplain, all major city and county services, office buildings, emergency response equipment and communications equipment are located outside of the floodplain and are not at direct risk of damage. Additionally, none of the cities' well heads are within the floodplain.

Roads and bridges are the major infrastructural element that is affected by flooding. Alternative routes to all parts of county are limited during most major flood events. Bridges and culverts have been repeatedly compromised by historical flood events causing major long-term damage to road systems.

Local power distribution systems may be compromised when power poles are undermined by flood waters. This is not a common occurrence as most of the power grid is located outside of flood areas.

Overall, the City of Okanogan has multiple sewer, water, and storm-water utilities within areas that could potentially flood. The city's sewer lagoons are located near the 100-year flood plain but are at a low to moderate risk of being compromised as they are protected by levees (some levees are in better conditions than others; refer to the end of the first Riverine Flooding section, just after the hazard summary tables, for more information about the levees in the City of Okanogan). Contamination of the water supply or backup of sewer water into structures could occur if flood waters did overtop the lagoons or the levee walls were damaged.

DAM FAILURE

The Conconully Lake and Salmon Lake dams, located up Salmon Creek near Conconully, pose the greatest threat to the City of Okanogan. Although a failure is unlikely, the release of water in emergency situations has caused damage to structures and infrastructure within the city. Also, recent reports have suggested that the Conconully reservoir is in need of improvements. As the circumstances regarding the release of water from behind either dam are highly variable, values of resources at risk to a dam-related incident could not be totaled as the inundation zones are unknown.

EARTHQUAKE HAZARDS

Determined by representatives of the city, the following table includes earthquake hazard ratings for the City of Okanogan. Okanogan does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole; refer to the Earthquake Hazards section of the Okanogan County Annex for more information.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	6 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

PROBABILITY OF FUTURE OCCURRENCE

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions in the Methow Valley have a slightly higher probability of experiencing an earthquake than those in the Okanogan River valley or on the eastern border of the County (10-15% probability versus 6-10% probability); however, no specific jurisdiction has more risk than another or than the County overall within these areas.¹⁴³

IMPACTS AND VALUE OF RESOURCES AT RISK

There was a 4.6 magnitude earthquake recorded in 2011; the epicenter was located about seven miles northwest of Okanogan. The earthquake produced light ground shaking that was felt by residents in the county.

Unreinforced masonry (URM) structures and unreinforced chimneys of homes will likely be damaged in the event of an earthquake. There are several publicly accessible unreinforced masonry structures in Okanogan in addition to the numerous homes and other buildings throughout the Cities with unreinforced chimneys. Damaged or collapsed chimneys could result in the secondary hazard of fire. Nonstructural damage caused by falling and swinging objects may be considerable after any magnitude earthquake. Damage to some older, more fragile bridges and land failure causing minor slides along roadways may isolate some residents.

In Okanogan, approximately 33 downtown structures are assumed to be unreinforced masonry. These structures were built prior to the inclusion of articles for seismic stability in the Uniform Building Codes in 1972. The number and value of unreinforced masonry homes or homes with masonry chimneys in Okanogan are unknown but estimated to include at least 100 buildings.

¹⁴³ USGS. 2008 United States National Seismic Hazard Maps. U.S. Geological Survey. U.S. Department of Interior. Available online at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>. October 2009.

LANDSLIDE HAZARDS

Determined by representatives of the city, the following table includes landslide hazard ratings for the City of Okanogan. Refer to the Landslide Hazards section of the Okanogan County Annex for more information about landslide risk in the county.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	5 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

There is a low probability that the City of Okanogan will experience damaging landslides. The few slopes in and around the community are generally less than 20%. While small, low angle slumps may occur on eyebrows of the surrounding rolling hills, these will be infrequent and likely the result of water saturation or a major disturbance such as an earthquake or road construction.

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no structures or infrastructure directly at risk from landslides within the city of Okanogan.

SEVERE WEATHER HAZARDS

Determined by representatives of the city, the following table includes severe weather hazard ratings for the City of Okanogan. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information about severe weather risk in the county.

Category	Rating	Definition
Location	3 – Significant	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	6 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

The city of Okanogan does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. The probability of a severe weather event occurring in Okanogan on an annual basis

is high. However, the impacts to these communities are usually minimal and are the same as those described for Okanogan County as a whole.

IMPACTS AND VALUE OF RESOURCES AT RISK

Winter Storms

It is difficult to estimate the cost of potential winter storm damages to structures and the economy in Okanogan. Damage to roofs by heavy snow accumulations depends on the moisture content of the snow and the structural characteristics of the buildings. In general, snow in this region tends to have low moisture content because of the low temperatures and arid environment. Frozen water pipes are the most common damage to residential and business structures. Older homes tend to be at a higher risk to frozen water pipes than newer ones. Snow plowing within the city limits is accomplished by the city's public works department. Private landowners are responsible for maintaining their own driveways or other private roads. Utility supplies are impacted during severe winter storms as power is lost on a regional basis. This has a two-fold impact on residents as not only is power cut to homes and businesses, but primary heating is lost for many residents. Gas furnaces and wood stoves supplement electrical heating, but with wood heating the senior population is at a disadvantage. Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for several days and businesses may not open. Damages are seen in the form of structural repair and loss of economic activity. Okanogan County schools are occasionally closed during and right after a severe winter storm because of cold temperatures and snow-covered roads.

Thunderstorms

Thunderstorms directly over the City of Okanogan are not likely to be severe enough to cause significant damages. However, in recent years, distant storm systems that produce heavy precipitation over high elevation areas have had substantial impacts on some parts of the city. Consequently, the runoff produced by such storm systems can cause localized flooding within the city that requires efforts from both private and public entities to resolve.

Hail

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property within Okanogan. The most significant losses are most clearly seen in the agriculture sectors of the economy.

Windstorms and Tornadoes

It is difficult to estimate potential losses in Okanogan due to windstorms and tornadoes. Construction throughout the County has been implemented in the presence of high wind events, and therefore, the community is at a higher level of preparedness to high wind events than many other areas experiencing lower average wind speeds.

We have estimated losses based on wind and tornado damage as follows:

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)
- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 1,329 total parcels with 1,003 improvements in the City of Okanogan worth almost \$150 million. Using the criteria outlined above an estimate of the impact of high winds on the city has been made. The potential wind and tornado impact on improvements values is estimated at more than \$2.2 million in damage. The estimated damage to roofs (on parcels with improvements) is approximately \$150,000.

Power failure often accompanies severe storms. Prolonged failure, especially during cold winter temperatures can have disastrous effects. All communities should be prepared to deal with power failures. Community shelters equipped with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water.

WILDLAND FIRE HAZARDS

Determined by representatives of the city, the following table includes wildland fire hazard ratings for the City of Okanogan. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information about wildfire risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

Distribution of Fuels

Most of the neighborhoods in the Okanogan River Valley are heavily developed for residential, commercial, or agricultural use. Orchards, livestock pasture, hay, or other crops are grown on nearly

every available acre that has access to irrigation water. During the summer and fall, this creates a mosaic of lush green vegetation where there is irrigation and cured sage and grass in areas where there isn't.

Wildland fuels within Okanogan are fairly limited to ditches, empty lots, and the riverbanks due to extensive urban and agricultural development. Orchards and other crops grow both within the valley and on many of the low benches where irrigation water is available. The surrounding foothills are vegetated primarily by sagebrush and various lower growing grasses. Sparse ponderosa pine can be found in a few of the nearby draws. The slope rising from the east side of the river near Okanogan is steep, almost vertical in some places; however, it appears to be nearly solid rock with little soil available for plant growth.

Fire Risk

Although wildfire potential and risk within Okanogan city limits is low, the rangeland that surrounds the city presents a significant wildfire risk. Farming and ranching activities can potentially increase the risk of a human-caused ignition. Large swaths of rangeland or pasture tend to be areas where fuels are continuous and, under extreme weather conditions, can present extreme levels of fire danger to structures and infrastructure located within or adjacent to those areas. Fires in rangeland fuels can move quickly and cause widespread destruction, but they can also be controlled quickly and have ecological benefits. Clearings and fuel breaks disrupt a slow-moving wildfire enabling suppression before a fire can ignite heavier fuels. High winds increase the rate of fire spread and intensity of non-irrigated crop and rangeland fires. It is imperative that homeowners implement fire mitigation measures to protect their structures and families prior to a wildfire event.

Wildfire risk in the agricultural landscape is at its highest during late summer and fall when vegetation is cured, and daily temperatures are at their highest. A wind-driven fire in agricultural fuels or dry native fuel complexes would produce a rapidly advancing, but variable intensity fire. Fires burning in some types of unharvested fields would be expected to burn more intensely with larger flame lengths due to the greater availability of fuels resulting from the higher productivity of the vegetation. There may be other types of fuels located outside of city limits that contribute to wildfire risk. For example, fields enrolled in the CRP or set aside for wildlife habitat can burn very intensely due to an increased amount of fuel build-up from previous years' growth. Fires in these types of fuels are harder to extinguish completely due to the dense duff layer, often leading to hold over fires that may reemerge at a later date causing additional fire starts.

Residents living in Okanogan have access to the municipal water supply system. Outside these areas, development relies on individual, co-op, or multiple-home well systems. Creeks, ponds, and developed drafting areas provide water sources for emergency fire suppression in the rural areas to a limited extent. Irrigation systems are capable of providing additional water supply for suppression equipment on a limited basis. Additional water resources distributed and documented throughout the agricultural landscape are needed to provide water for fire suppression.

Above ground, high voltage transmission lines cross the planning area in many directions in corridors cleared of most vegetation, which provides for a defensible space around the power line infrastructure

and may provide a control point for fire suppression, if well maintained. Local public electrical utility lines are both above and below ground traveling through back yards and along roads and highways. Many of these lines are at risk to damage from trees or tree limbs that might be toppled or broken as a result of severe weather. Power and communications may be cut to some of these during a wildfire event.

Fire Protection

The city of Okanogan Fire Department provides structural fire protection as well as wildland fire protection within the city limits. Okanogan also hosts one of Fire District #3 fire stations that provides structural and wildland fire protection outside of city limits. As of August 2021, all Okanogan County fire districts and each city/town fire department, including the City of Okanogan Fire Department, have signed a “Mutual Aid Agreement” to assist any of the other districts in the County with fire suppression to the utmost of their abilities.

Beyond the Fire District #3 jurisdiction, State lands are the sole responsibility of the Washington Department of Natural Resources (suppression & reciprocal agreements may apply). Federal lands are the sole responsibility of the Federal management agency (reciprocal agreement may apply). Much of the private lands in Okanogan County are within joint jurisdiction between the County fire protection districts and the WA DNR.

The DNR provides wildfire protection during the fire season between April and October with a varying degree of resources available in the early spring and late autumn months. The DNR does not provide structural fire suppression but does provide wildfire protection on non-forested land that threatens DNR-protected lands. The U.S. Forest Service seasonally responds to all wildland fires on their jurisdiction and may also respond to wildland fires on private lands based on a reciprocal agreement with the DNR. The BLM provides wildfire protection on their ownership within Okanogan County and has mutual aid agreements with the DNR for protection of forested land. BLM also does not provide structural fire suppression.

PROBABILITY OF FUTURE OCCURRENCE

Okanogan allows for irrigation of landscaping and agricultural crops, which not only helps keep the vegetation green and at lower propensity for ignitions, but also gives firefighters abundant access to water resources for suppression purposes. As crop production slows in the fall, the irrigation pressure tends to taper off, leaving previously lush grasses and other vegetation to dry out and become a potential fire hazard.

The sagebrush and grassland fuels that dominant this part of the County usually becomes available to burn fairly early in the summer. The growth of a productive orchard takes many years and is, therefore, a long-term investment. The potential loss of these orchards and the surrounding structures to fire would severely damage the local economy as well as change the way of life for many residents.

IMPACTS OF WILDLAND FIRE EVENTS

The potential impacts from a wildfire in Okanogan are very similar to the impacts described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel. Individual structures, property, and livelihoods could be severely damaged or lost as a result of a fire; however, the community is not likely to suffer severe or long-term economic losses.

Low frequency fires in the shrublands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

Smoke from a nearby wildland fire may impact sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Okanogan to other communities; thus, travel and commerce may be interrupted.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Okanogan from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Okanogan would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, much of the information in the county annex will apply to the City of Okanogan. There is a high probability that Okanogan will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county. The following table displays the volcano hazard ratings that were selected by the Planning Team for Okanogan County; these ratings also apply to the City of Okanogan.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that could fall on the City of Okanogan. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

General impacts to the City of Okanogan are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and seismic activity are expected to have the greatest impact on the small rural cities and communities of Okanogan County.

The greatest impacts from Ashfall will likely concern water quality and emergency response. Ashfall will have a significant impact on the Okanogan River which could affect the supply of drinking water to the city and other water systems. Light ashfall is not expected to cause any major damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the municipality. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the general public.

HAZARDOUS MATERIALS HAZARDS

Due to data limitations, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. Refer to the county section for a more complete analysis of hazardous materials. Overall, risk associated with hazardous materials for the City of Okanogan is similar to that of the county. Therefore, the following table displays the hazardous material hazard ratings that were selected by the Planning Team for Okanogan County.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

LOCAL EVENT HISTORY

There are 13 cleanup sites on record with the Washington Department of Ecology. There are four sites that are awaiting cleanup, one on which cleanup has started, one on which construction has been completed and will be monitored, and seven have been cleaned up and require no further action (Table 107).

Table 107) Hazardous waste clean-up sites in Okanogan, WA. Sites highlighted in blue are still active. Data is from the Washington State Department of Ecology Cleanup Site Search.

Cleanup Site ID	Site Name	Site Status	Site Rank
2721	4th of July Mine	Awaiting Cleanup	NA
1096	Leonard Judd Property	Awaiting Cleanup	5 - Lowest Assessed Risk
3345	Virginia Houser Property	Awaiting Cleanup	5 - Lowest Assessed Risk
4422	CANAMERA MILLING & SMELTING	Awaiting Cleanup	NA
2784	US DA FHA Sid Marquis Farm	Cleanup Started	NA
11538	OKANOGAN COUNTY CENTRAL LANDFILL	Construction Complete- Performance Monitoring	NA
3625	STARCRISP INC	No Further Action	NA
4305	Peacock Mine	No Further Action	NA
9363	OKANOGAN MINI MART	No Further Action	NA
10566	FLYING B 1	No Further Action	NA
7563	WA DOT OKANOGAN MAINTENANCE DIVISION	No Further Action	NA
9159	US ARMY NATIONAL GUARD ARMORY 080	No Further Action	NA
10285	OKANOGAN COUNTY PUD 1	No Further Action	NA

PROBABILITY OF FUTURE OCCURRENCE

The probability of a large release of hazardous materials into the environment is low as there are no major processing facilities or transportation infrastructure that are set up specifically for hazardous materials.

Operations that are most likely to be associated with larger spills or releases of hazardous materials into the environment include mining, farming, and other industrial operations. The probability of the release of small quantities of hazardous substances is moderate; typically, releases become less likely as the quantity or volume released increases.

IMPACTS OF HAZARDOUS MATERIALS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUES OF RESOURCES AT RISK

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified, other costs could include medical treatment for people have been exposed to hazardous materials, environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the City of Okanogan. Therefore, the following table, which is representative of the City of Okanogan, displays the pandemic hazard ratings that were selected by the Planning Team for Okanogan County. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

The city has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The city has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to the City of Okanogan. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for the City of Okanogan was 54 (5.2% of total county cases) and the virus had caused one death (7.7% of total deaths in the county). For the entire county, there were 1,042 total cases and 13 deaths recorded by that same date.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the City of Okanogan. Nationwide, the pandemic will have resulted in hundreds of thousands of deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

TOWN OF TWISP ANNEX

FLOOD HAZARDS

Determined by representatives of the city, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the Town of Twisp. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the Town of Twisp.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

Dam failure hazard ratings for the Town of Twisp.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

RIVERINE FLOODING

The community of Twisp is located at the confluence of the Twisp River from the west and the Methow River from the north. Residences, businesses, and other structures associated with the community actually straddle both waterways; however, only small sections of the townsite are within the floodplain identified on the FEMA Flood Insurance Rate Maps.

Floods in the area are typically the result of two different types of weather events, rain-on-snow and thunderstorms. Rain-on-snow- events that affect Twisp occur when significant snowpack exists in the Okanogan and Wenatchee National Forest on each side of the Methow Valley. Warm rains falling on the

snowpack result in a significantly increased rate of snowmelt. Often this melting occurs while the ground is frozen and the water cannot be absorbed into the soil, resulting in increased overland flows. Flood waters recede slowly as rain-on-snow weather events tend to last for several days. Low velocity flooding occurs in Twisp almost annually during the spring runoff period. Ice jams in the smaller tributaries have historically caused flooding problems. The impacts of successive ice dams being built up and then breaking are felt all along the Twisp River and Methow River drainages as the rush of water quickly overwhelms culverts, bridges, and storm drainage systems.

Soils with low permeability and sparse vegetation in some areas combine to foster flash flooding when intense thunderstorms hit the Twisp area. Floods from thunderstorms do not occur as frequently as those from general rain and snowmelt conditions but can be far more severe. The possibility for injury and death from flash floods is heightened because they occur quickly and are so uncommon that people do not recognize the potential danger.

The major impacts from both types of flooding in Twisp are the restricted use of several streets, highways, commercial, industrial, and residential areas. There are numerous bridge and culvert crossings over both the Methow River, the Twisp River, and several irrigation canals throughout their extents within the town and the surrounding area.

Warm weather or rain after a heavy snowfall is responsible for high flows in these waterways. A high level of sediment is prevalent during periods of high runoff. This sediment tends to cause a deteriorating condition in channel beds through erosion and deposition. Natural obstructions to flood waters include trees, brush, and other vegetation along the stream banks in the floodplain area. Debris can plug culverts and accumulate on bridge abutments at several locations throughout the town. Several streets and road shoulders are prone to erosion during flood events around the Twisp area. Many secondary routes are not paved, which results in gravel washing down-slope potentially clogging drainage systems or directing water to places that were not intended.

The onset of flooding in the smaller drainages can range from extremely slow to very fast. This variability depends on the cause of flooding and other factors such as rainfall intensity, the areas receiving the rain, temperature, and the condition of the soil. Floods that occur quickly are usually caused by thunderstorms, while floods that occur more slowly are often the result of moderate, but prolonged rainfall, snowmelt, or a combination of both. In the case of intensive rainfall immediately above developed areas, the onset of flooding may occur in a matter of minutes.

Rural residences, ranches, farms, and roadways located near smaller waterways may be at significant flood risk. The onset of flooding in the smaller drainages can range from extremely slow to very fast. This variability depends on the cause of flooding and other factors such as rainfall intensity, the areas receiving the rain, temperature, and the condition of the soil. Floods that occur quickly are usually caused by thunderstorms, while floods that occur more slowly are often the result of moderate, but prolonged rainfall, snowmelt, or a combination of both. In the case of intense rainfall immediately above developed areas, the onset of flooding may occur in a matter of minutes.

A high level of sediment is prevalent during periods of intense runoff. This sediment tends to cause a deteriorating condition in streambeds and channels through deposition. Natural obstructions to flood waters include trees, brush, and other vegetation along the stream banks in the floodplain area. Considerable debris has been allowed to accumulate in these channels, plugging culverts and bridges at several locations throughout the county.

DAM FAILURE

Twisp is located at the confluence of the Methow and Twisp Rivers but there are no high impact dams located near or upstream from the town. Although there are numerous small dams in the vicinity of Twisp, none of these dams would threaten any lives should they fail. Other than the potential for road damage or minor property damage, a dam failure presents little to no risk to the Town of Twisp.

The failure of a dam could result in the release of a relatively large volume of water, especially if its purpose is water retention (i.e. a reservoir or impoundment), and cause sedimentation and erosion. Flood waters carrying sediment, which builds up behind a dam over time, follow natural and man-made drainage features after being released by a dam failure. Sediment deposition and erosion are common in the paths/drainages that flood waters follow which can cause damage to both the natural environment and human development.

After a dam failure, the most significant changes will be above the dam where water was impounded. After the dam failure, water levels will resemble a natural flow-pattern which was altered when the dam was constructed. Water levels above the dam will be permanently reduced unless the dam is rebuilt or replaced.

PROBABILITY OF FUTURE OCCURRENCE

RIVERINE FLOODING

The probability of flood events occurring in Twisp is relatively high. Low magnitude flood events can be expected several times each year. Minor flash flooding is a common occurrence, particularly in the channels coming from Corbett and Childers Draw; however, these events rarely cause damages. Due to the flat topography and drainage infrastructure, the impacts of these events are slight and will usually amount to minor and temporary traffic issues caused by plugged culverts. Larger magnitude and high impact flood events have occurred but are not likely in any given year. These types of flood events have the highest probability of occurrence in the winter or early spring in Twisp as a result of rain-on-snow events or rapid runoff.

DAM FAILURE

As there are no high-risk dams located upstream from the Town of Twisp, a dam failure presents a low risk to the town. There are numerous small dams in the vicinity of Twisp, but they are associated with small impoundments that would cause minimal damage if they were to fail.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

The potential impacts from flooding in Twisp are very similar to the impacts described for Okanogan County as a whole. First responders and other volunteers aiding with emergency flood control or cleanup efforts are potentially at risk of injury due to accidents or possibly exposure to contaminated water. Although unlikely, the town's water supply could be affected by contaminated flood waters entering the groundwater supply. Refer to Figure 67 for a map of NFIP flood zones in the City of Omak.

The major impacts from flooding in Twisp are the restricted use of several streets, commercial, and residential areas. There are numerous bridge and culvert crossings both within the Town and in the surrounding area.

The availability of food and other supplies is not likely to be impacted or interrupted by a flood event. Furthermore, the delivery of community services such as postal services, health care, law enforcement, and emergency response is also not likely to be impacted by flood events in Twisp. While individual homes and businesses may incur damages as a result of a flood, the economy of the community will not be impacted by this type of hazard.

Environmental damages resulting from a flood event are also unlikely. Erosion along the stream banks and deposition of sediments in the Twisp area is possible, but due to grass and other vegetation on the stream banks, these impacts will most likely be minimal and localized. Contamination of the riparian area by floodwaters containing chemicals or other pollutants is also a possibility.

Table 108) Definitions of NFIP flood zones identified in Okanogan County, WA.

ZONE	FLOOD TYPE	DESCRIPTION
A	100-Year	High Risk: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	100-Year	High Risk: Areas subject to a one percent or greater annual chance of flooding in any given year. Base flood elevations are shown as derived from detailed hydraulic analyses (Zone AE is used on new and revised maps in place of Zones A1-A30)
AO	100-Year	High Risk: River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
X500	500-Year	Low to Moderate Risk: Areas of moderate flood hazard from the principal source of flood in the area, determined to be within the limits of one percent and 0.2 percent annual chance floodplain. (Shaded Zone X is used on new and revised maps in place of Zone B.)

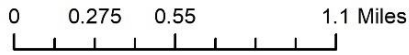
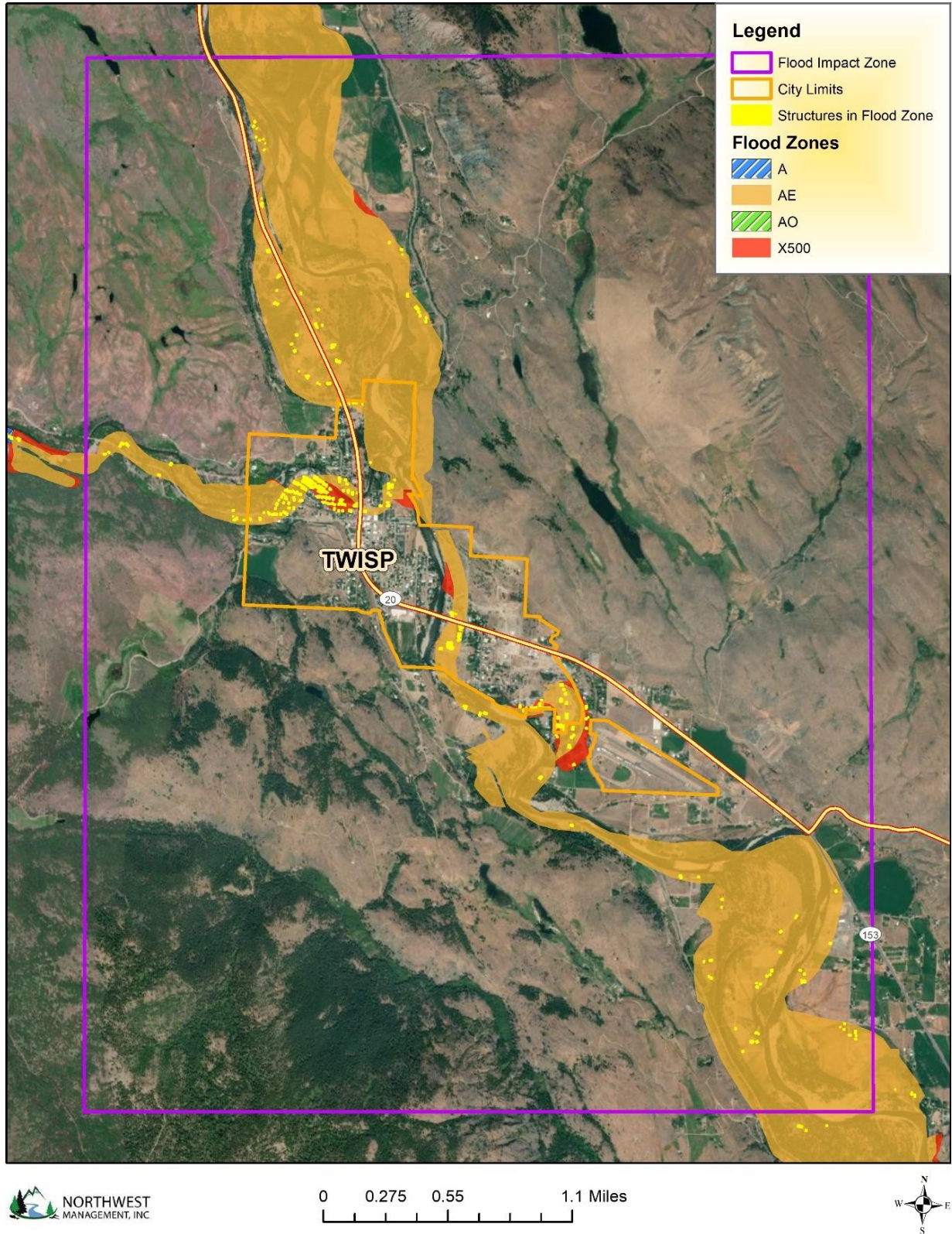


Figure 67) FEMA National Flood Insurance Program Flood Zone map of Twisp, WA. Refer to Table 108 (below) for definitions of the NFIP flood zones identified on the map. *Note: Okanogan County regulatory flood maps are currently being updated; the final drafts will be available by winter 2023/2024.*

DAM FAILURE

There are numerous dams in proximity to Twisp, but none of them pose any risk to lives downstream if they were to fail. As most impoundments in the area are small, direct impacts resulting from a failure are likely to be localized and, overall, negligible. Direct impacts could include damage to roadways, erosion, and minor flooding damage to homes and other structures.

There may also be indirect consequences that result from a dam failure which would largely be related to the economy. For example, direct economic consequences include the costs of repairing damage and replacing lost items while indirect economic consequences include the loss of jobs, the loss of sales, and the cost of securing alternative space for residential or business purposes.

Twisp could be affected by a dam failure elsewhere in the county. Economic impacts may not be limited to assets in the inundation area but may extend to infrastructure and resources that serve a much broader area, including Twisp. In addition to direct damage from dam failure, economic impacts include the amount of time required to repair or replace and reopen businesses, governmental and nonprofit agencies, and industrial facilities damaged by the dam failure.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

The following table summarizes the number of structures, number of parcels, number of improvements made to those properties, and total and average value of improvements in the 100-year and 500-year flood zones within the Town of Twisp.

Twisp	No. Structures	No. Parcels	No. Improv.	Improv. Value	Avg. Improv. Value
100 Yr FZ	210	391	190	\$28,730,900	\$151,215
500 Yr FZ	262	428	383	\$63,154,200	\$164,893

Although Okanogan County Fire District #6, the Okanogan County Public Utilities District, and the Okanogan County Electric Co-op provide service to areas within the Twisp floodplain, they do not have any facilities or assets located within the identified floodplain. Nevertheless, these districts could be impacted due to emergency response calls or limited access caused by flooding.

The Twisp area, particularly the Twisp River drainage, is currently experiencing significant residential growth, a trend throughout much of the Methow Valley. The negative impact of locating residential and light commercial resources in the areas most prone to flooding has been seen during the spring flooding events. While county planning efforts have attempted to mitigate some of the risks associated with developing the floodplain, these developments are not without risk to the owners of new homes and also the owners of existing homes and businesses as the flood waters will spillover as the waters rise.

Very few of Twisp's critical facilities are located within the floodplain. All major government offices, shelters, emergency response equipment, communications equipment, and water and sewer facilities are located outside of the floodplain and are not at direct risk of damage.

Roads and bridges are the major infrastructural element that is affected by flooding. Alternative routes to all parts of the county are limited during most major flood events. There are four bridge crossings and numerous culverts that are within the 100-year floodplain in the Twisp area. Substandard or unrated bridges accessing private residences, particularly in the Twisp River area, have an increased risk of submersion, damage, or even destruction during a high-water event. In some cases, the riverbank where these have been placed has not been reinforced and is; therefore, highly susceptible to erosion. Very few private bridges in the Twisp area have been engineered to withstand a 100-year flood event.

Local power distribution systems may be compromised when power poles are undermined by flood waters. This is not a common occurrence as most of the power grid is located outside of flood areas.

DAM FAILURE

It is highly unlikely that the Town of Twisp will be affected by a dam failure. As stated previously, there are numerous dams and impoundments in the Twisp area, but none of the dams put any lives at risk, should they fail, and all impoundments are relatively small. Costs associated with the failure of a dam in the Twisp area could include repairs to culverts and road surfaces, water damage to homes and other structures, insurance claims, and the loss of a water resources. Specific values could not be totaled as the inundation zones associated with the dams discussed earlier in this section are unknown.

EARTHQUAKE HAZARDS

Determined by representatives of the city, the following table includes earthquake hazard ratings for the Town of Twisp. Twisp does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole; refer to the Earthquake Hazards section of the Okanogan County Annex for more information.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	5 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions in the Methow Valley have a slightly higher probability of experiencing an earthquake than those in the Okanogan River valley or on the eastern border of the County (10-15% probability versus 6-10% probability); however, no specific jurisdiction has more risk than another or than the County, overall,

within these areas. Refer to the peak ground acceleration map in the earthquake section of the County annex for more information.

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no recorded occurrences of earthquakes significantly impacting the town of Twisp; however, some minimal shaking has been felt as a result of larger earthquakes elsewhere.

Unreinforced masonry (URM) structures and unreinforced chimneys of homes will likely be damaged in the event of an earthquake. There are several publicly accessible unreinforced masonry structures in Twisp in addition to the numerous homes and other buildings throughout the Town with unreinforced chimneys. Damaged or collapsed chimneys could result in the secondary hazard of fire. Nonstructural damage caused by falling and swinging objects may be considerable after any magnitude earthquake. Damage to some older, more fragile bridges and land failure causing minor slides along roadways may isolate some residents.

In Twisp, nearly all downtown structures are assumed to be unreinforced masonry. These structures were built prior to the inclusion of articles for seismic stability in the Uniform Building Codes in 1972. The number and value of unreinforced masonry homes or homes with masonry chimneys in Twisp is unknown but estimated to include at least 10-20 buildings.

LANDSLIDE HAZARDS

Determined by representatives of the town, the following table includes landslide hazard ratings for the Town of Twisp. Refer to the Landslide Hazards section of the Okanogan County Annex for more information about landslide risk in the county.

Category	Rating	Definition
Location	3 – Significant	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	3 – Severe	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

The town of Twisp has a low probability of experiencing damaging landslides, but a high probability of being affected by landslides in the surrounding area. Slopes in and around the community are generally less than 25%. Many of the rural subdivisions and groups of homes in the numerous tributaries of the Methow River have a much higher landslide risk, particularly on the west side of the valley. Slopes along many of these tributaries are within the range of steepness (angle of repose) where loose topsoil, fractured rock, and other unconsolidated material have a high potential to slide. It is also probable that

small slides will continue to occur on the cut and fill slopes of some roads. This type of slide is generally small with little permanent damage to the road or other infrastructure; however, there is some risk of traffic being delayed temporarily while road crews clear the debris and stabilize the bank.

IMPACTS AND VALUE OF RESOURCES AT RISK

Twisp does not have a high potential for significant damage caused by landslides; however, many of the rural housing clusters on the west side of the valley do have significant risk. Many homes such as those along the Twisp River, Libby Creek, and Gold Creek have a moderate to high risk depending on their location. Homeowners in these higher risk areas should be aware of the potential risk and construct roads and building sites accordingly. Further weakening of toe slopes could trigger a large-scale slide.

There is also moderate risk of landslide activity along the major travel corridors that access communities in the Methow Valley, which could hinder response by various fire protection districts (Okanogan County Fire Districts #6 and 15) and public utilities districts (Okanogan County PUD and Okanogan County Electric Co-Op) during emergencies. Since State Highways 20 and 153 are the only main access routes to these communities, a road closure for even a short period of time, can have serious impacts to residents and visitors traveling through the area. The effects of landslides on roads and the power supply has and will continue to impact the people living in the area. These impacts have historically been minor, resulting in limited vehicle access or temporary power loss.

SEVERE WEATHER HAZARDS

Determined by representatives of the city, the following table includes severe weather hazard ratings for the Town of Twisp. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information about severe weather risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	9 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

The Town of Twisp does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. The probability of a severe weather event occurring in Okanogan on an annual basis is high. However, the impacts to these communities are usually minimal and are the same as those described for Okanogan County as a whole.

IMPACTS AND VALUE OF RESOURCES AT RISK

Winter Storms

It is difficult to estimate the cost of potential winter storm damages to structures and the economy in Twisp. Damage to roofs by heavy snow accumulations depends on the moisture content of the snow and the structural characteristics of the buildings. In general, snow in this region tends to have low moisture content because of the low temperatures and arid environment. Additionally, snow rarely accumulates for long periods of time due to regular wind events. Frozen water pipes are the most common damage to residential and business structures. Older homes tend to be at a higher risk to frozen water pipes than newer ones. Snow plowing within the town limits is accomplished by the town's public works department. Private landowners are responsible for maintaining their own driveways or other private roads. Utility supplies are impacted during severe winter storms as power is lost on a regional basis. This has a two-fold impact on residents as not only is power cut to homes and businesses, but primary heating is lost for many residents. Gas furnaces and wood stoves supplement electrical heating, but with wood heating the senior population is at a disadvantage. Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for several days and businesses may not open. Damages are seen in the form of structural repair and loss of economic activity. Okanogan County schools are occasionally closed during and right after a severe winter storm because of cold temperatures and snow-covered roads.

Thunderstorms

Thunderstorms are not likely to be severe enough in Twisp to cause significant damages. However, the loss potential from flooding that results from severe thunderstorms could be significant.

Hail

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property within Twisp. The most significant losses are most clearly seen in the agriculture sectors of the economy. Potential losses to agriculture can be disastrous. Crop damage from hail will also be different depending on the time of year and the type of crop. Most farmers carry insurance on their crops to help mitigate the potential financial loss resulting from a localized hailstorm. Homeowners in Twisp rarely incur severe damage to structures (roofs); however, hail damage to vehicles is not uncommon. The damage to vehicles is difficult to estimate because the number of vehicles impacted by a specific ice storm is unknown. Additionally, most hail damage records are kept by various insurance agencies.

Windstorms and Tornadoes

It is difficult to estimate potential losses in Twisp due to windstorms and tornadoes. Construction throughout the County has been implemented in the presence of high wind events, and therefore, the

community is at a higher level of preparedness to high wind events than many other areas experiencing lower average wind speeds.

We have estimated losses based on wind and tornado damage as follows:

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)
- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 763 total parcels with 487 improvements in the Town of Twisp worth almost \$69 million. Using the criteria outlined above an estimate of the impact of high winds on the city has been made. The potential wind and tornado impact on improvements values is estimated at more than \$1 million in damage. The estimated damage to roofs (on parcels with improvements) is approximately \$73,000.

Power failure often accompanies severe storms. More rural parts of the County like Twisp are sometimes better prepared to deal with power outages for a few days due to the frequent occurrence of such events; however, prolonged failure, especially during cold winter temperatures can have disastrous effects. All communities should be prepared to deal with power failures. Community shelters equipped with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water.

WILDLAND FIRE HAZARDS

Determined by representatives of the city, the following table includes wildland fire hazard ratings for the Town of Twisp. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information about wildfire risk in the county.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	4 – Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events	4 – Highly Likely	90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year
Overall Significance	12 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

Distribution of Fuels

The Methow River Valley and the surrounding hillsides in the Twisp area consists primarily of grass and sage fuels. Agricultural and residential development along the valley bottom has resulted in a patchwork of irrigated crops and home sites. Near the Twisp and Carlton community centers and along the riverbanks deciduous trees add to the highly productive riparian vegetation. Ponderosa pine and Douglas-fir forests along some of the more distant ridge tops tend to become denser and more continuous to the east and west extending into the Okanogan National Forest on each side of the valley. Several of the developed drainages including Libby Creek and Benson Creek and along State Route 20 (Frazer Creek) within the National Forest have similar fuel compositions consisting of shrub steppe leading into moderate to dense fir stands on the north slopes and low to moderate density ponderosa pine on the south slopes. Fires in the grass and sage fuels of the valley would be expected to spread rapidly, particularly upslope, but burn at low to moderate intensities. Open pine and fir stands would likely support surface fires with only occasional jackpotting of slash piles or other fuels. Further to the east and west in the more forested areas outside the Methow River Valley, wildfires would likely burn more intensely and cause more mortality of the trees.

Fire Risk

Okanogan Public Utility District (PUD) and Okanogan County Electric Cooperative (OCEC) provide electrical service to the Methow Valley. The Methow Valley's electricity needs are now served by two transmission lines. Service provided by the original transmission line, which starts in Okanogan at a substation and follows State Route 20 over Loup Loup Pass to the substation in Twisp, has been supplemented with the Pateros transmission line. Okanogan PUD owns and operates both lines. Additionally, the valley's residents are served by a network of distribution lines that connect the transmission line to homes and businesses. The Okanogan PUD and OCEC share maintenance of the distribution system. Both utilities maintain some percentage of underground lines in the Methow Valley. The OCEC has reported that 95% of new distribution line construction and feeder upgrades in their service area are being installed underground. There are also a growing number of residents living off the power grid by creating their own power source via solar, wind, or generators.

Wildfire risk in the agricultural landscape is at its highest during late summer and fall when crops are cured and daily temperatures are at their highest. A wind-driven fire in agricultural fuels or dry native fuel complexes would produce a rapidly advancing, but variable intensity fire. Fires burning in some types of unharvested fields would be expected to burn more intensely with larger flame lengths due to the greater availability of fuels resulting from the higher productivity of the vegetation. Fields enrolled in the CRP or set aside for wildlife habitat can burn very intensely due to an increased amount of fuel build-up from previous years' growth. Fires in these types of fuels are harder to extinguish completely due to the dense duff layer, often leading to hold over fires that may reemerge at a later date causing additional fire starts.

Fire Protection

Okanogan County Fire District #6 is responsible for structural and wildland fire protection within most of the populated areas of Twisp. Okanogan County Fire Protection District #15 provides protection for the populated areas bordering the Methow River through the Lower Methow Neighborhood.

All of the Okanogan County fire districts have signed a “Memorandum of Understanding” to assist any of the other districts in the County with fire suppression to the utmost of their abilities.

State lands are the sole responsibility of the Washington Department of Natural Resources (suppression & reciprocal agreements may apply). Federal lands are the sole responsibility of the Federal management agency (reciprocal agreement may apply). Much of the private lands in Okanogan County are within joint jurisdiction between the County fire protection districts and the WA DNR.

The DNR provides wildfire protection during the fire season between April and October with a varying degree of resources available in the early spring and late autumn months. The U.S. Forest Service seasonally responds to all wildland fires on their jurisdiction and may also respond to wildland fires on state and private lands based on a reciprocal agreement with the DNR.

PROBABILITY OF FUTURE OCCURRENCE

The Twisp area is at moderate to high risk of wildfires. The continuity of fuels along much of the Methow River Valley bottom are broken alfalfa fields and stands of low-density trees, which helps slow the spread of fire. Most of the fire risk in this neighborhood occurs on the mid and upper slopes and in the developed drainages. Libby Creek and Texas Creek were identified in the Methow Community Wildfire Protection Plan as potential “hot spots” for fire activity. Economic values, fuel types, fire history, and access issues led to this designation. The riparian fuels along the riverbanks may also support a wildfire later in the summer as the water level goes down and the thick grass and brush begins to dry out. Fire spread along the waterway has the potential to threaten many homes as several structures are located along or near the water’s edge.

IMPACTS OF WILDLAND FIRE EVENTS

The potential impacts from a wildfire in Twisp are very similar to the impacts described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel. Individual structures, property, and livelihoods could be severely damaged or lost as a result of a fire; however, the community is not likely to suffer severe or long-term economic losses.

Low frequency fires in the shrublands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

Smoke from a nearby wildland fire may impact sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Twisp to other communities; thus, travel and commerce may be interrupted.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Twisp from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Twisp would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that Twisp will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county. Determined by representatives of the town, the following table includes volcano hazard ratings for the Town of Twisp. Refer to the Volcano Hazards section of the Okanogan County Annex for more information about volcano risk in the county.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	4 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that could fall on the Town of Twisp. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

General impacts to the Town of Twisp are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and seismic activity are expected to have the greatest impact on the small rural cities and communities of Okanogan County.

The greatest impacts from ashfall will likely concern water quality and emergency response. Ashfall will have a significant impact on the Methow and Twisp Rivers which could affect the systems that supply drinking water to the city and other water systems. Light ashfall is not expected to cause any major

damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the municipality. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the general public.

HAZARDOUS MATERIALS HAZARDS

Due to data limitation, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. Refer to the county section for a more complete analysis of hazardous materials. Determined by representatives of the city, the following table includes hazardous materials hazard ratings for the Town of Twisp.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	9 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

There are 12 cleanup sites on record with the Washington Department of Ecology. There are three sites that are awaiting cleanup, three on which cleanup has started, and five have been cleaned up and require no further action (Table 109). The Red Shirt and Alder Mill sites are both ranked as Level-1 sites for arsenic and metal pollutants.

Table 109) Hazardous waste clean-up sites in Twisp, WA. Sites highlighted in blue are still active. Data is from the Washington State Department of Ecology Cleanup Site Search.

Cleanup Site ID	Site Name	Site Status	Site Rank
11448	Twisp Landfill	Construction Complete- Performance Monitoring	NA
1521	Alder Mine	Awaiting Cleanup	NA
3004	Kings Pacific Pride	Awaiting Cleanup	3 - Moderate Risk
4357	Lloyds Logging Exc Soil	Awaiting Cleanup	5 - Lowest Assessed Risk
4473	Red Shirt Mill	Cleanup Started	1 - Highest Assessed Risk
4720	Alder Mill	Cleanup Started	1 - Highest Assessed Risk
4914	Lloyd Logging Equipment Yard	Cleanup Started	5 - Lowest Assessed Risk
10730	TWISP RANGER DISTRICT OFFICE	No Further Action	NA
11681	US DA FS Twisp Ranger Station 2009 Remediation	No Further Action	NA
609	KINGS TIRE SERVICE	No Further Action	NA
6097	TRAIN STATION MINI MART	No Further Action	5 - Lowest Assessed Risk
6122	WA DOT TWISP MAINTENANCE SITE	No Further Action	NA

PROBABILITY OF FUTURE OCCURRENCE

The probability of a large release of hazardous materials into the environment is low as there are no major processing facilities or transportation infrastructure that are set up specifically for hazardous materials. Operations that are most likely to be associated with larger spills or releases of hazardous materials into the environment include mining, milling, and other industrial operations. The probability of the release of small quantities of hazardous substances is low to moderate; typically, releases become less likely as the quantity or volume released increases.

IMPACTS OF HAZARDOUS MATERIALS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUES OF RESOURCES AT RISK

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified, other costs could include medical treatment for people have been exposed to hazardous materials, environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the Town of Twisp. Therefore, the following table, which is representative of the Town of Twisp, displays the pandemic hazard ratings that were selected by the Planning Team for Okanogan County. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

The town has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The town has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to the Town of Twisp. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for the Town of Twisp was one (0.1% of total county cases) and the virus had caused zero deaths. For the entire county, there were 1,042 total cases and 13 deaths recorded by that same date.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the Town of Twisp. Nationwide, the pandemic will have resulted in hundreds of thousands of deaths, the

loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

TOWN OF WINTHROP ANNEX

FLOOD HAZARDS

Determined by representatives of the Town, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the Town of Winthrop. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the Town of Winthrop.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	9 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

Dam failure hazard ratings for the Town of Winthrop.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	5 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

RIVERINE FLOODING

The Town of Winthrop is located at the confluence of the Methow and Chewuch Rivers. There is significant development along both sides of the Methow River, but particularly on the west side, below the confluence, development is occurring rapidly and includes several commercial lots. This area is experiencing a boom in residential construction; however, most development is occurring away from the rivers and outside of the NFIP flood zones. Representatives of Winthrop expect to see a considerable increase in the number of households in Town in the 2020 census.

The Methow and Chewuch Rivers join in downtown Winthrop, bisecting the town. The Methow River enters Winthrop from the west, and bends to the south at the confluence with the Chewuch River at the south end of the downtown corridor. The Methow River is flanked by residences, businesses, parks, industrial operations, and the Winthrop Fish Hatchery in and near Winthrop. The Chewuch River flows along the west side of the town center and forms a large oxbow just to the north of the community. Although the structures located near this oxbow are not identified as being with the floodplain, this bank has a high likelihood of failure during high water events as the river's channel migrates. Undercutting and erosion of banks along oxbows is a common and usually natural occurrence in meandering rivers and streams.

Floods in the area are typically the result of two different types of weather events, rain-on-snow and thunderstorms. Rain-on-snow- events that affect Winthrop occur when significant snowpack exists in the Okanogan and Wenatchee National Forest on each side of the Methow Valley. Warm rains falling on the snowpack result in a significantly increased rate of snowmelt. Often this melting occurs while the ground is frozen and the water cannot be absorbed into the soil, resulting in increased overland flows. Flood waters recede slowly as rain-on-snow weather events tend to last for several days. Low velocity flooding occur in Winthrop almost annually during the spring runoff period. Ice jams in the smaller tributaries have historically caused flooding problems. The impacts of successive ice dams being built up and then breaking are felt all along the Winthrop River and Methow River drainages as the rush of water quickly overwhelms culverts, bridges, and storm drainage systems.

Low water permeable soil and sparse vegetation in some areas combine to foster flash flooding when intense thunderstorms hit the Winthrop area. Floods from thunderstorms do not occur as frequently as those from general rain and snowmelt conditions, but can be far more severe. The possibility for injury and death from flash floods is heightened because they occur quickly and are so uncommon that people do not recognize the potential danger.

The major impacts from both types of flooding in Winthrop are the restricted use of several streets, highways, commercial, industrial, and residential areas, as well as disruption of water and sewer services that cross the rivers in pipes suspended from bridges. There is significant concern about bank erosion at the confluence of the Methow and Chewuch Rivers, which has worsened over the course of subsequent high water and flood events. There are numerous bridge and culvert crossings over both the Methow River, the Chewuch River, and several irrigation canals throughout their extents within the town and the surrounding area.

Warm weather or rain after a heavy snowfall is responsible for high flows in these waterways. A high level of sediment is prevalent during periods of high runoff. This sediment tends to cause a deteriorating condition in channel beds through erosion and deposition. Natural obstructions to flood waters include trees, brush, and other vegetation along the stream banks in the floodplain area. Debris can plug culverts and accumulate on bridge abutments at several locations throughout the town. Several streets and road shoulders are prone to erosion during flood events around the Winthrop area. Secondary routes in proximity to town are not always paved, which results in gravel washing down-slope potentially clogging drainage systems or directing water to places that were not intended.

The onset of flooding in the smaller drainages can range from extremely slow to very fast. This variability depends on the cause of flooding and other factors such as rainfall intensity, the areas receiving the rain, temperature, and the condition of the soil. Floods that occur quickly are usually caused by thunderstorms, while floods that occur more slowly are often the result of moderate, but prolonged rainfall, snowmelt, or a combination of both. In the case of intensive rainfall immediately above developed areas, the onset of flooding may occur in a matter of minutes.

Rural residences, ranches, farms, and roadways located near smaller waterways may be at significant flood risk. The onset of flooding in the smaller drainages can range from extremely slow to very fast. This variability depends on the cause of flooding and other factors such as rainfall intensity, the areas receiving the rain, temperature, and the condition of the soil. Floods that occur quickly are usually caused by thunderstorms, while floods that occur more slowly are often the result of moderate, but prolonged rainfall, snowmelt, or a combination of both. In the case of intense rainfall immediately above developed areas, the onset of flooding may occur in a matter of minutes.

A high level of sediment is prevalent during periods of intense runoff. This sediment tends to cause a deteriorating condition in streambeds and channels through deposition. Natural obstructions to flood waters include trees, brush, and other vegetation along the stream banks in the floodplain area. Considerable debris has been allowed to accumulate in these channels, plugging culverts and bridges at several locations throughout the county.

DAM FAILURE

Winthrop is located at the confluence of the Methow and Chewuch Rivers but there are no high impact dams located near or upstream from the town. Although there are numerous small dams in the vicinity of Winthrop, none of these dams would threaten any lives should they fail. Other than the potential for road damage or minor property damage, a dam failure presents little to no risk to the Town of Winthrop.

The failure of a dam could result in the release of a relatively large volume of water, especially if its purpose is water retention (i.e. a reservoir or impoundment), and cause sedimentation and erosion. Flood waters carrying sediment, which builds up behind a dam over time, follow natural and man-made drainage features after being released by a dam failure. Sediment deposition and erosion are common in the paths/drainages that flood waters follow which can cause damage to both the natural environment and human development.

After a dam failure, the most significant changes will be above the dam where water was impounded. After the dam failure, water levels will resemble a natural flow-pattern which was altered when the dam was constructed. Water levels above the dam will be permanently reduced unless the dam is rebuilt or replaced.

PROBABILITY OF FUTURE OCCURRENCE

RIVERINE FLOODING

The probability of flood events occurring in Winthrop is moderate. Low magnitude flood events can be expected several times each year. Flooding is less likely to occur along the Chewuch which is mostly high bank, bedrock constrained and more likely to occur along the Methow which has lower banks and less constraints. Larger magnitude and high impact flood events have occurred but are not likely in any given year. These types of flood events have the highest probability of occurrence in the winter or early spring in Winthrop as a result of rain-on-snow events or rapid runoff. Impacts from climate change will also alter streamflow and flood-timing. This could result in an increase in both the frequency and severity of flooding in Winthrop.

DAM FAILURE

As there are no high-risk dams located upstream from the Town of Winthrop, a dam failure presents a low risk to the town. There are numerous small dams in the vicinity of Winthrop, but they are associated with small impoundments that would cause minimal damage if they were to fail.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

The potential impacts from flooding in Winthrop are very similar to the impacts described for Okanogan County as a whole. First responders and other volunteers aiding with emergency flood control or cleanup efforts are potentially at risk of injury due to accidents or possibly exposure to contaminated water. Although unlikely, the town's water supply could be affected by contaminated flood waters entering the groundwater supply. Refer to Figure 68 for a map of NFIP flood zones in the Town of Winthrop.

The major concerns regarding any flooding in Winthrop are bank failure, which could result in significant impacts to a large portion of downtown and undermine SR20, road failure, and utility line failure. Since the town is bisected by the rivers, any disruption to the bridges would trap people on one side or the other. As for water and sewer utilities, both systems rely on pipe crossings of the rivers, and could be severely damaged in a sudden bank erosion event. Significant erosion occurs regularly at the confluence of the rivers, which presents additional risk to structures and infrastructure in that area.

The availability of food and other supplies is not likely to be impacted or interrupted by a flood event. Furthermore, the delivery of community services such as postal services, health care, law enforcement, and emergency response is also not likely to be impacted by flood events in Winthrop. While individual homes and businesses may incur damages as a result of a flood, the economy of the community will not be impacted by this type of hazard.

The type of environmental damage that is most likely to occur as the result of a flood is the contamination of the riparian area by floodwaters containing chemicals or other pollutants. Other impacts, such as erosion and overtopping, can be viewed as natural processes that might even be beneficial for flora and fauna in the floodplain.

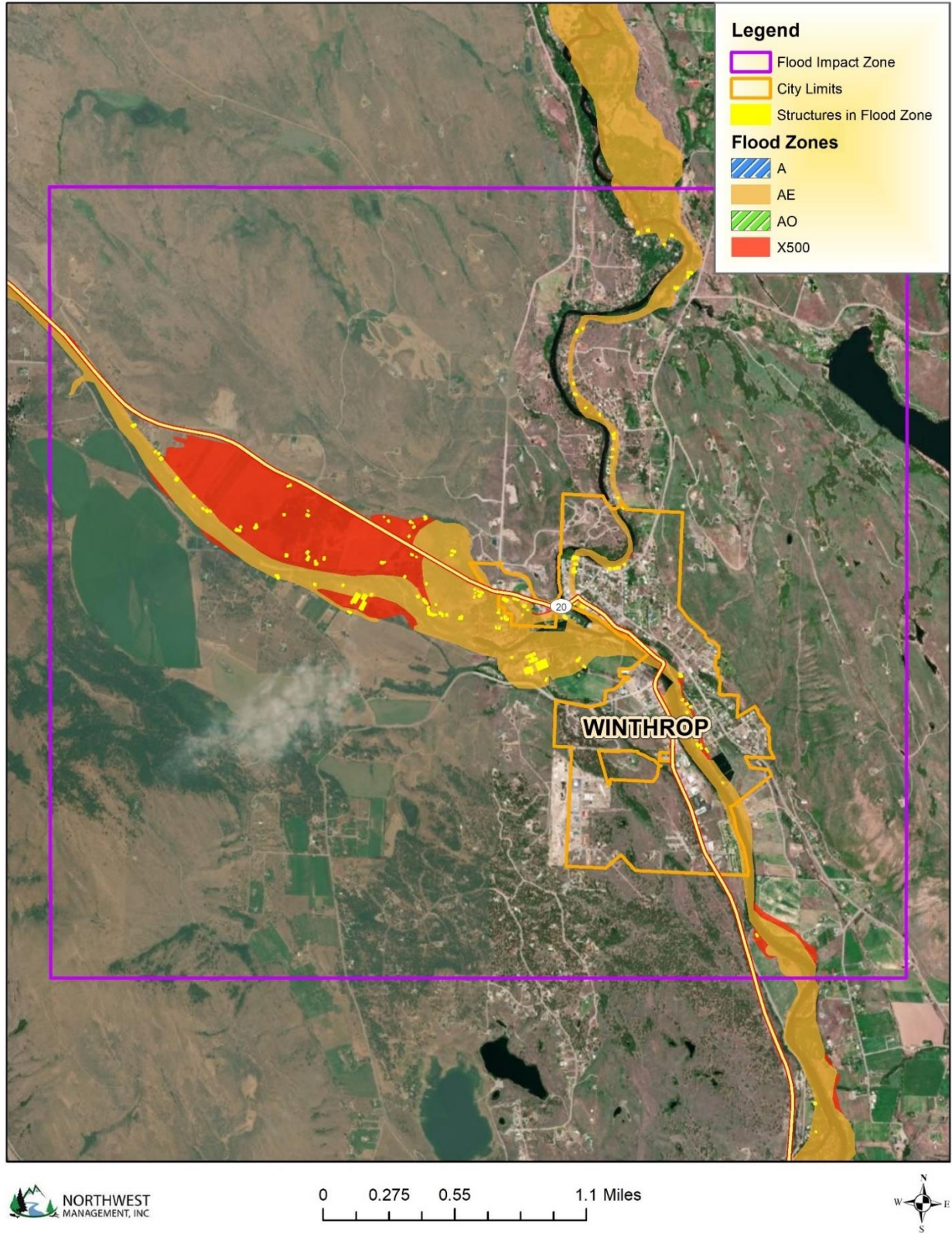


Figure 68) FEMA National Flood Insurance Program Flood Zone map of Winthrop, WA. Refer to Table 110 (below) for definitions of the NFIP flood zones identified on the map. *Note: Okanogan County regulatory flood maps are currently being updated; the final drafts will be available by winter 2023/2024.*

Table 110) Definitions of NFIP flood zones identified in Okanogan County, WA.

ZONE	FLOOD TYPE	DESCRIPTION
A	100-Year	High Risk: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	100-Year	High Risk: Areas subject to a one percent or greater annual chance of flooding in any given year. Base flood elevations are shown as derived from detailed hydraulic analyses (Zone AE is used on new and revised maps in place of Zones A1-A30)
AO	100-Year	High Risk: River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
X500	500-Year	Low to Moderate Risk: Areas of moderate flood hazard from the principal source of flood in the area, determined to be within the limits of one percent and 0.2 percent annual chance floodplain. (Shaded Zone X is used on new and revised maps in place of Zone B.)

DAM FAILURE

There are numerous dams in proximity to Winthrop, but none of them pose any risk to lives downstream if they were to fail. As most impoundments in the area are small, direct impacts resulting from a failure are likely to be localized and, overall, negligible. Direct impacts could include damage to roadways, erosion, and minor flooding damage to homes and other structures.

There may also be indirect consequences that result from a dam failure which would largely be related to the economy. For example, direct economic consequences include the costs of repairing damage and replacing lost items while indirect economic consequences include the loss of jobs, the loss of sales, and the cost of securing alternative space for residential or business purposes.

Winthrop could be affected by a dam failure elsewhere in the county. Economic impacts may not be limited to assets in the inundation area but may extend to infrastructure and resources that serve a much broader area, including Winthrop. In addition to direct damage from dam failure, economic impacts include the amount of time required to repair or replace and reopen businesses, governmental and nonprofit agencies, and industrial facilities damaged by the dam failure.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

The following table summarizes the number of structures, number of parcels, number of improvements made to those properties, and total and average value of improvements in the 100-year and 500-year flood zones within the Town of Winthrop.

Winthrop	No. Structures	No. Parcels	No. Improv.	Improv. Value	Avg. Improv. Value
100 Yr FZ	105	313	176	\$32,796,200	\$186,342
500 Yr FZ	154	353	205	\$37,075,900	\$180,858

Although Okanogan County Fire District #6 and the Okanogan County Electric Co-Op provide service to areas within the Winthrop floodplain, they do not have any facilities or assets located within the identified floodplain. Nevertheless, these districts could be impacted due to emergency response calls or limited access caused by flooding.

Critical facilities located within the floodplain include the Winthrop Auditorium (Barn) and the Methow Fish Hatchery. The Winthrop Auditorium is the Town's primary emergency response facility, and it is located at the edge of the 100-year floodplain. In a severe flood event, it is unlikely that it would be available. All other major city services, office buildings, shelters, emergency response equipment, and communications equipment are located outside of the floodplain and are not at direct risk to flooding. There are a few personal water wells located within the floodplain in the greater Winthrop area; however, none of the town's water supply wells are at high risk.

Roads and bridges are the infrastructural elements that are most affected by flooding. Alternative routes to all parts of county are limited during most major flood events. Bridges and culverts near Winthrop have been repeatedly compromised by past flood events causing long term damage to road systems. Local power distribution systems may be compromised when power poles are undermined by flood waters; however, this is not a common occurrence as most of the power grid is located outside of flood areas.

DAM FAILURE

It is highly unlikely that the Town of Winthrop will be affected by a dam failure. As stated previously, there are numerous dams and impoundments in the Winthrop area, but none of the dams put any lives at risk, should they fail, and all impoundments are relatively small. Costs associated with the failure of a dam in the Winthrop area could include repairs to culverts and road surfaces, water damage to homes and other structures, insurance claims, and the loss of a water resources. Specific values could not be totaled as the inundation zones associated with the dams discussed earlier in this section are unknown.

EARTHQUAKE HAZARDS

Determined by representatives of the Town, the following table includes earthquake hazard ratings for the Town of Winthrop. Winthrop does not have any differing issues or levels of risk associated with this

hazard than Okanogan County as a whole; refer to the Earthquake Hazards section of the Okanogan County Annex for more information.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

PROBABILITY OF FUTURE OCCURRENCE

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions in the Methow Valley have a slightly higher probability of experiencing an earthquake than those in the Okanogan River valley or on the eastern border of the County (10-15% probability versus 6-10% probability); however, no specific jurisdiction has more risk than another or than the County overall within these areas.

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no recorded occurrences of earthquakes significantly impacting the town of Winthrop; however, some minimal shaking has been felt as a result of larger earthquakes elsewhere.

Unreinforced masonry (URM) structures and unreinforced chimneys of homes will likely be damaged in the event of an earthquake. There are several publicly accessible unreinforced masonry structures in Winthrop in addition to the numerous homes and other buildings throughout the Town with unreinforced chimneys. Damaged or collapsed chimneys could result in the secondary hazard of fire. Nonstructural damage caused by falling and swinging objects may be considerable after any magnitude earthquake. Damage to some older, more fragile bridges and land failure causing minor slides along roadways may isolate some residents.

In Winthrop, none of the downtown structures are unreinforced masonry; these structures were built prior to the inclusion of articles for seismic stability in the Uniform Building Codes in 1972. The number and value of unreinforced structures or homes with masonry chimneys located elsewhere in Winthrop is unknown but estimated to include at least 20-40 buildings.

LANDSLIDE HAZARDS

Determined by representatives of the town, the following table includes landslide hazard ratings for the Town of Winthrop. Refer to the Landslide Hazards section of the Okanogan County Annex for more information about landslide risk in the county.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	6 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

The town of Winthrop has a very low probability of experiencing damaging landslides. Slopes in and around the community are generally less than 25%. Many of the rural subdivisions and groups of homes in the numerous tributaries of the Methow River have a much higher landslide risk, particularly on the west side of the valley. Slopes along many of these tributaries are within the range of steepness (angle of repose) where loose topsoils, fractured rock, and other unconsolidated material have a high potential to slide. It is also probable that small slides will continue to occur on the cut and fill slopes of some roads. This type of slide is generally small with little permanent damage to the road or other infrastructure; however, there is some risk of traffic being delayed temporarily while road crews clear the debris and stabilize the bank.

IMPACTS AND VALUE OF RESOURCES AT RISK

The communities of Winthrop, Twisp, and Pateros do not have a high potential for significant damage caused by landslides; however, many of the rural housing clusters on the west side of the valley do have significant risk. Many homes such as those along the Twisp River, Libby Creek, and Gold Creek have a moderate to high risk depending on their location. Homeowners in these higher risk areas should be aware of the potential risk and construct roads and building sites accordingly. Further weakening of toe slopes could trigger a large-scale slide.

There is also moderate risk of landslide activity along the major travel corridors, State Highways 20 and 153, that provide access to the communities in the Methow Valley. Road closures, for even a short period of time, resulting from landslides can slow or prevent the ingress and egress of residents or visitors to the valley and hinder response by law enforcement, various fire protection districts (Okanogan County Fire Districts #6 and 15), and public utilities districts (Okanogan County PUD and Okanogan County Electric Cooperative) during emergencies. In addition to roadways, landslides have also affected power infrastructure and disrupted the supply of power to the valley. Although these events are typically minor, they seem to be increasing in frequency due to slope destabilization associated with wildland fire.

SEVERE WEATHER HAZARDS

Determined by representatives of the Town, the following table includes severe weather hazard ratings for the Town of Winthrop. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information about severe weather risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	9 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

The probability of a severe weather event occurring in Winthrop on an annual basis is high; however, the town of Winthrop does not have any differing levels of risk associated with this hazard than Okanogan County. Many of the impacts from such events are also the same as what was described for the County except for snowfall. The Methow Valley can get significantly more precipitation in the form of snow than most other parts of the Okanogan Valley.

IMPACTS AND VALUE OF RESOURCES AT RISK

It is difficult to estimate the cost of potential winter storm damages to structures and the economy in Winthrop. Damage to roofs caused by heavy winter snowfall depends on the moisture content of the snow, total snow accumulation, and the structural characteristics of the buildings; the Methow Valley typically gets more snow than the rest of the county and the snow can be heavy. Frozen water pipes are the most common damage to residential and business structures. Older homes tend to be at a higher risk to frozen water pipes than newer ones. Snow plowing in within the town limits is accomplished by the town's public works department. Private landowners are responsible for maintaining their own driveways or other private roads. Utility supplies are impacted during severe winter storms as power is lost on a regional basis. This has a two-fold impact on residents as not only is power cut to homes and businesses, but primary heating is lost for many residents. Gas furnaces and wood stoves supplement electrical heating, but with wood heating the senior population is at a disadvantage. Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for several days and businesses may not open. Damages are seen in the form of structural repair and loss of economic activity. Okanogan County schools are occasionally closed during and right after a severe winter storm because of cold temperatures and snow covered roads.

Thunderstorms are not likely to be severe enough in Winthrop to cause significant damages. However, the loss potential from flooding that results from severe thunderstorms could be significant.

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property within Winthrop. The most significant losses are most clearly seen in the agriculture sectors of the economy. Potential losses to agriculture can be disastrous. Crop damage from hail will also be different depending on the time of year and the type of crop. Most farmers carry insurance on their crops to help mitigate the potential financial loss resulting from a localized hail storm. Homeowners in Winthrop rarely incur severe damage to structures (roofs); however, hail damage to vehicles is not uncommon. The damage to vehicles is difficult to estimate because the number of vehicles impacted by a specific ice storm is unknown. Additionally, most hail damage records are kept by various insurance agencies.

It is difficult to estimate potential losses in Winthrop due to windstorms and tornadoes. Construction throughout the County has been implemented in the presence of high wind events, and therefore, the community is at a higher level of preparedness to high wind events than many other areas experiencing lower average wind speeds.

We have estimated losses based on wind and tornado damage as follows:

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)
- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 749 total parcels with 440 improvements in the Town of Winthrop worth a little more than \$73 million. Using the criteria outlined above an estimate of the impact of high winds on the city has been made. The potential wind and tornado impact on improvements values is estimated at more than \$1.1 million in damage. The estimated damage to roofs (on parcels with improvements) is approximately \$66,000.

Power failure often accompanies severe storms. More rural parts of the County like Winthrop are sometimes better prepared to deal with power outages for a few days due to the frequent occurrence of such events; however, prolonged failure, especially during cold winter temperatures can have disastrous effects. All communities should be prepared to deal with power failures. Community shelters equipped with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water.

WILDLAND FIRE HAZARDS

Determined by representatives of the city, the following table includes wildland fire hazard ratings for the Town of Winthrop. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information about wildfire risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	9 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

The hills and valley bottom in the Winthrop area primarily feature sagebrush and mid-length grasses while some smaller draws feature stringers of sparse ponderosa pine. Fires in these light, flashy fuels can be expected to spread rapidly under hot, dry conditions. Within the valley, fuel continuity has been disrupted as much of the native vegetation has been converted to livestock pasture, agricultural fields, or residential development. Fuel continuity has been further disrupted by riparian vegetation, including black cottonwoods, willows, and other hardwoods are present along the Methow and Chewuch Rivers, and through the maintenance of recreation areas, such as Pearygin Lake State Park, where vegetation is mowed or treated and, in some cases, watered which reduces wildfire hazards.

Power infrastructure in the Methow Valley is particularly vulnerable to wildfire, but efforts have been made recently to protect and build redundancy into the power system. Okanogan Public Utility District (PUD) and Okanogan Rural Electric Cooperative (OCEC) provide electrical service to the Methow Valley. The Methow Valley’s electricity needs are now served by two transmission lines. Service provided by the original transmission line, which starts in Okanogan at a substation and follows State Route 20 over Loup Loup Pass to the substation in Twisp, has been supplemented with the Pateros transmission line. Okanogan PUD owns and operates both lines. Additionally, the valley’s residents are served by a network of distribution lines that connect the transmission line to homes and businesses. The Okanogan PUD and OCEC share maintenance of the distribution system. Both utilities maintain some percentage of underground lines in the Methow Valley. The OCEC has reported that 95% of new distribution line construction and feeder upgrades in their service area are being installed underground. There is also a growing number of residents living off the power grid by creating their own power source via solar, wind, or generators. These efforts should reduce the likelihood that power is lost over the entire jurisdiction or for long periods of time during emergency situations involving wildland fire.

Fire Protection in the Methow Valley:

- *County and Structural Protection:* Okanogan County Fire District #6 is responsible for structural and wildland fire protection within most of the populated areas of the Winthrop and Twisp-Carlton Neighborhoods. Okanogan County Fire Protection District #15 provides protection for the populated areas bordering the Methow River through the Lower Methow Neighborhood.
- *State Lands:* State lands are the sole responsibility of the Washington Department of Natural Resources (suppression & reciprocal agreements may apply). The DNR provides wildfire protection during the fire season between April and October with a varying degree of resources available in the early spring and late autumn months.
- *Federal Lands and Agencies:* Federal lands are the sole responsibility of the Federal management agency (reciprocal agreement may apply). The U.S. Forest Service seasonally responds to all wildland fires on their jurisdiction and may also respond to wildland fires on state and private lands based on a reciprocal agreement with the DNR.
- *Private Lands:* Much of the private lands in Okanogan County are within joint jurisdiction between the County fire protection districts and the WA DNR.

PROBABILITY OF FUTURE OCCURRENCE

The Winthrop Neighborhood has a moderate risk of experiencing a large wildland fire due to the extensive development and conversion of native fuels to pasture or other agricultural use. However, recreational activities, the lighting of fires, and other human activities in surrounding areas present a significant wildfire risk to the Town of Winthrop. For instance, wildfires that start in the uplands and high forests of the Chewuch and Methow watersheds can be carried into town as both watersheds pass through Winthrop from narrow valleys. Recreational activities along the Methow and Chewuch Rivers and at Pearygin Lake State Park have a high likelihood of an ignition from campfires, BBQs, ATVs, etc. Careful maintenance of the fuels within and surrounding the park reduces this potential risk and helps protect the park from fires spreading into the area from the surrounding area. In the event of a threatening fire, the town of Winthrop may be at high risk due to the use of wood building materials on many of the buildings. The plank board siding, wooden sidewalks, and wood shingled roofs are conducive to ignition from fire brands and from human and vehicular errors.

IMPACTS OF WILDLAND FIRE EVENTS

The potential impacts from a wildfire in Winthrop are similar to those described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel, especially because of the rural conditions and limited ingress and egress. Individual structures, property, and livelihoods could be severely damaged or lost and the community could endure significant economic impacts as a result of wildfire.

Low frequency fires in the shrublands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

Smoke from nearby wildland fires significantly impacts sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Winthrop to other communities; thus, travel and commerce are interrupted significantly.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Winthrop from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Winthrop would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that Winthrop will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county. Determined by representatives of the town, the following table includes volcano hazard ratings for the Town of Winthrop. Refer to the Volcano Hazards section of the Okanogan County Annex for more information about volcano risk in the county.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	4 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that could fall on the Town of Winthrop. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

General impacts to the Town of Winthrop are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and seismic activity are expected to have the greatest impact on the small rural cities and communities of Okanogan County.

The greatest impacts from ashfall will likely concern water quality and emergency response. Ashfall will have a significant impact on the Chewuch and Methow Rivers which could affect the systems that supply drinking water to the city and other water systems. Light ashfall is not expected to cause any major damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the municipality. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the general public.

HAZARDOUS MATERIALS HAZARDS

Due to data limitation, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. Refer to the county section for a more complete analysis of hazardous materials. Determined by representatives of the city, the following table includes hazardous materials hazard ratings for the Town of Winthrop.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	6 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

LOCAL EVENT HISTORY

There are four cleanup sites on record with the Washington Department of Ecology. There is one site that is awaiting and three have been cleaned up and require no further action

Table 111) Hazardous waste clean-up sites in Winthrop, WA. Sites highlighted in blue are still active. Data is from the Washington State Department of Ecology Cleanup Site Search.

Cleanup Site ID	Site Name	Site Status	Site Rank
4849	Crescent Mine	Awaiting Cleanup	NA
3246	Okanogan Electric Co Op	No Further Action	NA
4907	Pasayten Cafe Texaco	No Further Action	NA
8183	WINTHROP NFH	No Further Action	NA

PROBABILITY OF FUTURE OCCURRENCE

The probability of a large release of hazardous materials into the environment is low as there are no major processing facilities or transportation infrastructure that are set up specifically for hazardous materials. Operations that are most likely to be associated with larger spills or releases of hazardous materials into the environment include mining, fuel station, and industrial or commercial businesses. The probability of the release of small quantities of hazardous substances is low to moderate; typically, releases become less likely as the quantity or volume released increases.

IMPACTS OF HAZARDOUS MATERIALS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUES OF RESOURCES AT RISK

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified, other costs could include medical treatment for people have been exposed to hazardous materials, environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the Town of Winthrop. Therefore, the following table, which is representative of the Town of Winthrop, displays the pandemic hazard ratings that were selected by the Planning Team for Okanogan County. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

The town has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The town has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to the Town of Winthrop. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for the Town of Winthrop was six (0.6% of total county cases) and the virus had caused zero deaths. For the entire county, there were 1,042 total cases and 13 deaths recorded by that same date.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the Town of Winthrop. Nationwide, the pandemic will have resulted in hundreds of thousands of deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

TOWN OF RIVERSIDE ANNEX

FLOOD HAZARDS

Determined by representatives of the town, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the Town of Riverside. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the Town of Riverside.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

Dam failure hazard ratings for the Town of Riverside.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

RIVERINE FLOODING

A large portion of the community of Riverside is located within the 100-year floodplain of the Okanogan River. All but a small portion near the Riverside Bridge is located on the west side of the river and much of this area has been developed for agricultural purposes. Johnson Creek, coming from the west, empties into the Okanogan River at Riverside; however, this stream does not seem to add to the floodplain.

In addition to the potential flood hazard of the Okanogan River, Johnson Creek, which drains several small tributaries out of the foothills to the west, flows through the middle of the residential neighborhood of

Riverside. Although Johnson Creek has no identified floodplain, a blockage could cause the stream to breach its banks resulting in severe damage to many homes and businesses.

Flooding in Riverside is usually the result of rain-on-snow events or heavy spring runoff in the high country. Warm weather or rain after a heavy snowfall is called a rain-on-snow event. Warm rains falling on the snow pack result in a significantly increased rate of snowmelt. Often the melting occurs when the ground is frozen and the water cannot be absorbed fast enough, resulting in increased overland flows. Flood waters recede slowly as the weather events tend to last for several days.

DAM FAILURE

Riverside is located on the Okanogan River but there are no high impact dams located near the town. The closest high impact dams are those located near Conconully, but the confluence of Salmon Creek and the Okanogan River is downstream from Riverside. There are at least five high-impact dams located upstream from Riverside, but the closest one is at least 20 miles away from the town and only one of them, Zosel Dam, is on the Okanogan River.

The failure of a dam could result in the release of a relatively large volume of water, especially if its purpose is water retention (i.e. a reservoir or impoundment), and cause sedimentation and erosion. Flood waters carrying sediment, which builds up behind a dam over time, follow natural and man-made drainage features after being released by a dam failure. Sediment deposition and erosion are common in the paths/drainages that flood waters follow which can cause extensive damage to both the natural environment and human development. In general, the damage will be the greatest at the point of release (at the dam) and more subtle downstream, especially if flood waters enter a larger river system or water body with a higher carrying capacity. Upon entering a larger river or larger body of water, flood waters lose momentum and disperse. The most notable change downstream may be rising water levels, which could approach flood stage, especially if a large volume of water were released rapidly by the failure.

Once the impoundment or reservoir is drained, flood waters downstream from the dam will recede and resemble pre-failure flows levels. The most significant changes will be above the dam where water was impounded. After the dam failure, water levels could resemble a natural flow-pattern which was altered when the dam was constructed. Water levels above the dam will be permanently reduced unless the dam is rebuilt or replaced.

PROBABILITY OF FUTURE OCCURRENCES

RIVERINE FLOODING

The probability of flood events occurring in Riverside is low to moderate. Low magnitude flood events can be expected several times each year. However, due to the levee and drainage infrastructure, the impacts of these events are slight and will usually amount to minor and temporary traffic issues. Larger magnitude and high impact flood events have occurred but are not likely in any given year. These types of flood events have the highest probability of occurrence in the winter or early spring in Riverside. Minor flash floods are common on the numerous small tributaries feeding the Okanogan River near the community but are not likely to have an impact on the Okanogan River channel within the city center.

DAM FAILURE

Given the low number of high-risk dams located upstream, the Town of Riverside, which is located along the Okanogan River, is at low risk to a dam failure. The only high-impact dam located upstream on the Okanogan River is the Zosel Dam in Oroville. Although Osoyoos Lake is behind Zosel Dam, which has partially failed in the mid-1970's, there are more than 30 miles of Okanogan River between Riverside and the Zosel Dam which should effectively buffer the sudden release of water resulting from a failure. There are several other high-impact dams located on tributaries to the Okanogan River, but they are also far from Riverside and are a component of reservoirs or impoundments that are relatively small.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

The potential impacts from flooding in Riverside are very similar to the impacts described for the County as a whole. First responders and other volunteers aiding with emergency flood control or cleanup efforts are potentially at risk of injury due to accidents or possibly exposure to contaminated water. Although unlikely, the city's water supply could be affected by contaminated flood waters entering the groundwater supply. Refer to Figure 69 for a map of NFIP flood zones in the City of Omak (refer to Table 112 for descriptions of NFIP flood zones)..

The major impacts from flooding in Riverside include flooding on the east side of the main as well as flooding in the field. Basement seepage is the most common impact to homes and other structures in Riverside.

The availability of food and other supplies is not likely to be impacted or interrupted by a flood event. Furthermore, community services such as postal services, health care, law enforcement, and emergency response are also not likely to be impacted by flood events in Riverside. While individual homes and businesses may incur damages because of a flood, it is unlikely that the local economy will be affected.

Table 112) Definitions of NFIP flood zones identified in Okanogan County, WA.

ZONE	FLOOD TYPE	DESCRIPTION
A	100-Year	High Risk: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	100-Year	High Risk: Areas subject to a one percent or greater annual chance of flooding in any given year. Base flood elevations are shown as derived from detailed hydraulic analyses (Zone AE is used on new and revised maps in place of Zones A1-A30)
AO	100-Year	High Risk: River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
X500	500-Year	Low to Moderate Risk: Areas of moderate flood hazard from the principal source of flood in the area, determined to be within the limits of one percent and 0.2 percent annual chance floodplain. (Shaded Zone X is used on new and revised maps in place of Zone B.)

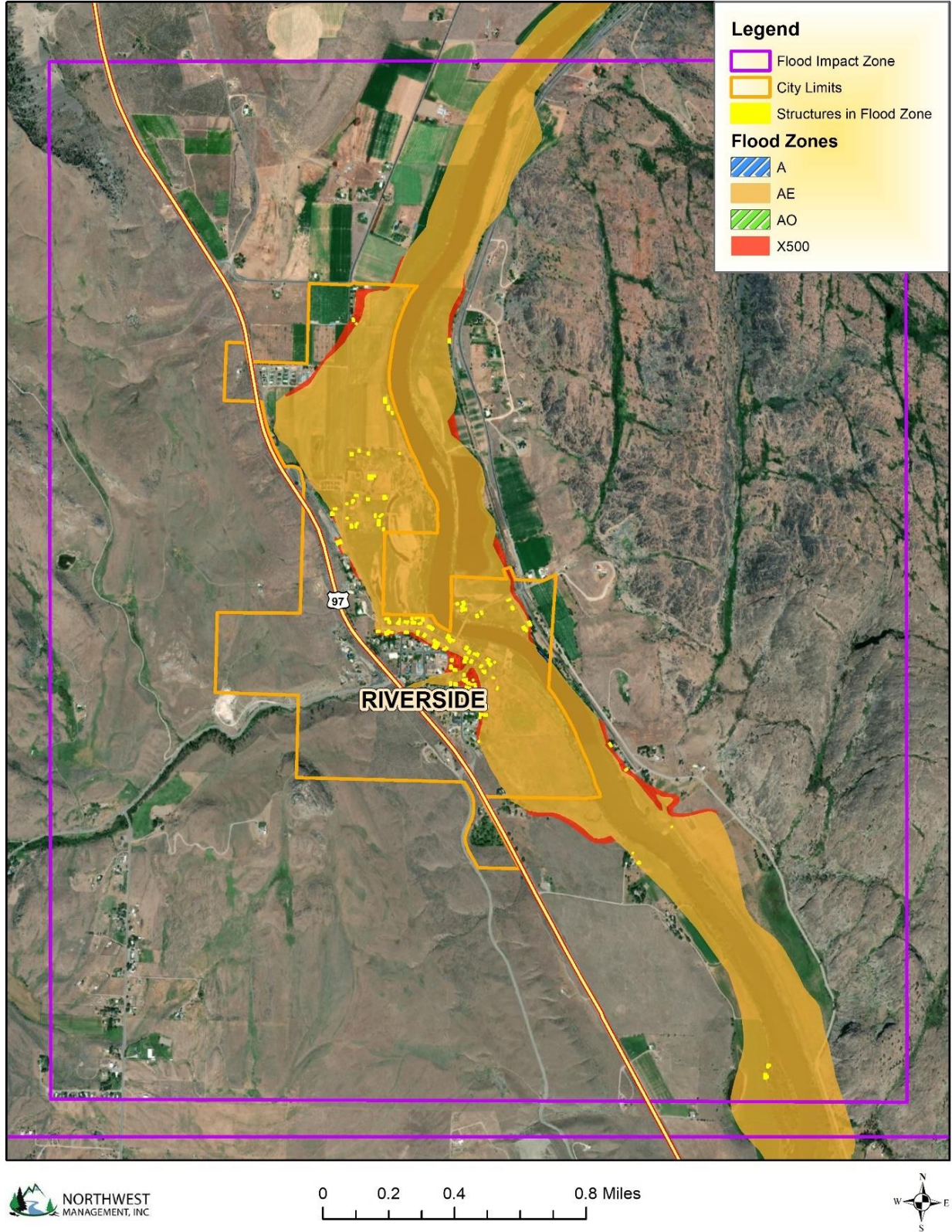


Figure 69) FEMA National Flood Insurance Program Flood Zone map of Riverside, WA. Refer to Table 112 (above) for definitions of the NFIP flood zones identified on the map. *Note: Okanogan County regulatory flood maps are currently being updated; the final drafts will be available by winter 2023/2024.*

Environmental damages resulting from a flood event are also unlikely. The Okanogan River occupies a relatively wide floodplain except for a short segment that has been channeled through the community. Scouring and erosion along the banks of the stream along this more narrow section is possible, but due to grass and other vegetation, these impacts will most likely be minimal and localized. Contamination of the riparian area by floodwaters containing chemicals or other pollutants is a possibility but is more likely to be realized in the surrounding areas than within the community due to the hydrologic profile of the floodplain.

DAM FAILURE

There are only a few high impact dams upstream from the Town of Riverside, with the closest dam located more than 30 miles away, so it is unlikely that a dam failure will have a direct impact on the town. However, there could be indirect consequences that result from a dam failure which would largely be related to the economy. For example, direct economic consequences include the costs of repairing damage and replacing lost items while indirect economic consequences include the loss of jobs, the loss of sales, and the cost of securing alternative space for residential or business purposes.

Economic impacts in surrounding areas, especially those close to the dam failure, may not be limited to assets in the inundation area but may extend to infrastructure and resources that serve a much broader area, including Riverside. In addition to direct damage from dam failure, economic impacts include the amount of time required to repair or replace and reopen businesses, governmental and nonprofit agencies, and industrial facilities damaged by the dam failure.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

The following table summarizes the number of structures, number of parcels, number of improvements made to those properties, and total and average value of improvements in the 100-year and 500-year flood zones within the Town of Riverside.

Riverside	No. Structures	No. Parcels	No. Improv.	Improv. Value	Avg. Improv. Value
100 Yr FZ	74	194	90	\$5,901,700	\$65,574
500 Yr FZ	105	206	193	\$12,755,500	\$66,091

Although Okanogan County Fire District #7 and the Okanogan County Public Utilities District provide service to areas within the Riverside floodplain, they do not have any facilities or assets located within the identified floodplain. Nevertheless, these districts could be impacted due to emergency response calls or limited access caused by flooding.

There is no critical infrastructure or facilities located within the floodplain in Riverside; however, there are several homes, businesses, and agricultural developments.

Roads and bridges are the major infrastructural element that could be affected by flooding. Alternative routes to all parts of county are limited during most major flood events.

Local power distribution systems may be compromised when power poles are undermined by flood waters; however, this is not a common occurrence as most of the power grid is located outside of flood areas.

DAM FAILURE

It is highly unlikely that the Town of Riverside will be affected by a dam failure. As stated previously, there are only a few high-impact dams that could affect the Riverside. Because of the distance of these dams from the city, direct impacts from an upstream failure should be negligible. Even if there are indirect economic impacts from a failure it is unlikely that any of those costs will be significant or have a major impact on Omak's economy. Specific values for both direct and indirect impacts could not be totaled as the inundation zones associated with the dams discussed earlier in this section are unknown.

EARTHQUAKE HAZARDS

Determined by representatives of the Town, the following table includes earthquake hazard ratings for the Town of Riverside. Riverside does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole; refer to the Earthquake Hazards section of the Okanogan County Annex for more information.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions in the Methow Valley have a slightly higher probability of experiencing an earthquake than those in the Okanogan River valley or on the eastern border of the County (10-15% probability versus 6-10% probability); however, no specific jurisdiction has more risk than another or than the County overall within these areas.¹⁴⁴

¹⁴⁴ USGS. 2008 United States National Seismic Hazard Maps. U.S. Geological Survey. U.S. Department of Interior. Available online at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>. October 2009.

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no recorded occurrences of earthquakes significantly impacting the city of Riverside; however, some minimal shaking has been felt as a result of larger earthquakes elsewhere.

Unreinforced masonry (URM) structures and unreinforced chimneys of homes will likely be damaged in the event of an earthquake. There are a few publicly accessible unreinforced masonry structures in Riverside in addition to the numerous homes and other buildings throughout the Town with unreinforced chimneys. Damaged or collapsed chimneys could result in the secondary hazard of fire. Nonstructural damage caused by falling and swinging objects may be considerable after any magnitude earthquake. Damage to some older, more fragile bridges and land failure causing minor slides along roadways may isolate some residents.

In Riverside, only three of the downtown structures are assumed to be unreinforced masonry. These structures were built prior to the inclusion of articles for seismic stability in the Uniform Building Codes in 1972. The number and value of unreinforced masonry homes or homes with masonry chimneys in Riverside are unknown but estimated to include at least 10-30 buildings.

Also of concern is the water tower which is Riverside's primary means of storing water. Small slides and erosion around the tower indicate that slope stability could be a concern in the event of a major earthquake.

LANDSLIDE HAZARDS

Determined by representatives of the town, the following table includes landslide hazard ratings for the Town of Riverside. Refer to the Landslide Hazards section of the Okanogan County Annex for more information about landslide risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	4 – Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	9 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

The Town of Riverside has a high probability of experiencing significant landslides as both sides of the river corridor feature steep slopes that could produce a slide. Recently, small, low angle slumps have occurred in areas that have been previously disturbed by construction projects or excavation. The water tower site is of particular concern as heavy rains and saturated soils have recently caused small slides near the tower site.

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no structures or infrastructure directly at risk from landslides within the town of Riverside.

SEVERE WEATHER HAZARDS

Determined by representatives of the town, the following table includes severe weather hazard ratings for the Town of Riverside. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information about severe weather risk in the county.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	6 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

The town of Riverside does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. The probability of a severe weather event occurring in Riverside on an annual basis is moderate. However, the impacts to the community are usually minimal and are the same as those described for Okanogan County as a whole.

IMPACTS AND VALUE OF RESOURCES AT RISK

It is difficult to estimate the cost of potential winter storm damages to structures and the economy in Riverside. Damage to roofs by heavy snow accumulations depends on the moisture content of the snow and the structural characteristics of the buildings. In general, snow in this region tends to have low moisture content because of the low temperatures and arid environment. Additionally, snow rarely accumulates for long periods of time due to regular wind events. Frozen water pipes are the most common damage to residential and business structures. Older homes tend to be at a higher risk to frozen water pipes than newer ones. Snow plowing in within the town limits is accomplished by the town’s public works department. Private landowners are responsible for maintaining their own driveways or other private roads. Utility supplies are impacted during severe winter storms as power is lost on a regional basis. This has a two-fold impact on residents as not only is power cut to homes and businesses, but primary heating is lost for many residents. Gas furnaces and wood stoves supplement electrical heating, but with wood heating the senior population is at a disadvantage. Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for

several days and businesses may not open. Damages are seen in the form of structural repair and loss of economic activity. Okanogan County schools are occasionally closed during and right after a severe winter storm because of cold temperatures and snow-covered roads.

Thunderstorms are not likely to be severe enough in Riverside to cause significant damages. However, they can produce strong winds in the canyon and limited flash flooding along the river which could result in damage to structures and infrastructure.

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property within Riverside. The most significant losses are most clearly seen in the agriculture sectors of the economy. Potential losses to agriculture can be disastrous. Crop damage from hail will also be different depending on the time of year and the type of crop. Most farmers carry insurance on their crops to help mitigate the potential financial loss resulting from a localized hailstorm. Homeowners in Riverside rarely incur severe damage to structures (roofs); however, hail damage to vehicles is not uncommon. The damage to vehicles is difficult to estimate because the number of vehicles impacted by a specific ice storm is unknown. Additionally, most hail damage records are kept by various insurance agencies.

It is difficult to estimate potential losses in the town of Riverside due to windstorms. The county has set standards for construction and building practices through the adoption of the latest International Building Codes. These codes consider various severe weather conditions, including high winds, and are likely to be sufficient for structures in the county. However, the canyon can channel storm winds, causing them to reach exceptional speeds, which could cause damage to structures or topple trees. Older buildings that have not been updated with modern building materials will likely be the most vulnerable to such an event.

Therefore, the following calculations were used to estimate both structural damage and roof damage resulting from high winds.

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)
- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 301 total parcels with 145 improvements in the Town of Riverside worth almost \$9.9 million. Using the criteria outlined above an estimate of the impact of high winds on the city has been made. The potential wind and tornado impact on improvements values is estimated at almost \$150,000 in damage. The estimated damage to roofs (on parcels with improvements) is almost \$22,000.

Power failure often accompanies severe storms. More rural parts of the County are sometimes better prepared to deal with power outages for a few days due to the frequent occurrence of such events;

however, prolonged failure, especially during cold winter temperatures can have disastrous effects. All communities should be prepared to deal with power failures. Community shelters equipped with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water.

WILDLAND FIRE HAZARDS

Determined by representatives of the town, the following table includes wildland fire hazard ratings for the Town of Riverside. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information about wildfire risk in the county.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	4 – Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events	4 – Highly Likely	90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year
Overall Significance	12 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

Wildland fuels within the community of Riverside are fairly limited to ditches, empty lots, and the riverbanks due to extensive urban and agricultural development. Orchards and other crops grow both within the valley and on many of the low benches where irrigation water is available. The surrounding foothills are vegetated primarily by sagebrush and various lower growing grasses. Sparse ponderosa pine can be found in a few of the nearby draws. The slope rising from the east side of the river near Okanogan is steep, almost vertical in some places; however, it appears to be nearly solid rock with little soil available for plant growth.

Wildfire potential in the agricultural fields near Riverside is high. Farming and ranching activities have the potential to increase the risk of a human-caused ignition. Large expanses of crops, CRP, rangeland or pasture provide areas of continuous fuels that may threaten homes and farmsteads near Riverside. Under extreme weather conditions, escaped fires in these fuels could threaten individual homes or the community; however, this type of fire is usually quickly controlled. Clearings and fuel breaks disrupt a slow moving wildfire enabling suppression before a fire can ignite heavier fuels. High winds increase the rate of fire spread and intensity of crop and rangeland fires. It is imperative that homeowners implement fire mitigation measures to protect their structures and families prior to a wildfire event.

Wildfire risk in the agricultural landscape is at its highest during late summer and fall when crops are cured and daily temperatures are at their highest. A wind-driven fire in agricultural fuels or dry native fuel

complexes would produce a rapidly advancing, but variable intensity fire. Fires burning in some types of unharvested fields would be expected to burn more intensely with larger flame lengths due to the greater availability of fuels resulting from the higher productivity of the vegetation. Fields enrolled in the CRP or set aside for wildlife habitat can burn very intensely due to an increased amount of fuel build-up from previous years' growth. Fires in these types of fuels are harder to extinguish completely due to the dense duff layer, often leading to hold over fires that may reemerge at a later date causing additional fire starts.

Residents living in Riverside have access to the municipal water supply system and public fire hydrants. Outside these areas, development relies on individual, co-op, or multiple-home well systems. Creeks, ponds, and developed drafting areas provide water sources for emergency fire suppression in the rural areas to a limited extent. Irrigation systems are capable of providing additional water supply for suppression equipment on a limited basis. Additional water resources distributed and documented throughout the agricultural landscape are needed to provide water for fire suppression.

Above ground, high voltage transmission lines cross the planning area in many directions in corridors cleared of most vegetation, which provides for a defensible space around the power line infrastructure and may provide a control point for fire suppression, if well maintained. Local public electrical utility lines are both above and below ground traveling through back yards and along roads and highways. Many of these lines are exposed to damage from falling trees and branches. Power and communications may be cut to some of these during a wildfire event.

State lands are the sole responsibility of the Washington Department of Natural Resources (suppression & reciprocal agreements may apply). Federal lands are the sole responsibility of the Federal management agency (reciprocal agreement may apply). Much of the private lands in Okanogan County are within joint jurisdiction between the County fire protection districts and the WA DNR.

The DNR provides wildfire protection during the fire season between April and October with a varying degree of resources available in the early spring and late autumn months. The DNR does not provide structural fire suppression, but does provide wildfire protection on non-forested land that threatens DNR-protected lands. The U.S. Forest Service seasonally responds to all wildland fires on their jurisdiction and may also respond to wildland fires on private lands based on a reciprocal agreement with the DNR. The BLM provides wildfire protection on their ownership within Okanogan County and has mutual aid agreements with the DNR for protection of forested land. BLM also does not provide structural fire suppression.

PROBABILITY OF FUTURE OCCURRENCE

The probability of a wildland fire threatening Creston on an annual basis is high. Homes and other structures located in the grasslands or agricultural fields within or surrounding the community have a high wildfire risk. Rangeland or grass fires are often the most dangerous due to high rates of spread. Fires in this fuel type are considered somewhat easier to suppress given the appropriate resources, but they can also be the most destructive. Homes along the perimeter of the community would have the highest risk due to their adjacency to flashy fuels.

IMPACTS OF WILDLAND FIRE EVENTS

Riverside allows for irrigation of landscaping and agricultural crops, which not only helps keep the vegetation green and at lower propensity for ignitions, but also gives firefighters abundant access to water resources for suppression purposes. As crop production slows in the fall, the irrigation pressure tends to taper off, leaving previously lush grasses and other vegetation to dry out and become a potential fire hazard.

The sagebrush and grassland fuels that dominant this part of the County usually becomes available to burn fairly early in the summer. The growth of a productive orchard takes many years and is, therefore, a long term investment. The potential loss of these orchards and the surrounding structures to fire would severely damage the local economy as well as change the way of life for many residents.

Although the fire did not impact Riverside directly, the 2015 Tunk Block fire burned on all sides of the Town. As the flaming fronts burned close to Riverside, both ingress and egress was cutoff as fires were burning toward the Town from all directions.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Riverside from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Riverside would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that Riverside will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county. Determined by representatives of the town, the following table includes volcano hazard ratings for the Town of Riverside. Refer to the Volcano Hazards section of the Okanogan County Annex for more information about volcano risk in the county.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that could fall on the Town of Riverside. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

General impacts to the Town of Riverside are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and seismic activity are expected to have the greatest impact on the small rural cities and communities of Okanogan County.

The greatest impacts from ashfall will likely concern water quality and emergency response. Ashfall will have a significant impact on the Okanogan River which could affect the systems that supply drinking water to the city and other water systems. Light ashfall is not expected to cause any major damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the municipality. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the general public.

HAZARDOUS MATERIALS HAZARDS

Due to data limitation, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. Refer to the county section for a more complete analysis of hazardous materials. Determined by representatives of the town, the following table includes hazardous materials hazard ratings for the Town of Riverside.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

LOCAL EVENT HISTORY

Currently, there are no cleanup sites on record with the Washington State Department of Ecology. The Johnson Creek Mine is the closest site but it has been cleaned up and requires no further action.

PROBABILITY OF FUTURE OCCURRENCE

The probability of a large release of hazardous materials into the environment is low as there are no major processing facilities or transportation infrastructure that are set up specifically for hazardous materials. Fuel stations and other small businesses in the area are the most likely source of a small spill. Related to some of the orchard operations in the area, ammonia is one of the only chemicals that is regularly transported past Riverside in large quantities.

The probability of the release of small quantities of hazardous substances is low to moderate; typically, releases become less likely as the quantity or volume released increases.

IMPACTS OF HAZARDOUS MATERIALS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUES OF RESOURCES AT RISK

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified, other costs could include medical treatment for people have been exposed to hazardous materials, environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the Town of Riverside. Selected by representatives of the Town, the following table includes hazard ratings for pandemic for the

Town of Riverside. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

LOCAL EVENT HISTORY

The town has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The town has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to the Town of Riverside. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for the City of Riverside was eight (0.8% of total county cases) and the virus had caused zero deaths. For the entire county, there were 1,042 total cases and 13 deaths recorded by that same date.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the Town of Riverside. Nationwide, the pandemic will have resulted in hundreds of thousands of deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

TOWN OF CONCONULLY ANNEX

FLOOD HAZARDS

Determined by representatives of the city, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the Town of Conconully. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the Town of Conconully.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

Dam failure hazard ratings for the Town of Conconully.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	4 – Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	9 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

RIVERINE FLOODING

The town of Conconully sits in a small basin with Salmon Lake directly abutting the east side of the community and Conconully Reservoir directly to the south. Salmon Lake is formed by the Salmon Lake Dam with water from the North Fork of Salmon Creek. Conconully Reservoir is formed by damming the water from Salmon Creek and the South Fork of Salmon Creek with the spillway being located about one mile south of Conconully. Even though Salmon Creek runs through the business district, the town of

Conconully is not located within the 100-year flood plain (there is a 100-year flood zone along Salmon Creek, but it is located downstream from the Conconully Reservoir).

All of these waterways are extremely prone to flash flooding from localized weather events due to typically shallow channels and wide floodplains. Rain-on-snow events can also have a significant effect on this watershed. Warm rains result in a significantly increased rate of snowmelt. Often this melting occurs while the ground is frozen and the water cannot be absorbed into the soil, resulting in increased overland flows. Flood waters recede slowly as rain-on-snow weather events tend to last for several days. Low velocity flooding occurs in several of the nearby tributaries almost annually during the spring runoff period.

Mudslides and flash flooding from the north are currently the greatest concern for Conconully. Log jams on the North Fork Salmon Creek further increase the risk related to mudslides and flash flooding as they are likely impounding sediment and other debris that will be let loose when the jam finally fails. In recent years, a mudslide blocked North Fork Salmon Creek Rd (NF 38) and trapped campers at the campground for an extended amount of time.

DAM FAILURE

Conconully is located away from the major rivers that run through or adjacent to the county, but it is situated between two impoundments. Conconully Reservoir is on the south side of town while Conconully Lake is on the east side of town; both reservoirs are associated with dams that have a high Downstream Hazard risk rating. The Salmon Lake Dam forms part of the eastern boundary of the town (the town is at the downstream end of Conconully Lake) while the Conconully Reservoir Dam is at the south end of the reservoir, on the opposite side from the town. *Currently, representatives from the town have no reason to believe that the Salmon Lake Dam will fail; however, the Conconully Reservoir Dam is in need of updates and improvements.*

The failure of a dam could result in the release of a relatively large volume of water, especially if its purpose is water retention (i.e. a reservoir or impoundment), and cause sedimentation and erosion. Flood waters carrying sediment, which builds up behind a dam over time, follow natural and man-made drainage features after being released by a dam failure. Sediment deposition and erosion are common in the paths/drainages that flood waters follow which can cause extensive damage to both the natural environment and human development. In general, the damage will be the greatest at the point of release (at the dam) and more subtle downstream, especially if flood waters enter a larger river system or water body with a higher carrying capacity. Upon entering a larger river or larger body of water, flood waters lose momentum and disperse. The most notable change downstream may be rising water levels, which could approach flood stage, especially if a large volume of water were released rapidly by the failure.

Once the impoundment or reservoir is drained, flood waters downstream from the dam will recede and resemble pre-failure flows levels. The most significant changes will be above the dam where water was impounded. After the dam failure, water levels could resemble a natural flow-pattern which was altered when the dam was constructed. Water levels above the dam will be permanently reduced unless the dam is rebuilt or replaced.

PROBABILITY OF FUTURE OCCURRENCE

RIVERINE FLOODING

Portions of the town of Conconully flood almost on an annual basis. Much of the townsite sits below the water table; thus, even a slightly elevated water level tends to flood some structures in town. Additionally, the proximity of Salmon Lake also adds to the potential for flooding and water seepage in the town. During a high water event, excess flow can be released from the Conconully Reservoir downstream into Salmon Creek and would not likely affect any structures in Conconully unless the spillway could not release water quickly enough causing water to back up into the townsite.

The Salmon Lake Dam controls water levels on Conconully Reservoir and is adjacent to the east edge of the townsite with the outlet stream located on the south end of the dam. Water released from the reservoir flows along southeast corner of downtown Conconully and into Conconully Reservoir. The main access route, Conconully Road, crosses this outlet stream just before it drains into Conconully Reservoir. Thus, during high water events, not only is there a chance that the entire town could be flooded by water overtopping Salmon Lake Dam, but the main escape route could be compromised by flood waters at the Conconully Road Bridge. This type of disaster was demonstrated in 1894 when the town of Conconully was completely destroyed by a 92-year flood event.

Flooding in Conconully, as with the rest of Okanogan County, is usually the result of rain-on-snow events or heavy spring runoff. Warm rains falling on the snowpack result in a significantly increased rate of snowmelt. Often the melting occurs when the ground is frozen and the water cannot be absorbed fast enough, resulting in increased overland flows. Flood waters recede slowly as the weather events tend to last for several days. Even though the two reservoirs help keep surface flow flood waters from inundating Conconully, the town's location at one of the lowest points in this small basin, tends to result in ground water seepage into structures and in many of the streets.

Several streets and road shoulders, particularly along the lake shores could erode under flood conditions around the Conconully area. Most secondary routes are not paved, which results in gravel washing down-slope potentially clogging drainage systems or directing water to places that were not intended.

DAM FAILURE

Even though there are two impoundments and two dams adjacent to the Town of Conconully, the probability of a future dam failure is low. Although it is very unlikely that either dam will fail, the failure of the Salmon Lake Dam will have significant implications for the Town of Conconully, threatening both property and the lives of those who live in town. The failure of the dam on the south end of Conconully Reservoir presents a greater risk to communities located downstream (especially Okanogan) than it does to Conconully. However, a sudden release of water from the reservoir could still cause damage to property and impact the local economy.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

The potential impacts from flooding in Conconully are very similar to the impacts described for Okanogan County as a whole. First responders and other volunteers aiding with emergency flood control measures or cleanup efforts are potentially at risk of injury due to accidents or possibly exposure to contaminated water. Although unlikely, the town's water supply could be affected by contaminated flood waters entering the groundwater supply.

The primary access into Conconully is Conconully Road from Okanogan. This is a paved, two lane road that is located outside the flood zone except as it enters the Conconully area. The only other potential escape route would be Sinlahekin Road towards Fish Lake to the northeast, which is a graveled, two-lane road. The Sinlahekin Road travels along a very steep sided valley bottom and has a relatively high potential for washouts or other damage during a flood event. Additionally, the outlet of this route could be compromised by flooding in the nearby Fish Lake area.

The availability of food and other supplies could be impacted or interrupted by a flood event. Furthermore, the delivery of community services such as postal services, health care, law enforcement, and emergency response might also be impacted by flood events in Conconully except in extreme circumstances such as a 100-year plus flood event. While individual homes and businesses may incur some damages as a result of a flood, the economy would likely incur the largest impact due to the potential loss of tourism during peak seasons.

Environmental damages resulting from a flood event are also unlikely. Erosion along the stream banks and deposition of sediments in the Conconully area is possible, but due to grass and other vegetation on the stream banks, these impacts will most likely be minimal and localized. Contamination of the riparian area by floodwaters containing chemicals or other pollutants is also a possibility.

DAM FAILURE

The failure of the Salmon Lake Dam would have serious implications for Conconully. The Salmon Lake Dam is adjacent to and runs parallel with the eastern edge of town, with Conconully Lake above the dam and the town positioned immediately below the dam. In the event of a failure, flood waters would spill directly into Conconully, causing serious damage to structures and infrastructure and putting lives at risk. Given the location of the outlet from Conconully Lake, it is the southeast corner of town that is the most likely to be affected in the event of a failure or partial failure. As flood waters flow through the town they will enter Conconully Reservoir which has some flood control capacity; however, it is likely that a large volume of water will enter Salmon Creek via the spillway at the south end of the reservoir and flow towards the Okanogan River.

The failure of the Conconully Reservoir Dam will have the greatest implications for downstream communities, but it could still impact the Town of Conconully. The drainage of the reservoir would mean the loss of a water resource and the possibility of impacts to property and roads along the edges of the

reservoir. The sudden drainage of the reservoir could cause embankments to slump which may result in damage to and the closure of roads.

Economic impacts are also associated with the failure of either dam. Direct economic consequences include the costs of repairing damage and replacing lost items while indirect economic consequences include the loss of jobs, the loss of sales, and the cost of securing alternative space for residential or business purposes. For example, the parks and resorts along the edges of the two impoundments will likely experience significant direct and indirect economic impacts related to a dam failure.

Conconully could also be affected by a dam failure elsewhere in the county. Economic impacts resulting from dam failures in surrounding areas, especially those close to the dam failure, may not be limited to assets in the inundation zone but may extend to infrastructure and resources that serve a much broader area, including Conconully. In addition to direct damage from dam failure, economic impacts include the amount of time required to repair or replace and reopen businesses, governmental and nonprofit agencies, and industrial facilities damaged by the dam failure.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

Conconully has approximately \$11.6 million of assets at risk located in the 100-year flood zone, which means there is a 1% chance of these properties flooding in any given year. Of these assets at risk, the largest proportion of value (61%) is classified as residential homes with \$7.1 million; however, recreational and public properties account for \$1.3 million and \$1.2 million, respectively. Public land accounts for 49% of the total acreage (63 acres) within the floodplain due to the location of Conconully State Park. Twenty-four percent of the total acreage (31 acres) is classified as resource land; however, this category makes up less than 1% of the total value in the Conconully flood zone.

Although the Okanogan County Public Utilities District provides services to areas within the Conconully floodplain, they do not have any facilities or assets located within the identified floodplain. Local power distribution systems may be compromised when power poles are undermined by flood waters; however, this is not a common occurrence as most of the power grid is located outside of flood areas.

Both the Conconully Town Hall and the city's fire station are within the 100 year flood zone; thus, there is a high potential for local emergency service and government operations to be hindered by flood waters. Equipment, structures, files, etcetera could be damaged or lost during a flood event.

Roads and bridges are the major infrastructural element that is affected by flooding. Alternative routes out of the Conconully area may be limited or completely lost during a major flood event. Bridges, particularly the Conconully Road Bridge, and culverts near Conconully have been repeatedly compromised by past flood events causing long term damage to road systems.

Several municipal water systems in Conconully are within the floodplain including the city well and the State Park water system; thus, numerous residents could be without clean drinking water as pumps and well houses become inoperable or contaminated by flood waters.

DAM FAILURE

Even though it is unlikely that Conconully will be affected by a dam failure, the impacts from a Salmon Lake Dam failure could be significant. A partial failure of the dam may only damage sections of roadway or cause minor flooding to some homes, but a complete dam failure could flood the entire town and threaten lives. Costs associated with the failure of a dam in the Conconully area could include repairs to roadway infrastructure, water damage to homes and other structures, insurance claims, loss of life, and the loss of a water resource. Specific values could not be totaled as the inundation zones associated with both dams are unknown.

EARTHQUAKE HAZARDS

Determined by representatives of the city, the following table includes earthquake hazard ratings for the Town of Conconully. Conconully does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole; refer to the Earthquake Hazards section of the Okanogan County Annex for more information.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	5 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area

PROBABILITY OF FUTURE OCCURRENCE

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions in the Methow Valley have a slightly higher probability of experiencing an earthquake than those in the Okanogan River valley or on the eastern border of the County (10-15% probability versus 6-10% probability); however, no specific jurisdiction has more risk than another or than the County overall within these areas.¹⁴⁵

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no recorded occurrences of earthquakes significantly impacting the town of Conconully; however, some minimal shaking has been felt as a result of larger earthquakes elsewhere.

¹⁴⁵ USGS. 2008 United States National Seismic Hazard Maps. U.S. Geological Survey. U.S. Department of Interior. Available online at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>. October 2009.

Unreinforced masonry (URM) structures and unreinforced chimneys of homes will likely be damaged in the event of an earthquake. There are no publicly accessible unreinforced masonry structures in Conconully, 10 homes and other buildings throughout the Town have unreinforced chimneys. Damaged or collapsed chimneys could result in the secondary hazard of fire. Nonstructural damage caused by falling and swinging objects may be considerable after any magnitude earthquake. Damage to some older, more fragile bridges and land failure causing minor slides along roadways may isolate some residents.

In Conconully, none of the downtown structures are unreinforced masonry. The value of structures in the downtown district is unknown. There are no known unreinforced masonry homes and approximately 10 homes with masonry chimneys in Conconully.

LANDSLIDE HAZARDS

Determined by representatives of the city, the following table includes landslide hazard ratings for the Town of Conconully. Refer to the Landslide Hazards section of the Okanogan County Annex for more information about landslide risk in the county.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	6 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

POTENTIAL OF FUTURE OCCURRENCE

The primary slope stability problem in the Conconully area is associated with the steepness of the slopes and the presence of unconsolidated soils. The slopes rising from the Sinlahekin Valley are very steep; thus, landslides could easily be triggered by water saturation of the overlying soils, flash flooding, human activity, wildfires, earthquakes, or other factors.

Fires in the Conconully area can cause a domino effect of multiple hazards. Higher intensity fires not only remove most of the vegetation, but they also cause soils to become hydrophobic or water repellent for a period of time after the fire. This combination leads to unusually high runoff after rain showers or during the spring runoff season. As streams and rivers begin to reach and exceed flood stage, bank failures and channel migration are common. Road building and other soil disturbances tend to exacerbate this effect leading to even more severe land and soil slides.

There is a high potential for landslides along Sinlahekin Road north of Conconully and along Salmon Creek on the south end of Conconully Reservoir. The major threat from landslides in these areas is the disruption

of traffic flow or possible entrapment due to the closure of roads. This area depends heavily on tourist traffic associated with Conconully State Park. The power supply system runs along Conconully Road from the Conconully to Okanogan. This area is not at high risk to landslides.

There are a few homes at very high risk to landslides along Sinlahekin Road near Conconully. These homes sit directly along the toe slope of the identified high risk slopes. Intense home construction and road building in this area could trigger a devastating landslide.

IMPACTS AND VALUE OF RESOURCES AT RISK

There are five structures worth approximately \$1.1 million in the Conconully Landslide Impact Zone (Figure 70). Fish Lake Road and Sinlahekin Road, which are secondary access routes, are the only critical infrastructure within this Impact Zone. It is difficult to estimate the potential dollar loss of these roadways as loss would be highly dependent on the extent of the damage.

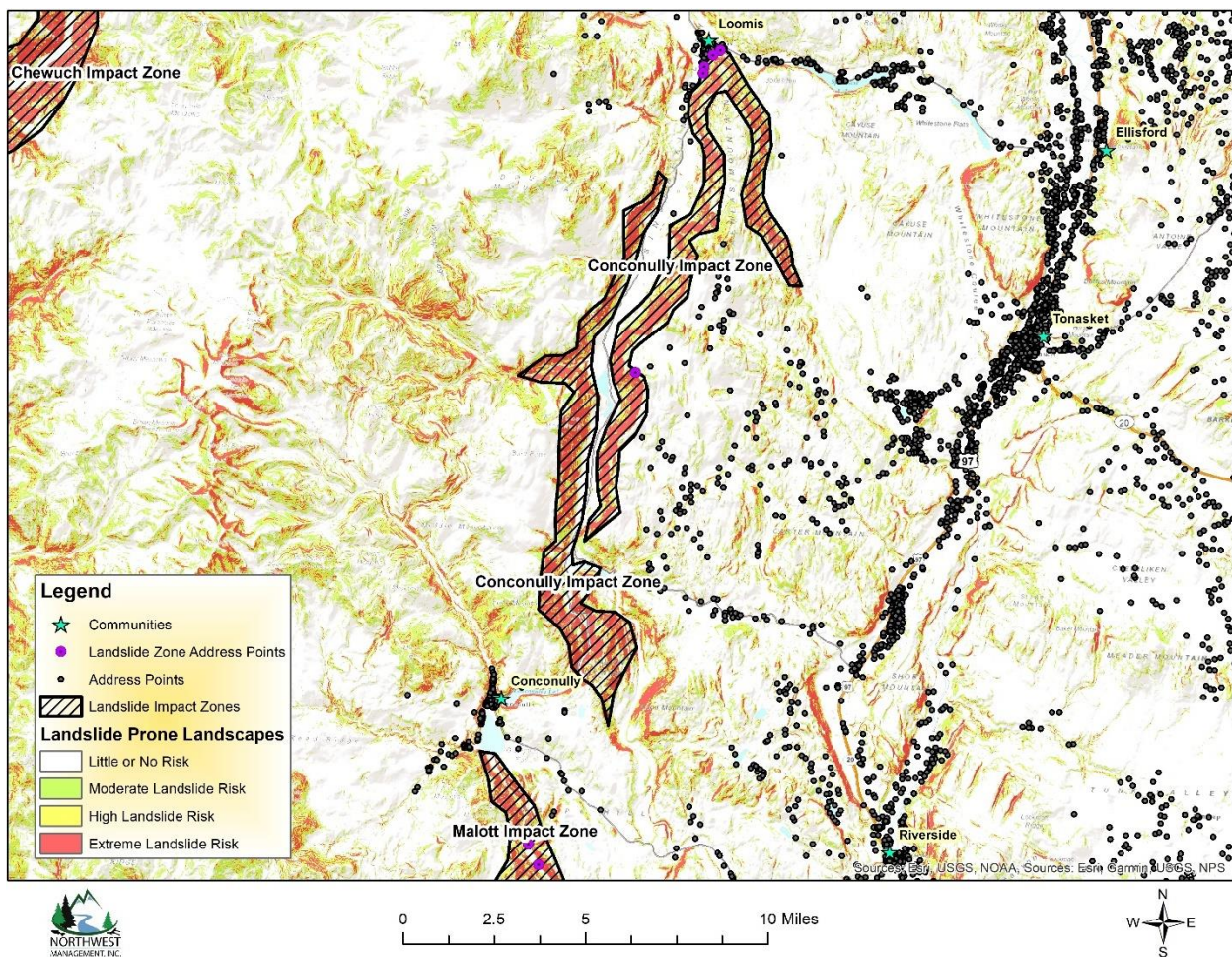


Figure 70) Conconully Landslide Impact Zones with structures/address points (purple points) in Okanogan County, WA. The zones were delineated by the Planning Team and the structure/address points are from a Washington State GIS layer.

No additional facilities or assets owned or maintained by the County, municipalities, fire districts or departments, or other special districts are currently located in the Conconully Landslide Impact Zone; however, Okanogan County Fire District #9 and the Okanogan County Public Utilities District service areas do cover this area. Access into the Conconully area could be hindered by landslides along the transportation corridors.

SEVERE WEATHER HAZARDS

Determined by representatives of the city, the following table includes severe weather hazard ratings for the Town of Conconully. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information about severe weather risk in the county.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	6 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

The town of Conconully does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. The probability of a severe weather event occurring in Conconully on an annual basis is high. However, the impacts to the community are usually minimal and are the same as those described for Okanogan County as a whole.

IMPACTS AND VALUE OF RESOURCES AT RISK

It is difficult to estimate the cost of potential winter storm damages to structures and the economy in Conconully. Damage to roofs by heavy snow accumulations depends on the moisture content of the snow and the structural characteristics of the buildings. In general, snow in this region tends to have low moisture content because of the low temperatures and arid environment. Additionally, snow rarely accumulates for long periods of time due to regular wind events. Frozen water pipes are the most common damage to residential and business structures. Older homes tend to be at a higher risk to frozen water pipes than newer ones. Snow plowing in within the town limits is accomplished by the town’s public works department. Private landowners are responsible for maintaining their own driveways or other private roads. Utility supplies are impacted during severe winter storms as power is lost on a regional basis. This has a two-fold impact on residents as not only is power cut to homes and businesses, but primary heating is lost for many residents. Gas furnaces and wood stoves supplement electrical heating, but with wood heating the senior population is at a disadvantage. Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with

shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for several days and businesses may not open. Damages are seen in the form of structural repair and loss of economic activity. Okanogan County schools are occasionally closed during and right after a severe winter storm because of cold temperatures and snow covered roads.

Thunderstorms are not likely to be severe enough in Conconully to cause significant damages. However, the loss potential from flooding that results from severe thunderstorms could be significant.

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property within Conconully. The most significant losses are most clearly seen in the agriculture sectors of the economy. Potential losses to agriculture can be disastrous. Crop damage from hail will also be different depending on the time of year and the type of crop. Most farmers carry insurance on their crops to help mitigate the potential financial loss resulting from a localized hail storm. Homeowners in Conconully rarely incur severe damage to structures (roofs); however, hail damage to vehicles is not uncommon. The damage to vehicles is difficult to estimate because the number of vehicles impacted by a specific ice storm is unknown. Additionally, most hail damage records are kept by various insurance agencies.

It is difficult to estimate potential losses in Conconully due to windstorms and tornadoes. Construction throughout the County has been implemented in the presence of high wind events, and therefore, the community is at a higher level of preparedness to high wind events than many other areas experiencing lower average wind speeds.

We have estimated losses based on wind and tornado damage as follows:

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)
- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 313 total parcels with 221 improvements in the Town of Conconully worth more than \$15.2 million. Using the criteria outlined above an estimate of the impact of high winds on the city has been made. The potential wind and tornado impact on improvements values is estimated at almost \$230,000 in damage. The estimated damage to roofs (on parcels with improvements) is more than \$33,150.

Power failure often accompanies severe storms. More rural parts of the County like Conconully are sometimes better prepared to deal with power outages for a few days due to the frequent occurrence of such events; however, prolonged failure, especially during cold winter temperatures can have disastrous effects. All communities should be prepared to deal with power failures. Community shelters equipped

with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water.

WILDLAND FIRE HAZARDS

Determined by representatives of the city, the following table includes wildland fire hazard ratings for the Town of Conconully. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information about wildfire risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

The Conconully community is located along the western edge of the Happy Hill Neighborhood and the southwestern edge of the Pine Creek Neighborhood. This neighborhood encompasses the incorporated town of Conconully and the Conconully State Park. Although there are many permanent residents, Conconully has been heavily developed as a recreationally destination. There are several resorts, campgrounds, and other recreational facilities surrounding the town site and the Conconully Reservoir and Salmon Lake. Most of the current development occurs within the town site, along the northern shore of Salmon Lake, and along the northwestern corner of Conconully Reservoir. In addition, there are numerous scattered residences along West Fork Road to the southwest and along Salmon Creek North Fork Road to the north.

The fuels in the Conconully Neighborhood are somewhat variable. Sparse to moderate density ponderosa pine and Douglas-fir stands are dominant around the shores of Salmon Lake, Conconully Reservoir, and extending to the west towards the Okanogan National Forest boundary. The understory vegetation is a mixture of open grass and shrub transitioning to mostly shrub and conifer regeneration as the elevation increases. Where homes occur some of the larger trees and understory vegetation in the immediate area has been thinned to allow for development. The south and west aspect slopes near the community are mostly covered with various grasses, a few sparse shrubs, and an occasional ponderosa pine. Due to the variable topography and vegetation, fire behavior will also tend to be variable. Fires will typically burn more intensely where forest fuels are more dense such as in the Salmon Creek drainages. On grass slopes and in open, well-spaced forest stands, fires will typically move quickly through the flashy surface fuels,

but burn with less intensity. Many of the structures within the Conconully community were built using wood materials for siding, decking, and or roofing, which because of its ignitability, adds to the potential fuel load.

There is no municipal water system in the town of Conconully, therefore residents in this area rely on personal or multiple home well systems, which includes residents of the rural neighborhoods of Pine Creek, Happy Hill, and Cook Mountain.

The neighborhoods of Pine Creek, Happy Hill, and Cook Mountain are provided electrical power via public distribution lines stemming from the main transmission lines in the Okanogan River valley. A branch of one of the main transmission lines travels from the valley up Conconully Road to the Town of Conconully.

Much of the Happy Hill and Conconully Neighborhoods have structural and wildland fire protection provided by Okanogan County Fire Protection District #9, excluding the north end of the Limebelt area. Additionally, the Town of Conconully maintains its own Volunteer Fire Department with fire protection responsibility within the community. Okanogan County Fire Protection District #3 extends part way up State Route 20 and the Chilliwist Road to provide structural and wildland fire protection to residents in those areas. Residents in the Pine Creek area lack any fire protection from a rural district.

State lands are the sole responsibility of the Washington Department of Natural Resources (suppression & reciprocal agreements may apply). Federal lands are the sole responsibility of the Federal management agency (reciprocal agreement may apply). Much of the private lands in Okanogan County are within joint jurisdiction between the County fire protection districts and the WA DNR. The DNR provides wildfire protection during the fire season between April and October with a varying degree of resources available in the early spring and late autumn months. The U.S. Forest Service seasonally responds to all wildland fires on their jurisdiction and may also respond to wildland fires on private lands based on a reciprocal agreement with the DNR.

Wildfire threats that are of greatest concern to Conconully are on public land. Currently, the town does everything it can within its jurisdiction to treat wildland fuels; however, fuels on public land are expansive and pose the greatest threat to Conconully.

PROBABILITY OF FUTURE OCCURRENCE

Residents in the Conconully Neighborhood have a very high risk of experiencing wildfire as was seen during the 2006 Tripod Fire. Not only are the fuels and topography in this area very conducive to fire, but there is a high likelihood of an ignition due to the extreme recreational use. Campfires and ATV's are just a few of the potential human-caused ignition sources. Further increasing the risk is the popularity of wood siding, decking, and roofing on homes throughout the area. Many homes and other structures are crammed onto small lots between the lake shores and the access routes with forest fuels on the slope above and among the structures. In the event of a fire, these homes would form a continuous fuel bed that could facilitate the spread the fire from home to home.

The Town of Conconully was threatened during the Tripod Fire of 2006; thus, significant fuel reduction work was completed in order to help prevent the fire from destroying the entire community. Emergency

thinning of forest stands and clearing of brush and slash within the townsite and surrounding area was conducted due to the high likelihood of the fire spreading directly towards Conconully. Efforts should be made to encourage residents and land managers to maintain this lessened fire risk condition.

IMPACTS OF WILDLAND FIRE EVENTS

The potential impacts from a wildfire in Conconully are very similar to the impacts described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel. Individual structures, property, and livelihoods could be severely damaged or lost as a result of a fire; however, the community is not likely to suffer severe or long-term economic losses.

Low frequency fires in the shrublands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

Smoke from a nearby wildland fire may impact sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Conconully to other communities; thus, travel and commerce may be interrupted.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Conconully from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Winthrop would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that Conconully will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county. Determined by representatives of the town, the following table includes volcano hazard ratings for the Town of Conconully. Refer to the Volcano Hazards section of the Okanogan County Annex for more information about volcano risk in the county.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that Conconully will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county.

PROBABILITY OF FUTURE OCCURRENCE

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that could fall on the Town of Conconully. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

General impacts to the Town of Conconully are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and seismic activity are expected to have the greatest impact on the small rural cities and communities of Okanogan County.

The greatest impacts from ashfall will likely concern water quality and emergency response. Ashfall will have a significant impact on Conconully Lake and Reservoir which could affect the systems that supply drinking water to the city and other water systems. Light ashfall is not expected to cause any major damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the municipality. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the general public.

HAZARDOUS MATERIALS HAZARDS

Due to data limitations, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. Refer to the county section for a more complete analysis of hazardous materials. Determined by representatives of the town, the following table includes hazardous materials hazard ratings for the Town of Conconully.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

LOCAL EVENT HISTORY

There are six cleanup sites on record with the Washington Department of Ecology. There are four sites that are awaiting cleanup, one on which cleanup has started, and one has been cleaned up and requires no further action (Table 113).

Table 113) Hazardous waste clean-up sites in Conconully, WA. Sites highlighted in blue are still active. Data is from the Washington State Department of Ecology Cleanup Site Search.

Cleanup Site ID	Site Name	Site Status	Site Rank
1531	First Thought Mine	Awaiting Cleanup	NA
1578	Wheeler Mine	Awaiting Cleanup	NA
1611	Arlington Mine	Awaiting Cleanup	NA
2073	Last Chance Mine	Awaiting Cleanup	NA
6272	Conconully General Store	Cleanup Started	5 - Lowest Assessed Risk
14873	US DA Conconully Ranger Station	No Further Action	NA

PROBABILITY OF FUTURE OCCURRENCE

The probability of a large release of hazardous materials into the environment is low as there are no major processing facilities or transportation infrastructure that are set up specifically for hazardous materials. Operations that are most likely to be associated with larger spills or releases of hazardous materials into the environment are primarily concerned with mining. The probability of the release of small quantities of hazardous substances is low to moderate; typically, releases become less likely as the quantity or volume released increases.

IMPACTS OF HAZARDOUS MATERIALS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUES OF RESOURCES AT RISK

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified, other costs could include medical treatment for people have been exposed to hazardous materials, environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the Town of Conconully. Therefore, the following table, which is representative of Conconully, displays the pandemic hazard ratings that were selected by the Planning Team for Okanogan County. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

The town has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The town has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to the City of Conconully. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for Okanogan County was 1,042 and the virus had caused 13 deaths. COVID-19 data specifically for Conconully was not available at the time this section was written.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the Town of Conconully. Nationwide, the pandemic will have resulted in hundreds of thousands of deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

CITY OF OROVILLE ANNEX

FLOOD HAZARDS

Determined by representatives of the city, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the City of Oroville. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the City of Oroville.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

Dam failure hazard ratings for the City of Oroville.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

RIVERINE FLOODING

The City of Oroville is located on a narrow strip of land between the Okanogan River and Similkameen River just north of their confluence. The southern tip of Osoyoos Lake, which is created by the Osoyoos Dam on the Okanogan River, lies directly north and upstream of the city limits. The two individual rivers have narrow floodplains that only affect small areas along the eastern and western boundaries of the community. The floodplain widens significantly south of Oroville as the Similkameen River drains into the Okanogan River and continues flowing southward through the Okanogan River valley.

Rural residences, ranches, farms, and roadways located near smaller waterways may be at significant flood risk. The onset of flooding in the smaller drainages can range from extremely slow to very fast. This variability depends on the cause of flooding and other factors such as rainfall intensity, the areas receiving the rain, temperature, and the condition of the soil. Floods that occur quickly are usually caused by thunderstorms, while floods that occur more slowly are often the result of moderate, but prolonged rainfall, snowmelt, or a combination of both. In the case of intense rainfall immediately above developed areas, the onset of flooding may occur in a matter of minutes.

A high level of sediment is prevalent during periods of intense runoff. This sediment tends to cause a deteriorating condition in streambeds and channels through deposition. Natural obstructions to flood waters include trees, brush, and other vegetation along the stream banks in the floodplain area. Considerable debris has been allowed to accumulate in these channels, plugging culverts and bridges at several locations throughout the county.

DAM FAILURE

Oroville is located on the Okanogan River, approximately 4.5 miles south of the international border. The closest high impact dams are the Enloe Dam, which is located a little more than 3.5 miles up the Similkameen River from Oroville, and the Zosel Dam which is located within Oroville city limits.

The failure of a dam could result in the release of a large volume of water, especially if its purpose is water retention (i.e. a reservoir or impoundment), and cause significant flooding, sedimentation, and erosion. Flood waters carrying sediment, which builds up behind a dam over time, follow natural and man-made drainage features after being released by a dam failure. Sediment deposition and erosion are common in the paths/drainages that flood waters follow which can cause extensive damage to both the natural environment and human development. In general, the damage will be the greatest at the point of release (at the dam) and more subtle downstream, especially if flood waters enter a larger river system or water body with a higher carrying capacity. Upon entering a larger river or larger body of water, flood waters lose momentum and disperse. The most notable change downstream may be rising water levels, which could approach flood stage, especially if a large volume of water were released rapidly by the failure.

Once the impoundment or reservoir is drained, flood waters downstream from the dam will recede and resemble pre-failure flows levels. The most significant changes will be above the dam where water was impounded. After the dam failure, water levels could resemble a natural flow-pattern which was altered when the dam was constructed. Water levels above the dam will be permanently reduced unless the dam is rebuilt or replaced.

PROBABILITY OF FUTURE OCCURRENCE

RIVERINE FLOODING

The majority of the potential flood hazard in and around Oroville is caused by the close proximity of the Okanogan River, the Similkameen River, and, to a lesser extent, Tonasket Creek, which drain several small tributaries out of the foothills both to the east and west. There is no identified floodplain associated with Osoyoos Lake due to the Osoyoos Lake Dam, which regulates water levels. Although the Tonasket Creek

does not have FEMA identified floodplain, a flash flood or blockage could cause the stream to breach its banks resulting in severe damage to many homes and businesses on the eastern edge of Oroville. This creek has historically been prone to flash flooding due to low soil permeability upstream; however, this type of event does not occur very frequently in Oroville.

High water events on the Okanogan and Similkameen Rivers are typically the result of rain-on-snow events or heavy spring runoff. Warm weather or rain after a heavy snowfall is called a rain-on-snow event. Warm rains falling on the snow pack result in a significantly increased rate of snowmelt. Often the melting occurs when the ground is frozen and the water cannot be absorbed fast enough, resulting in increased overland flows. Flood waters recede slowly as the weather events tend to last for several days. The Similkameen River, which as the largest tributary contributes about 70% of the water in the Okanogan River, has the most immediate impact on the Okanogan River water levels.

Thunderstorms are localized summer events that can also have an impact on the flooding potential of Oroville. Flooding due to a thunderstorm can occur rapidly, overwhelming the carrying capacity of channels or the city's storm drainage system in a short time. The duration of this type of flooding tends to be a matter of hours and is usually associated with localized thunderstorms in which the ground cannot absorb moisture as quickly as it is coming down. Tonasket Creek and other smaller channels are generally more prone to the effects of flooding during a thunderstorm than a river system.

Several streets and road shoulders could potentially erode under flood conditions near Oroville. Many secondary routes are not paved, which results in gravel washing down-slope potentially clogging drainage systems or directing water to places that were not intended.

DAM FAILURE

Overall, the City of Oroville is at low risk to a dam failure as a complete failure is unlikely to occur. However, there are two high impact dams in the vicinity of Oroville that could present significant risk to communities downstream if they were to fail. The Enloe Dam is upstream on the Similkameen River and the Zosel Dam is within Oroville city limits. Although the inundation areas resulting from the failure of either dam are unknown, it is possible that homes and other structures located along both rivers will be affected by flood waters if the respective dam were to fail.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

The potential impacts from flooding in Oroville are very similar to the impacts described for Okanogan County as a whole. First responders and other volunteers aiding with emergency flood control or cleanup efforts are potentially at risk of injury due to accidents or possibly exposure to contaminated water. Although unlikely, the town's water supply could be affected by contaminated flood waters entering the groundwater supply. Refer to Figure 71 for a map of NFIP flood zones in the City of Oroville.

The primary access into Oroville is U.S. Highway 97. This is a two-lane, paved road that is well-traveled by area commuters. The highway roughly parallels the Okanogan River and is susceptible to being

compromised by flood events at several points within the county. Secondary escape routes include the Loomis-Oroville Road, which follows the Similkameen River and the Oroville-Toroda Creek Road, which follows Tonasket Creek eastward. It is likely that these routes would also be compromised during a major flood event.

The availability of food and other supplies is not likely to be impacted or interrupted by a flood event. Furthermore, the delivery of community services such as postal services, health care, law enforcement, and emergency response is also not likely to be impacted by flood events in Oroville. While individual homes and businesses may incur damages, the economy of the community will not be impacted by most flood events. A 100-year plus flood event that damages the local grain elevators or rail yard may lead to temporary economic hardships within the community. Large flood events of this magnitude have a higher probability of occurrence during the winter or spring when the elevators are more likely to be empty, thus lessening the potential economic impact.

Environmental damages resulting from a flood event are unlikely in Oroville. The Similkameen River occupies a relatively narrow floodplain that has been channeled prior to entering the city. Scouring and erosion along the banks of the stream along this more narrow section is possible, but due to grass and other vegetation, these impacts will most likely be minimal and localized. Contamination of the riparian area by floodwaters containing chemicals or other pollutants is a possibility, but is more likely to be realized in the surrounding areas than within the community due to the hydrologic profile of the floodplain. South of Oroville, the floodplain widens where the Similkameen and Okanogan Rivers converge, which lessens the risk of erosion and scouring.

Table 114) Definitions of NFIP flood zones identified in Okanogan County, WA.

ZONE	FLOOD TYPE	DESCRIPTION
A	100-Year	High Risk: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	100-Year	High Risk: Areas subject to a one percent or greater annual chance of flooding in any given year. Base flood elevations are shown as derived from detailed hydraulic analyses (Zone AE is used on new and revised maps in place of Zones A1-A30)
AO	100-Year	High Risk: River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
X500	500-Year	Low to Moderate Risk: Areas of moderate flood hazard from the principal source of flood in the area, determined to be within the limits of one percent and 0.2 percent annual chance floodplain. (Shaded Zone X is used on new and revised maps in place of Zone B.)

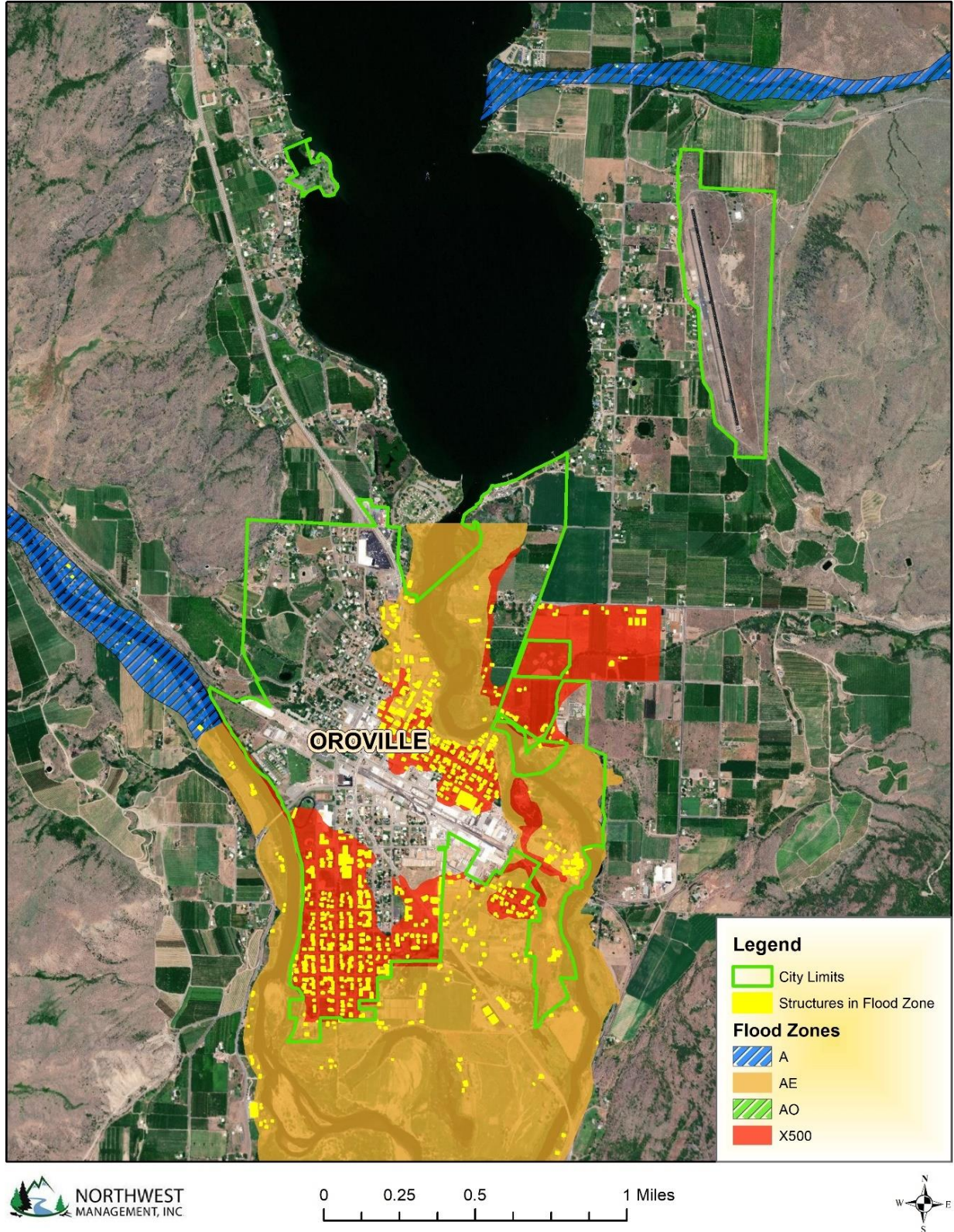


Figure 71) FEMA National Flood Insurance Program Flood Zone map of Oroville, WA. Refer to Table 114 (above) for definitions of the NFIP flood zones identified on the map. *Note: Okanogan County regulatory flood maps are currently being updated; the final drafts will be available by winter 2023/2024.*

DAM FAILURE

If either Enloe Dam or Zosel Dam were to fail, it is possible that homes and other structures close to either the Similkameen or Okanogan Rivers will be subjected to flooding. A dam failure can have both direct and indirect impacts. Direct impacts include loss of life and property; both dams have a high Downstream Hazard risk rating which indicates that 300 or more lives are at risk should either dam fail. Property losses include damage to homes, businesses, and other structures, damage to roadways, power infrastructure, and other infrastructure related to utilities, communications, and transportation. Specific impacts cannot be listed as the extent of the inundation zones is unknown.

Indirect consequences that result from a dam failure would largely be related to the economy. For example, direct economic consequences include the costs of repairing damage and replacing lost items while indirect economic consequences include the loss of jobs, the loss of sales, and the cost of securing alternative space for residential or business purposes. For example, indirect impacts could result from a failure of Zosel Dam that drains enough water out of Osoyoos Lake that the shoreline and lake access are adversely affected. Lower water levels could affect boat launches, swimming, and other recreational activities, thus affecting the tourism industry in the area.

Economic impacts in surrounding areas, especially those close to the dam failure, may not be limited to assets in the inundation area but may extend to infrastructure and resources that serve a much broader area. In addition to direct damage from dam failure, economic impacts include the amount of time required to repair or replace and reopen businesses, governmental and nonprofit agencies, and industrial facilities damaged by the dam failure.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

Oroville has approximately \$14.5 million of assets located in the 100-year flood zone, which means there is a 1% chance of these properties flooding in any given year. The vast majority of the value of assets at risk is classified as residential homes (\$11.5 million). The value of commercial property within the Oroville city limits amounts to \$1.9 million. These two categories account for approximately 93% of the value in the flood zone (Figure 4.15). Recreational property comprises \$428,200 and vacant property is worth \$278,800, 3% and 2% each of the total value of assets within the floodplain in Oroville.

Although Okanogan County Fire District #1 and the Okanogan County Public Utilities District provide service to areas within the Oroville floodplain, they do not have any critical facilities or assets located within the identified floodplain. Nevertheless, these districts could be impacted due to emergency response calls or limited access caused by flooding.

Roads and bridges are the major infrastructural element that is affected by flooding. Alternative routes to all parts of county are limited during most major flood events. Bridges and culverts have been repeatedly compromised by past flood events causing major long-term damage to road systems.

There are currently no critical facilities or assets within the floodplain in Oroville including governmental facilities, emergency response stations, water systems, power lines, etc.

DAM FAILURE

Oroville is at low risk for dam failure as it is unlikely that either the Zosel or Enloe Dam will completely fail. A partial failure of either dam may only damage sections of roadways or cause minor flooding to some homes, but if either dam were to fail completely there could be loss of life and significant property damage given the proximity of both dams to the city.

Costs associated with the failure of either dam could include repairs to roadway infrastructure, water damage to homes and other structures, insurance claims, loss of life, and the loss of a water resource. Costs may also be indirect and include the loss of jobs, closure of businesses, reduction in tourism, and other costs related to the local economy. Specific values could not be totaled as the inundation zones associated with both dams are unknown.

EARTHQUAKE HAZARDS

Determined by representatives of the city, the following table includes earthquake hazard ratings for the City of Oroville. Oroville does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole; refer to the Earthquake Hazards section of the Okanogan County Annex for more information.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

There are no recorded occurrences of earthquakes significantly impacting the town of Oroville; however, some minimal shaking has been felt as a result of larger earthquakes elsewhere. Oroville does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole.

PROBABILITY OF FUTURE OCCURRENCE

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions in the Methow Valley have a slightly higher probability of experiencing an earthquake than those in the Okanogan River valley or on the eastern border of the County (10-15% probability versus 6-10%

probability); however, no specific jurisdiction has more risk than another or than the County overall within these areas.¹⁴⁶

IMPACTS AND VALUE OF RESOURCES AT RISK

Unreinforced masonry (URM) structures and unreinforced chimneys of homes will likely be damaged in the event of an earthquake. There are several publicly accessible unreinforced masonry structures in Oroville in addition to the numerous homes and other buildings throughout the Town with unreinforced chimneys. Damaged or collapsed chimneys could result in the secondary hazard of fire. Nonstructural damage caused by falling and swinging objects may be considerable after any magnitude earthquake. Damage to some older, more fragile bridges and land failure causing minor slides along roadways may isolate some residents.

In Oroville, a few of the downtown structures are assumed to be unreinforced masonry including the Alpine Brewing Company. These structures were built prior to the inclusion of articles for seismic stability in the Uniform Building Codes in 1972. The number and value of unreinforced masonry homes or homes with masonry chimneys in Oroville is unknown, but estimated to include at least 10 brick construction homes and approximately 30 residences with masonry chimneys.

LANDSLIDE HAZARDS

Determined by representatives of the city, the following table includes landslide hazard ratings for the City of Oroville. Refer to the Landslide Hazards section of the Okanogan County Annex for more information about landslide risk in the county.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

The Town of Oroville has very low probabilities of experiencing damaging landslides. The few slopes in and around the community are generally less than 20%. While small, low angle slumps may occur on brows of the surrounding rolling hills, these will be infrequent and likely the result of water saturation or a major disturbance such as an earthquake or road construction.

¹⁴⁶ USGS. 2008 United States National Seismic Hazard Maps. U.S. Geological Survey. U.S. Department of Interior. Available online at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>. October 2009.

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no structures or infrastructure directly at risk from landslides within the town of Oroville.

SEVERE WEATHER HAZARDS

Determined by representatives of the city, the following table includes severe weather hazard ratings for the City of Oroville. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information about severe weather risk in the county.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	5 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

The town of Oroville does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. The probability of a severe weather event occurring in Oroville on an annual basis is very high. However, the impacts to the community are usually minimal and are the same as those described for Okanogan County as a whole.

IMPACTS AND VALUE OF RESOURCES AT RISK

It is difficult to estimate the cost of potential winter storm damages to structures and the economy in Oroville. Damage to roofs by heavy snow accumulations depends on the moisture content of the snow and the structural characteristics of the buildings. In general, snow in this region tends to have low moisture content because of the low temperatures and arid environment. Additionally, snow rarely accumulates for long periods of time due to regular wind events. Frozen water pipes are the most common damage to residential and business structures. Older homes tend to be at a higher risk to frozen water pipes than newer ones. Snow plowing in within the town limits is accomplished by the town's public works department and the Washington Department of Transportation. Private landowners are responsible for maintaining their own driveways or other private roads. Utility supplies are impacted during severe winter storms as power is lost on a regional basis. This has a two-fold impact on residents as not only is power cut to homes and businesses, but primary heating is lost for many residents. Gas furnaces and wood stoves supplement electrical heating, but with wood heating the senior population is at a disadvantage. Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for several days and businesses may

not open. Damages are seen in the form of structural repair and loss of economic activity. Okanogan County schools are occasionally closed during and right after a severe winter storm because of cold temperatures and snow covered roads.

Thunderstorms are not likely to be severe enough in Oroville to cause significant damages. However, the loss potential from flooding that results from severe thunderstorms could be significant.

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property within Oroville. The most significant losses are most clearly seen in the agriculture sectors of the economy. Potential losses to agriculture can be disastrous. Crop damage from hail will also be different depending on the time of year and the type of crop. Most farmers carry insurance on their crops to help mitigate the potential financial loss resulting from a localized hail storm. Homeowners in Oroville rarely incur severe damage to structures (roofs); however, hail damage to vehicles is not uncommon. The damage to vehicles is difficult to estimate because the number of vehicles impacted by a specific ice storm is unknown. Additionally, most hail damage records are kept by various insurance agencies.

It is difficult to estimate potential losses in Oroville due to windstorms and tornadoes. Construction throughout the County has been implemented in the presence of high wind events, and therefore, the community is at a higher level of preparedness to high wind events than many other areas experiencing lower average wind speeds.

We have estimated losses based on wind and tornado damage as follows:

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)
- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 1,182 total parcels with 825 improvements in the City of Oroville worth almost \$114 million. Using the criteria outlined above an estimate of the impact of high winds on the city has been made. The potential wind and tornado impact on improvements values is estimated at just over \$1.7 million in damage. The estimated damage to roofs (on parcels with improvements) is more than \$123,750.

Power failure often accompanies severe storms. Prolonged failure, especially during cold winter temperatures can have disastrous effects. All communities should be prepared to deal with power failures. Community shelters equipped with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water.

WILDLAND FIRE HAZARDS

Determined by representatives of the city, the following table includes wildland fire hazard ratings for the City of Oroville. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information about wildfire risk in the county.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

Oroville is heavily developed for residential, commercial, or agricultural use. Orchards, livestock pasture, hay, or other crops are grown on nearly every available acre that has access to irrigation water. During the summer and fall, this creates a mosaic of lush green vegetation where there is irrigation and cured sage and grass in areas where irrigation is absent.

Wildland fuels within the valley floor of the City of Oroville are minimal due to extensive commercial and residential development as well as the proliferation of the orchards and other crops. The foothills rising out of the valley are typically covered by sage brush and bunchgrasses that form a continuous fuel bed. The steepness of the topography is variable; however, the foothills near the valley have low to moderate steepness, but the degree of slope tends to increase on the mid and upper slopes. The slope rising from the east side of the valley between the community of Oroville and Swanson Mill Road is much steeper and sparsely forested by ponderosa pine. This slope is characterized by sheer rock faces and outcroppings; however, the lack of vegetation does not generally help to slow the upslope spread of wildfire.

All of the residents within the city limits of Oroville have access to the municipal water systems. Those outside the city limits and in unincorporated communities typically rely on personal or multiple home well systems. Oroville is served by the Oroville-Tonasket Irrigation District.

Grand Coulee Dam generates power, which is then distributed by high tension lines across the Colville Indian Reservation to the substations in Okanogan and to a substation located near Coleman Butte. This transmission line continues north to the City of Tonasket generally following the State Route 97 corridor.

The Okanogan Fire Protection District #1 provides both structural and wildfire protection for nearly all of the Oroville. Mutual aid agreements between fire districts supplement wildland fire protection when needed. Additional fire protection is provided by the Washington DNR, which provides wildfire protection and suppression on privately owned forestland and state-owned forestland. The DNR does not provide structural fire suppression, but does provide wildfire protection on non-forested land that threatens DNR-protected lands. The BLM provides wildfire protection on their ownership within Okanogan County and

has mutual aid agreements with the DNR for protection of forested land. BLM also does not provide structural fire suppression.

PROBABILITY OF FUTURE OCCURRENCE

The area surrounding Oroville utilizes irrigation for landscaping and agricultural crops, which not only helps keep the vegetation green and at lower propensity for ignitions, but also gives firefighters abundant access to water resources for suppression purposes. As crop production slows in the fall, the irrigation pressure tends to taper off, leaving previously lush grasses and other vegetation to dry out and become a potential fire hazard.

The sagebrush and grassland fuels that dominant the area near Oroville usually becomes available to burn fairly early in the summer. The growth of a productive orchard takes many years and is, therefore, a long term investment. The potential loss of these orchards and the surrounding structures to fire would severely damage the local economy as well as change the way of life for many residents.

IMPACTS OF WILDLAND FIRE EVENTS

The potential impacts from a wildfire in Oroville are very similar to the impacts described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel. Individual structures, property, and livelihoods could be severely damaged or lost as a result of a fire; however, the community is not likely to suffer severe or long-term economic losses.

Low frequency fires in the shrublands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

Smoke from a nearby wildland fire may impact sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Oroville to other communities; thus, travel and commerce may be interrupted.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Oroville from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Oroville would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that Oroville will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county. Determined by representatives of the town, the following table

includes volcano hazard ratings for the City of Oroville. Refer to the Volcano Hazards section of the Okanogan County Annex for more information about volcano risk in the county.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, much of the information in the county annex will apply to the City of Oroville. There is a high probability that Oroville will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county.

PROBABILITY OF FUTURE OCCURRENCE

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that could fall on the City of Oroville. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

General impacts to the City of Oroville are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and seismic activity are expected to have the greatest impact on the small rural cities and communities of Okanogan County.

The greatest impacts from ashfall will likely concern water quality and emergency response. Ashfall will have a significant impact on the Okanogan and Similkameen Rivers which could affect the systems that supply drinking water to the city and other water systems. Light ashfall is not expected to cause any major damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the municipality. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and

have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the general public.

HAZARDOUS MATERIALS HAZARDS

Due to data limitations, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. Refer to the county section for a more complete analysis of hazardous materials. Determined by representatives of the city, the following table includes hazardous materials hazard ratings for the City of Oroville.

Category	Rating	Definition
Location	2 – Limited	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

LOCAL EVENT HISTORY

There are 28 cleanup sites on record with the Washington Department of Ecology. There are nine sites that are awaiting cleanup, three on which cleanup has started, and 16 have been cleaned up and require no further action (Table 115). Triune Mine is the only Level-1 site in the area; it is contaminated with metals.

Table 115) Hazardous waste clean-up sites in Oroville, WA. Sites highlighted in blue are still active. Data is from the Washington State Department of Ecology Cleanup Site Search.

Cleanup Site ID	Site Name	Site Status	Site Rank
1112	Delate Mine	Awaiting Cleanup	NA
1290	Crystal Butte Mine	Awaiting Cleanup	NA
1417	Mariposa Mine	Awaiting Cleanup	NA
1488	Rainbow Mine	Awaiting Cleanup	NA
2154	Triune Mine	Awaiting Cleanup	1 - Highest Assessed Risk
3090	Poland China Mine	Awaiting Cleanup	NA

Cleanup Site ID	Site Name	Site Status	Site Rank
3471	Telluride Mine	Awaiting Cleanup	NA
2390	Richard Reed Property	Awaiting Cleanup	5 - Lowest Assessed Risk
4171	Spokane Mine	Awaiting Cleanup	4 - Low-Moderate Risk
1339	Beth Lake Prospect	Cleanup Started	
7017	Quick Mart Eisen Chevron	Cleanup Started	2 - Moderate-High Risk
6258	DALES TEXACO OROVILLE	Cleanup Started	3 - Moderate Risk
814	Oroville Washington Customs & Border Patrol Station	No Further Action	NA
3283	Ivanhoe Mine	No Further Action	NA
4174	Mary Ann Creek Placer	No Further Action	NA
4911	Tranmer Fuel Co	No Further Action	NA
1101	Verizon Molson Central Office	No Further Action	NA
1265	Gold Digger Apples 9th	No Further Action	NA
1410	Hiawatha Mine	No Further Action	NA
3532	ENLOE DAM	No Further Action	NA
3624	DA THORNDIKE & SONS INC	No Further Action	NA
4719	OROVILLE DUMP	No Further Action	5 - Lowest Assessed Risk
4912	OROVILLE PUBLIC WORKS	No Further Action	
6911	ORO FRUIT CO INC	No Further Action	
7018	JACKPOT FOOD MART 01 081	No Further Action	3 - Moderate Risk
7807	DELTA H ORCHARD	No Further Action	
10553	Northwest Wholesale Inc Oroville	No Further Action	
11339	OROVILLE SUBSTATION	No Further Action	

PROBABILITY OF FUTURE OCCURRENCE

The probability of a large release of hazardous materials into the environment is low as there are no major processing facilities or transportation infrastructure that are set up specifically for hazardous materials. Operations that are most likely to be associated with larger spills or releases of hazardous materials into the environment include mining, industry, and commerce. The probability of the release of small quantities of hazardous substances is low to moderate; typically, releases become less likely as the quantity or volume released increases.

IMPACTS OF HAZARDOUS MATERIALS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUES OF RESOURCES AT RISK

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified, other costs could include medical treatment for people have been exposed to hazardous materials, environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the City of Oroville. Therefore, the following table, which is representative of Oroville, displays the pandemic hazard ratings that were selected by the Planning Team for Okanogan County. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

The city has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The city has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to the City of Oroville. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for the City of Omak was 49 (4.7% of total county cases) and the virus had caused one death (7.7% of total deaths in the county). For the entire county, there were 1,042 total cases and 13 deaths recorded by that same date.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the City of Oroville. Nationwide, the pandemic will have resulted in hundreds of thousands of deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

CITY OF BREWSTER ANNEX

FLOOD HAZARDS

Determined by representatives of the city, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the City of Brewster. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the City of Brewster.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

Dam failure hazard ratings for the City of Brewster.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

RIVERINE FLOODING

The community of Brewster is located on the southern edge of Okanogan County along the Columbia River just downstream of the mouth of the Okanogan River. Much of the perimeter of city lies along the banks of the Columbia River; however, only small sections of the townsite are within the floodplain identified on the FEMA Flood Insurance Rate Maps. The water level on this section of the Columbia River is controlled by the Chief Joseph Dam approximately twelve miles upstream.

DAM FAILURE

The City of Brewster is located on the Columbia River (Lake Pateros) in between two major dams; Brewster is upstream from the Wells Dam and downstream from Chief Joseph Dam. Given the size of the dams and the volume of water behind them, both dams have a Downstream Hazard rating of 1A which means that more than 300 lives would be at risk if either dam were to fail.

The failure of a Columbia River Dam could result in the release of a substantial volume of water, especially because the system of dams creates a series of impoundments which form the river. In general, the damage will be the greatest at the point of release (at the dam) and more subtle downstream as flood waters lose momentum and disperse as they enter other large impoundments. Close to the dam, sediment deposition and erosion may impact shorelines, causing extensive damage to both the natural environment and human development. Downstream from the failure, the most notable change will likely be rising water levels which could approach flood stage if enough water were released by the failure of the dam.

Once the impoundment is drained, flood waters downstream from the dam will slowly recede and resemble pre-failure flow levels (assuming the next dam downstream was not damaged as well). The most significant changes will be above the dam where water was impounded. After the dam failure, water levels above the dam will be lower and may be closer to pre-construction levels. Water levels above the dam will be permanently reduced unless the dam is rebuilt or replaced.

PROBABILITY OF FUTURE OCCURRENCES

RIVERINE FLOODING

Floods in Brewster are typically the result of two different types of events, rain-on-snow and thunderstorms. Rain-on-snow- events that affect Brewster occur when significant snowpack exists in the Okanogan National Forest or when large regional rain-on-snow or major spring runoff events occur in the Columbia River basin. Warm rains falling on the snowpack result in a significantly increased rate of snowmelt. Often this melting occurs while the ground is frozen and the water cannot be absorbed into the soil, resulting in increased overland flows. Due to large area, flood waters along the Columbia would likely recede slowly; however, due to the numerous dams and varying capacity of reservoirs, it is difficult to estimate the extent of the potential damage.

Low water permeable soil and sparse vegetation in the Swamp Creek drainage north of the townsite could combine to foster flash flooding when intense thunderstorms hit the Brewster area. Flooding of smaller drainages due to thunderstorms or spring runoff is likely to occur more frequently than flooding along the Columbia River. Nevertheless, the possibility for injury and death from flash floods is heightened because they occur quickly and usually with little warning.

The major impacts from both types of flooding in Brewster are the restricted use of several streets, highways, commercial, industrial, and residential areas. The State Highway 173 bridge spanning the Columbia River is the only crossing for approximately twelve miles. Flood damage to this bridge would cost millions of dollars to repair.

DAM FAILURE

Overall, the City of Brewster is at low risk to a dam failure as a complete failure of a Columbia River Dam is highly unlikely to occur. However, the failure of a large dam, such as the Chief Joseph Dam, could have devastating impacts on communities located downstream, including Brewster. As it is the first dam upstream from Brewster, the Chief Joseph Dam poses the greatest downstream threat to the city. However, since the dam generates electricity and provides water for irrigation it is regularly inspected and maintained.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

The potential impacts from flooding in Brewster are very similar to the impacts described for Okanogan County as a whole. First responders and other volunteers aiding with emergency flood control or cleanup efforts are potentially at risk of injury due to accidents or possibly exposure to contaminated water. Depressions and low spots are likely to have standing water during prolonged rain events and during the spring due to the high water table; thus, contaminants in the soil or on vegetation in these areas could impact the water supply. Refer to Figure 72 for a map of NFIP flood zones in the City of Brewster.

The availability of food and other supplies is not likely to be impacted or interrupted by a flood event. Furthermore, the delivery of community services such as postal services, health care, law enforcement, and emergency response is also not likely to be impacted by flood events in Brewster. While individual homes may incur damages as a result of a flood, the economy of the community will not be impacted by this type of hazard.

Environmental damages resulting from a flood event are not likely to occur. In fact, this type of event will likely improve established wetland areas.



Figure 72) FEMA National Flood Insurance Program Flood Zone map of Brewster, WA. Refer to Table 116 (below) for definitions of the NFIP flood zones identified on the map. Note: Okanogan County regulatory flood maps are currently being updated; the final drafts will be available by winter 2023/2024.

Table 116) Definitions of NFIP flood zones identified in Okanogan County, WA.

ZONE	FLOOD TYPE	DESCRIPTION
A	100-Year	High Risk: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	100-Year	High Risk: Areas subject to a one percent or greater annual chance of flooding in any given year. Base flood elevations are shown as derived from detailed hydraulic analyses (Zone AE is used on new and revised maps in place of Zones A1-A30)
AO	100-Year	High Risk: River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
X500	500-Year	Low to Moderate Risk: Areas of moderate flood hazard from the principal source of flood in the area, determined to be within the limits of one percent and 0.2 percent annual chance floodplain. (Shaded Zone X is used on new and revised maps in place of Zone B.)

DAM FAILURE

Brewster is located downstream from the Chief Joseph Dam and upstream from the Wells Dam. Both dams have a Downstream Hazard rating of 1A as a failure could put more than 300 lives at risk. The failure of the Chief Joseph Dam is the greatest threat to Brewster, but the failure of the Wells Dam and the Grand Coulee Dam, which is upstream from the Chief Joseph Dam, could also directly and indirectly affect Brewster.

The failure of a Columbia River dam would most likely be the result of the age of the structure, inadequate spillway capacity, or structural damage caused by an earthquake or flood. The failure of a Columbia River Dam would release a massive quantity of water which could cause human casualties, economic loss, and environmental damage. A dam failure could occur rapidly, providing little warning and evacuation time for people living downstream. Although most of the impoundments and dams on the Columbia River are large, they could be overwhelmed by the flows resulting from a dam failure which could result in extensive flooding.

There are several possible dam failure scenarios that could impact the City of Brewster. As the Columbia River is a series of dams and impoundments, the failure of one dam will likely have implications for the dams above and below it:

- Wells Dam:** Because it is located downstream from Brewster, a Wells Dam failure should have minimal direct impacts on the city. The failure of the Wells Dam will cause water levels around Brewster to drop so flooding will not be an issue. However, the sudden drop in water levels could cause slumping along the shoreline which could cause damage to property, roadways, or other types of infrastructure. As the city is located on the Columbia River (Lake Pateros), a significant drop in water levels could affect recreation and tourism and, therefore, have an impact on the

local economy. There are likely to be other impacts to the city as well that would result from a dramatic change to a large water resource such as the Columbia River/Lake Pateros.

- **Chief Joseph Dam:** As it is the closest dam upstream from Brewster, the failure of the Chief Joseph Dam would have significant impacts on the city; even a partial failure of the dam could release a significant amount of water. Although the depth and extent of the inundation zone is unknown Brewster could be subjected to significant flooding, resulting in extensive damage to property, homes, structures, roadways, infrastructure, and, potentially, the loss of life. A complete failure could happen suddenly, giving residents in Brewster little time to leave the city and relocate to higher ground.
- **Grand Coulee Dam:** The Grand Coulee Dam is below Lake Roosevelt which is the largest Columbia River impoundment on the American side. Because of Lake Roosevelt's exceptional capacity, a dam failure on the Canadian side poses a minimal threat to Columbia River systems and communities on the American side. However, that also means that the failure of the Grand Coulee Dam, which is the second largest concrete dam in the world, will have significant implications for populations and development located downstream. The Chief Joseph Dam is situated between Brewster and the Grand Coulee Dam so it would likely act as a buffer and dampen flood waters; however, communities downstream will likely be affected by high water levels and extensive flooding given the volume of water behind the Grand Coulee Dam.

In addition to direct impacts there could be indirect impacts that result from a dam failure, most of which would be related to the local economy. For example, direct economic consequences include the costs of repairing damage and replacing lost items while indirect economic consequences include the loss of jobs, the loss of sales, the cost of securing alternative space for residential or business purposes, and the time required to reopen a facility or resume or restore services.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

Brewster has approximately \$8.7 million of property at risk located in the 100-year flood zone, which means there is a 1% chance of these properties flooding in any given year. Of these assets at risk, the largest proportion of parcels is classified as commercial properties with \$4.2 million (49%) on 2 acres. Thirty-eight percent of the total acreage (7 acres) is classified as resource property and is worth approximately \$104,400. The value of residential property in the flood zone is approximately \$2.8 million.

Although Okanogan County Fire District #15 and the Okanogan County Public Utilities District provide service to areas within the Brewster floodplain, they do not have any facilities or assets located within the identified floodplain. Nevertheless, these districts could be impacted due to emergency response calls or limited access caused by flooding.

Roads and bridges are the major infrastructural element that could be affected by flooding. Alternative routes to all parts of county are limited during most major flood events. Bridges and culverts have been repeatedly compromised by past flood events causing major long-term damage to road systems.

There are currently no critical facilities or assets within the floodplain in Brewster including governmental facilities, emergency response stations, water systems, etc. Two powerline rights-of-way pass over the community; however, no associate infrastructure is at risk to flood damage.

DAM FAILURE

Brewster is at low risk for dam failure as it is unlikely that either the Chief Joseph, Grand Coulee, or Wells Dams will completely fail. However, given the sizes of the dams and the volume of water stored behind them, even a partial failure could result in the flooding of communities located downstream. The complete failure of a Columbia River dam will likely result in extensive flooding and destruction of communities located downstream and put hundreds of lives at risk.

Costs associated with the failure of either dam could include repairs to roadway infrastructure, water damage to homes and other structures, insurance claims, loss of life, and the loss of a water resource. Depending on the extent of the failure, costs could range from minimal (damage to shoreline areas) to catastrophic (extreme levels of damage to an entire community). Costs may also be indirect and include the loss of jobs, closure of businesses, reduction in tourism, and other costs related to the local economy. Specific values could not be totaled as the inundation zones associated with the failure of any dam described in this section is unknown.

EARTHQUAKE HAZARDS

Determined by representatives of the city, the following table includes earthquake hazard ratings for the City of Brewster. Brewster does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole; refer to the Earthquake Hazards section of the Okanogan County Annex for more information.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

PROBABILITY OF FUTURE OCCURRENCE

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions in the Okanogan River valley or on the eastern border of the County have a 6-10% probability; however, no specific jurisdiction has more risk than another or than the County overall within these areas.¹⁴⁷

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no recorded occurrences of earthquakes significantly impacting the City of Brewster; however, some minimal shaking has been felt as a result of larger earthquakes elsewhere.

Unreinforced masonry (URM) structures and unreinforced chimneys of homes will likely be damaged in the event of an earthquake. There are a few publicly accessible unreinforced masonry structures in Brewster in addition to the numerous homes and other buildings throughout the City with unreinforced chimneys. Damaged or collapsed chimneys could result in the secondary hazard of fire. Nonstructural damage caused by falling and swinging objects may be considerable after any magnitude earthquake. Damage to some older, more fragile bridges and land failure causing minor slides along roadways may isolate some residents.

In Brewster, several of the downtown structures are assumed to be unreinforced masonry. These structures were built prior to the inclusion of articles for seismic stability in the Uniform Building Codes in 1972. The number and value of unreinforced masonry homes or homes with masonry chimneys in Brewster is unknown but estimated to include 20 buildings.

LANDSLIDE HAZARDS

Determined by representatives of the city, the following table includes landslide hazard ratings for the City of Brewster. Refer to the Landslide Hazards section of the Okanogan County Annex for more information about landslide risk in the county.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	6 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

¹⁴⁷ USGS. 2008 United States National Seismic Hazard Maps. U.S. Geological Survey. U.S. Department of Interior. Available online at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>. October 2009.

The City of Brewster has a very low probability of experiencing damaging landslides. Slopes in and around the community are generally less than 25%. While small, low angle slumps may occur on brows of the hills south of town, these will be infrequent and likely the result of water saturation or a major disturbance such as an earthquake or road construction.

The intense irrigation of orchards and other crops throughout the valley could cause smaller scale slides and slumps, particularly on steeper slopes. Over watering or malfunctioning irrigation canals, pipes, or headgates could cause the ground to become saturated. Cut and fill slopes and other disturbed soils have a particularly high risk of becoming unstable due to water saturation.

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no structures or infrastructure directly at risk from landslides within the City of Brewster.

SEVERE WEATHER HAZARDS

Determined by representatives of the city, the following table includes severe weather hazard ratings for the City of Brewster. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information about severe weather risk in the county.

Category	Rating	Definition
Location	4 – Extensive	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

The City of Brewster does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. The probability of a severe weather event occurring in Brewster on an annual basis is very high. However, the impacts to the community are usually minimal and are the same as those described for Okanogan County as a whole.

IMPACTS AND VALUE OF RESOURCES AT RISK

It is difficult to estimate the cost of potential winter storm damages to structures and the economy in Brewster. Damage to roofs by heavy snow accumulations depends on the moisture content of the snow and the structural characteristics of the buildings. In general, snow in this region tends to have low moisture content because of the low temperatures and arid environment. Additionally, snow rarely accumulates for long periods of time due to regular wind events. Frozen water pipes are the most common damage to residential and business structures. Older homes tend to be at a higher risk to frozen

water pipes than newer ones. Snow plowing in within the town limits is accomplished by the town's public works department. Private landowners are responsible for maintaining their own driveways or other private roads. Utility supplies are impacted during severe winter storms as power is lost on a regional basis. This has a two-fold impact on residents as not only is power cut to homes and businesses, but primary heating is lost for many residents. Gas furnaces and wood stoves supplement electrical heating, but with wood heating the senior population is at a disadvantage. Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for several days and businesses may not open. Damages are seen in the form of structural repair and loss of economic activity. Okanogan County schools are occasionally closed during and right after a severe winter storm because of cold temperatures and snow-covered roads.

Thunderstorms are not likely to be severe enough in Brewster to cause significant damages. However, the loss potential from flooding that results from severe thunderstorms could be significant.

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property within Brewster. The most significant losses are most clearly seen in the agriculture sectors of the economy. Potential losses to agriculture can be disastrous. Crop damage from hail will also be different depending on the time of year and the type of crop. Most farmers carry insurance on their crops to help mitigate the potential financial loss resulting from a localized hail storm. Homeowners in Brewster rarely incur severe damage to structures (roofs); however, hail damage to vehicles is not uncommon. The damage to vehicles is difficult to estimate because the number of vehicles impacted by a specific ice storm is unknown. Additionally, most hail damage records are kept by various insurance agencies.

It is difficult to estimate potential losses in Brewster due to windstorms and tornadoes. Construction throughout the County has been implemented in the presence of high wind events, and therefore, the community is at a higher level of preparedness to high wind events than many other areas experiencing lower average wind speeds.

We have estimated losses based on wind and tornado damage as follows:

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)
- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 982 total parcels with 617 improvements in the City of Brewster worth just over \$113 million. Using the criteria outlined above an estimate of the impact of high winds on the city has been made. The potential wind and tornado impact on improvements values

is estimated at just under \$1.7 million in damage. The estimated damage to roofs (on parcels with improvements) is more than \$92,000.

Power failure often accompanies severe storms. Prolonged failure, especially during cold winter temperatures can have disastrous effects. All communities should be prepared to deal with power failures. Community shelters equipped with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water.

WILDLAND FIRE HAZARDS

Determined by representatives of the city, the following table includes wildland fire hazard ratings for the City of Brewster. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information about wildfire risk in the county.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	4 – Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events	4 – Highly Likely	90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year
Overall Significance	12 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

The channeled scablands are a dominant landscape in Brewster. This unique geological feature was created by ice age floods that swept across eastern Washington and down the Columbia River Plateau periodically during the Pleistocene era. The massive erosion caused by the flood events scoured the landscape down to the underlying basalt creating vast areas of rocky cliffs, river valleys, channel ways and pothole lakes. Typical vegetation found throughout this landscape is grass, mixed shrub and sagebrush with areas of wetlands, marsh, ponderosa pine islands, cultivated crops and CRP fields. The channeled scablands landscape prevails in the southcentral portion of the county within the Colville Indian Reservation and along the major waterways of the Okanogan River, Columbia River, Tumwater Creek and Rice Canyon. Landownership is predominantly private or Tribal with areas owned by the State of Washington and the Bureau of Land Management occurring along the western fringes of the scablands. Tribal ownership includes numerous named and unnamed lakes that occur between the Okanogan River and Omak Lake. Private landownership includes cattle ranches and in holdings of cultivated farmland and CRP fields. New development occurs primarily near communities and along major roads. Most of the pressure for multi-housing subdivisions occurs in close proximity to the towns. Rural development is widely dispersed consisting primarily of isolated ranching headquarters, home sites, irrigation systems,

and developed springs or wells. In nearly all developed areas, structures are in close proximity to vegetation that becomes a significant fire risk at certain times of the year.

Residents living in the populated center of Brewster have access to municipal water supply systems with public fire hydrants. Outside this area, development relies on individual, co-op or multiple-home well systems. Creeks, ponds and developed drafting areas provide water sources for emergency fire suppression in the rural areas to a limited extent. Water tanks have been set up at several ranches throughout the area as a supplemental water supply during fire season. Irrigation systems are capable of providing additional water supplies for suppression equipment on a limited basis. Additional water resources distributed and documented throughout the agricultural landscape are needed to provide adequate water for fire suppression.

There is a transmission line that goes south to the Brewster area following State Route 97 for 13 miles and then crosses the Okanogan River and ends in Brewster Flat.

Public utility lines travel both above and below ground along roads and cross-country to remote facilities. Many irrigation systems and wells rely on above ground power lines for electricity. These power poles pass through areas of dense wildland fuels that could be destroyed or compromised in the event of a wildfire. Cell phone service is well established in most parts of the county with only limited dead zones.

Okanogan County Fire Protection District #15 provides structural and wildland fire protection for the City of Brewster.

PROBABILITY OF FUTURE OCCURRENCE

Brewster allows for irrigation of landscaping and agricultural crops, which not only helps keep the vegetation green and at lower propensity for ignitions, but also gives firefighters abundant access to water resources for suppression purposes. As crop production slows in the fall, the irrigation pressure tends to taper off, leaving previously lush grasses and other vegetation to dry out and become a potential fire hazard.

The sagebrush and grassland fuels that dominant this part of the County usually becomes available to burn fairly early in the summer. The growth of a productive orchard takes many years and is, therefore, a long term investment. The potential loss of these orchards and the surrounding structures to fire would severely damage the local economy as well as change the way of life for many residents.

IMPACTS OF WILDLAND FIRE EVENTS

The potential impacts from a wildfire in Brewster are very similar to the impacts described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel. Individual structures, property, and livelihoods could be severely damaged or lost as a result of a fire; however, the community is not likely to suffer severe or long-term economic losses.

Low frequency fires in the shrublands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

Smoke from a nearby wildland fire may impact sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Brewster to other communities; thus, travel and commerce may be interrupted.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Brewster from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Brewster would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that Brewster will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county. Determined by representatives of the town, the following table includes volcano hazard ratings for the City of Brewster. Refer to the Volcano Hazards section of the Okanogan County Annex for more information about volcano risk in the county.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that could fall on the City of Brewster. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

General impacts to the City of Brewster are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and

seismic activity are expected to have the greatest impact on the small rural cities and communities of Okanogan County.

The greatest impacts from ashfall will likely concern water quality and emergency response. Ashfall will have a significant impact on the Columbia River which could affect the systems that supply drinking water to the city and other water systems. Light ashfall is not expected to cause any major damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the municipality. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the general public.

HAZARDOUS MATERIALS HAZARDS

Due to data limitations, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. Refer to the county section for a more complete analysis of hazardous materials. Determined by representatives of the city, the following table includes hazardous materials hazard ratings for the City of Brewster.

Category	Rating	Definition
Location	2 – Limited	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

LOCAL EVENT HISTORY

There are 12 cleanup sites on record with the Washington Department of Ecology. There is one site that is awaiting cleanup, one on which cleanup has started, and ten have been cleaned up and require no further action (Table 117). The Gebbers Farms site is the only Level-1 site listed but it has already been cleaned up and requires no further action.

Table 117) Hazardous waste clean-up sites in Brewster, WA. Sites highlighted in blue are still active. Data is from the Washington State Department of Ecology Cleanup Site Search.

Cleanup Site ID	Site Name	Site Status	Site Rank
15016	Brewster School District 2019 Athletic Field	Awaiting Cleanup	NA
6185	Bobs Triangle Texaco	Cleanup Started	NA
3394	CUSTOM APPLE PACKERS INC	No Further Action	NA
8815	MUMMA TRUCKING UST 9945	No Further Action	NA
12449	Quik E Mart 1	No Further Action	NA
422	Brewster Elementary School	No Further Action	3 - Moderate Risk
2085	US ARMY COE RIGGAN FARM PROPERTY	No Further Action	NA
3245	GEBBERS FARMS	No Further Action	1 - Highest Assessed Risk
3752	BROOKHART ORCHARD	No Further Action	NA
4108	Brewster Heights Packing Truck Shop	No Further Action	NA
4355	PARISEAU FARM DUMP	No Further Action	1 - Highest Assessed Risk
4563	Brewster School Dist New Soccer Fields	No Further Action	NA

PROBABILITY OF FUTURE OCCURRENCE

The probability of a large release of hazardous materials into the environment is low as there are no major processing facilities or transportation infrastructure that are set up specifically for hazardous materials. Operations that are most likely to be associated with larger spills or releases of hazardous materials into the environment include fuel stations, industry, and commerce. Since the last plan update, the Apple House packing shed burned and released a large volume of anhydrous ammonia (which was likely used in the facilities cooling systems). The probability of the release of small quantities of hazardous substances is low to moderate; typically, releases become less likely as the quantity or volume released increases.

IMPACTS OF HAZARDOUS MATERIALS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUES OF RESOURCES AT RISK

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified,

other costs could include medical treatment for people have been exposed to hazardous materials, environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the City of Brewster. Therefore, the following table, which is representative of Brewster, displays the pandemic hazard ratings that were selected by the Planning Team for Okanogan County. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

The city has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The city has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to the City of Brewster. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for the City of Brewster was 595 (57.1% of total county cases) and the virus had caused eight death (61.5% of total deaths in the county). For the entire county, there were 1,042 total cases and 13 deaths recorded by that same date.

There is one hospital in the City of Brewster. Three Rivers Hospital is located at the northern end of the city off Hospital Way. According to the Washington State Hospital Association there are 25 general

hospital beds available for patient care. Visit <https://www.mvhealth.org/threerivershospital.net/> for more information about Three Rivers Hospital's services, capabilities, and response to COVID-19.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the City of Brewster. Nationwide, the pandemic will have resulted in hundreds of thousands of deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

CITY OF PATEROS ANNEX

FLOOD HAZARDS

Determined by representatives of the city, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the City of Pateros. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the City of Pateros.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	4 – Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

Dam failure hazard ratings for the City of Pateros.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	4 – Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	9 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

RIVERINE FLOODING

The City of Pateros is located on the southern edge of Okanogan County at the confluence of the Columbia River and the Methow River; a significant portion of the city’s boundary is formed by the banks of the two rivers. Even though the water level on this section of the Columbia River is controlled by the Chief Joseph Dam, which is located approximately twelve miles upstream, Pateros is still at risk to flooding, especially from the Methow River. As supported by historic flood events and current mapping efforts conducted by FEMA (Figure 75), flooding occurs infrequently but the impacts to Pateros could be significant.

The flood of 1948 was one of the most significant historic floods to affect Pateros. As described by an article featured in the June 3, 1948 edition of the Quad City Harold, damage and losses from the flood concerned infrastructure, homes, businesses, private property, and the local economy. The following excerpt and photos (Figure 74) are from the Okanogan County Historical Archives and the City of Pateros Museum Collection. Both the article and the photos were sourced and copied from The Confluence.

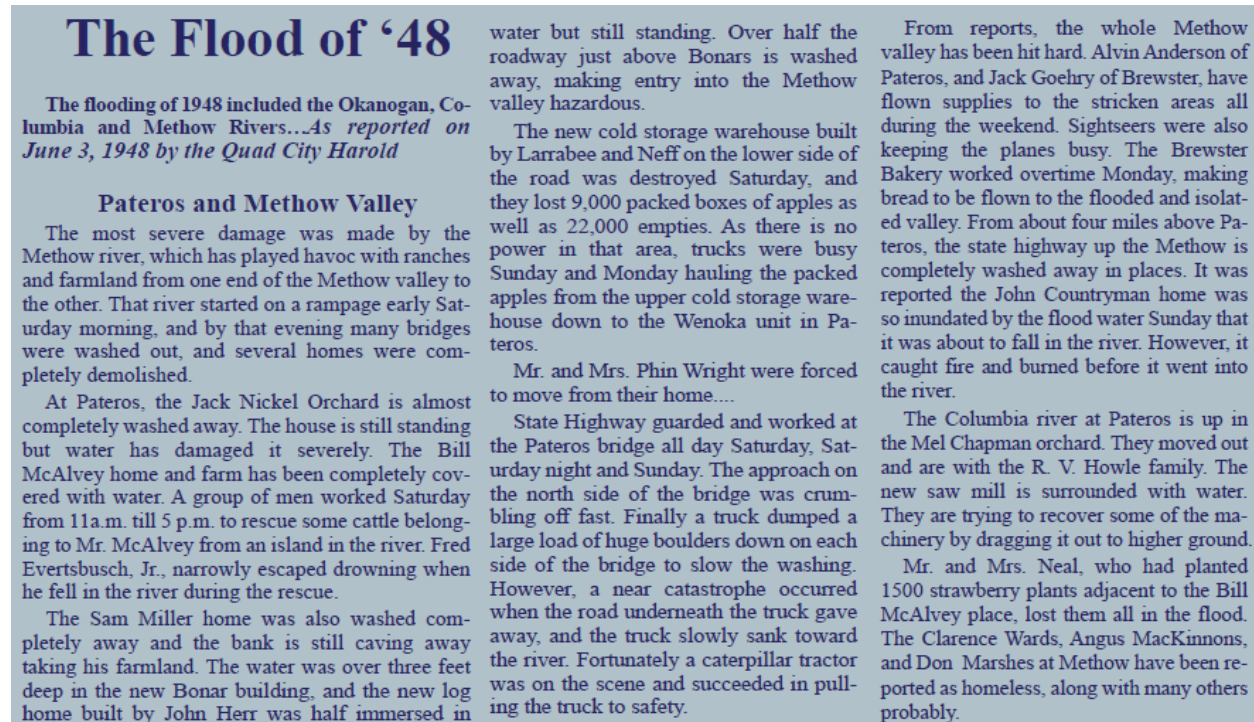


Figure 73) Excerpt from the June 3, 1948 edition of the Quad City Harold. The article originally came from the Okanogan County Historical Society Archives and the City of Pateros Museum Collection (the version included in this plan was copied from The Confluence).

Overall, rural residences, ranches, farms, and roadways located near the Methow River and smaller waterways may have the most significant flood risk. The onset of flooding in the smaller drainages can range from extremely slow to very fast. This variability depends on the cause of flooding and other factors such as rainfall intensity, the areas receiving the rain, temperature, and the condition of the soil. Floods that occur quickly are usually caused by thunderstorms, while floods that occur more slowly are often the result of moderate, but prolonged rainfall, snowmelt, or a combination of both. In the case of intense rainfall immediately above developed areas, the onset of flooding may occur in a matter of minutes.

A high level of sediment is prevalent during periods of intense runoff. This sediment tends to cause a deteriorating condition in streambeds and channels through deposition. Natural obstructions to flood waters include trees, brush, and other vegetation along the stream banks in the floodplain area. Considerable debris has been allowed to accumulate in these channels, plugging culverts and bridges at several locations throughout the county.



Figure 74) Photos of the 1948 flood conditions in Pateros, WA. Photos are from the Okanogan County Historical Archives (the versions included in this plan were copied from *The Confluence*).

DAM FAILURE

The City of Pateros is located at the confluence of the Columbia River and the Methow River in between two major dams; Pateros is upstream from the Wells Dam and downstream from Chief Joseph Dam. Given the size of the dams and the volume of water behind them, both dams have a Downstream Hazard rating of 1A which means that more than 300 lives would be at risk if either dam were to fail.

The failure of a Columbia River Dam could result in the release of a substantial volume of water, especially because the system of dams creates a series of impoundments which form the river. In general, the damage will be the greatest at the point of release (at the dam) and more subtle downstream as flood waters lose momentum and disperse as they enter other large impoundments. Close to the dam, sediment deposition and erosion may impact shorelines, causing extensive damage to both the natural environment and human development. Downstream from the failure, the most notable change will likely be rising water levels which could approach flood stage if enough water were released by the failure of the dam.

Once the impoundment is drained, flood waters downstream from the dam will slowly recede and resemble pre-failure flow levels (assuming the next dam downstream was not damaged as well). The most significant changes will be above the dam where water was impounded. After the dam failure, water levels above the dam will be lower and may be closer to pre-construction levels. Water levels above the dam will be permanently reduced unless the dam is rebuilt or replaced.

PROBABILITY OF FUTURE OCCURRENCE

RIVERINE FLOODING

Floods along the Methow River are typically the result of two different types of events, rain-on-snow and thunderstorms. Rain-on-snow- events that affect Pateros occur when significant snowpack exists in the Okanogan-Wenatchee National Forest or when large regional rain-on-snow or major spring runoff events occur in the Columbia River basin. Warm rains falling on the snowpack result in a significantly increased rate of snowmelt. Often this melting occurs while the ground is frozen and the water cannot be absorbed into the soil, resulting in increased overland flows. Due to large area, flood waters along the Columbia would likely recede slowly; however, due to the numerous dams and varying capacity of reservoirs, it is difficult to estimate the extent of the potential damage.

Low water permeable soil and sparse vegetation in the Swamp Creek drainage north of the townsite could combine to foster flash flooding when intense thunderstorms hit the Brewster area. Flooding of smaller drainages due to thunderstorms or spring runoff is likely to occur more frequently than flooding along the Columbia River. Nevertheless, the possibility for injury and death from flash floods is heightened because they occur quickly and usually with little warning.

The major impacts from both types of flooding in Pateros are extremely low given the terrain and how the city lies in relation to the rivers.

DAM FAILURE

Overall, the City of Pateros is at low risk to a dam failure as a complete failure of a Columbia River Dam is highly unlikely to occur. However, the failure of a large dam, such as the Chief Joseph Dam, could have devastating impacts on communities located downstream, including Pateros. As it is the first dam upstream from Pateros, the Chief Joseph Dam poses the greatest downstream threat to the city. However, since the dam generates electricity and provides water for irrigation it is regularly inspected and maintained.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

According to the latest draft of the Pateros FIRM (Flood Insurance Rate Map) map, which was recently prepared by FEMA, there are parts of the city that fall within the 100-year flood plain (Figure 75). These areas have been classified as Zone AE and they are mostly found at the confluence of the Methow and Columbia Rivers. There are 34 structures in the Pateros flood zones as they are currently delineated.

Other potential impacts to Pateros from flooding are similar to those described for Okanogan County as a whole. First responders and other volunteers aiding with emergency flood control or cleanup efforts are potentially at risk of injury due to accidents or possibly exposure to contaminated water. Depressions and low spots are likely to have standing water during prolonged rain events or overtopping from the Methow River which increases the likelihood that contaminants on roadways and other surfaces could impact the water supply.

Okanogan County, WA Natural Hazard Mitigation Plan 2022

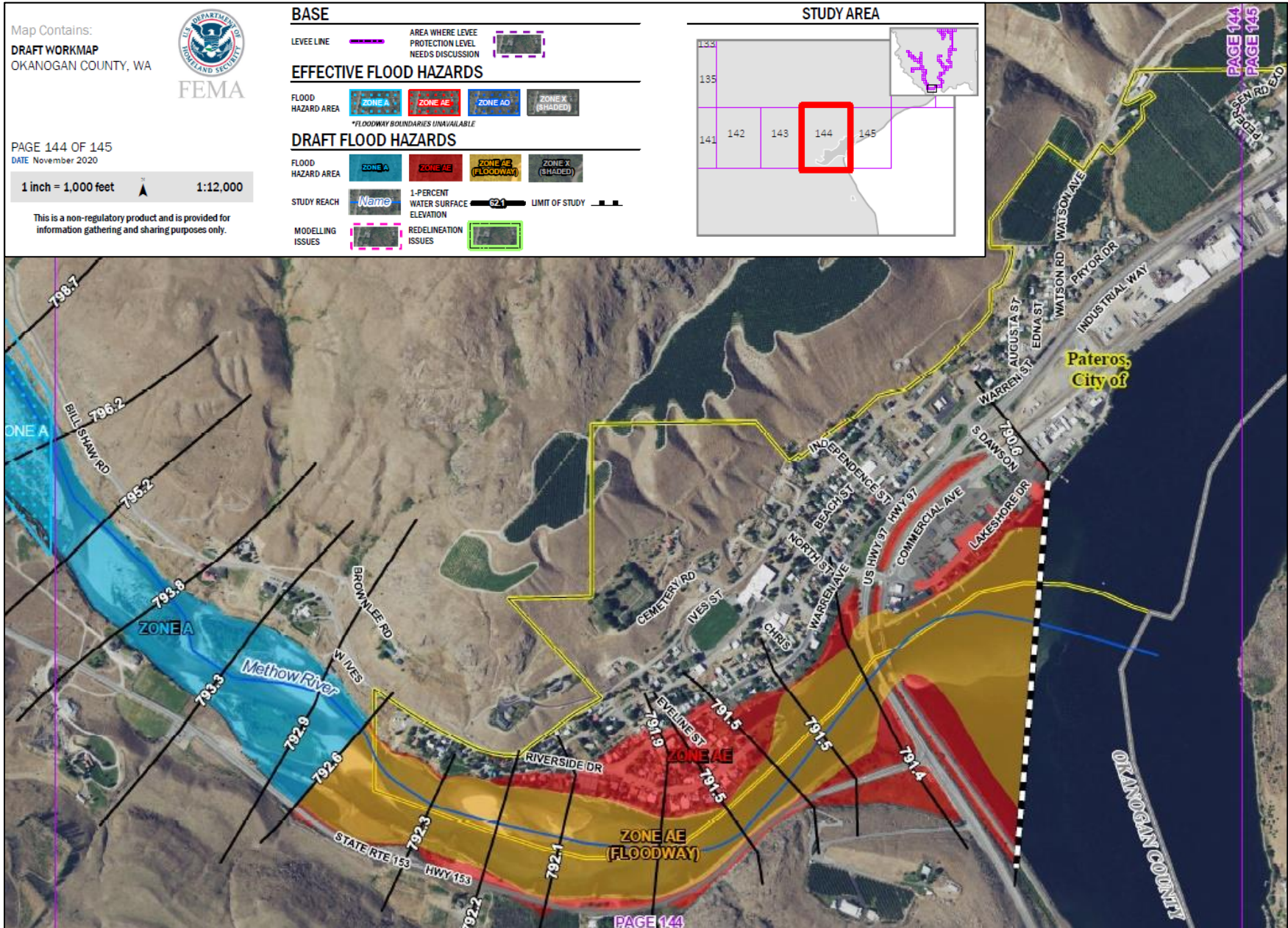


Figure 75) Draft FEMA National Flood Insurance Program Flood Zone map of Pateros, WA (Okanogan County regulatory flood maps are currently being updated; the final drafts will be available by winter 2023/2024). Refer to Table 118 (below) for definitions of the NFIP flood zones identified on the map.

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The availability of food and other supplies is not likely to be impacted or interrupted by a flood event. Furthermore, community services such as postal services, health care, law enforcement, and emergency response are also unlikely to be affected by flood events in Pateros. While individual homes may incur damages from flooding, the local economy will not be impacted by this type of hazard.

Table 118) Definitions of NFIP flood zones identified in Okanogan County, WA.

ZONE	FLOOD TYPE	DESCRIPTION
A	100-Year	High Risk: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	100-Year	High Risk: Areas subject to a one percent or greater annual chance of flooding in any given year. Base flood elevations are shown as derived from detailed hydraulic analyses (Zone AE is used on new and revised maps in place of Zones A1-A30)
AO	100-Year	High Risk: River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
X500	500-Year	Low to Moderate Risk: Areas of moderate flood hazard from the principal source of flood in the area, determined to be within the limits of one percent and 0.2 percent annual chance floodplain. (Shaded Zone X is used on new and revised maps in place of Zone B.)

DAM FAILURE

Pateros is located downstream from the Chief Joseph Dam and upstream from the Wells Dam. Both dams have a Downstream Hazard rating of 1A as a failure could put more than 300 lives at risk. The failure of the Chief Joseph Dam is the greatest threat to Pateros, but the failure of the Wells Dam and the Grand Coulee Dam, which is upstream from the Chief Joseph Dam, could also directly and indirectly affect Pateros.

The failure of a Columbia River dam would most likely be the result of the age of the structure, inadequate spillway capacity, or structural damage caused by an earthquake or flood. The failure of a Columbia River Dam would release a massive quantity of water which could cause human casualties, economic loss, and environmental damage. A dam failure could occur rapidly, providing little warning and evacuation time for people living downstream. Although most of the impoundments and dams on the Columbia River are large, they could be overwhelmed by the flows resulting from a dam failure which could result in extensive flooding.

There are several possible dam failure scenarios that could impact the City of Pateros. As the Columbia River is a series of dams and impoundments, the failure of one dam will likely have implications for the dams above and below it:

- **Wells Dam:** Because it is located downstream from Pateros, a Wells Dam failure should have minimal direct impacts on the city. The failure of the Wells Dam will cause water levels around Pateros to drop so flooding will not be an issue. However, the sudden drop in water levels could

cause slumping along the shoreline which could cause damage to property, roadways, or other types of infrastructure. As the city is located on the Columbia River (Lake Pateros), a significant drop in water levels could affect recreation and tourism and, therefore, have an impact on the local economy. There are likely to be other impacts to the city as well that would result from a dramatic change to a large water resource such as the Columbia River/Lake Pateros.

- **Chief Joseph Dam:** As it is the closest dam upstream from Pateros, the failure of the Chief Joseph Dam would have significant impacts on the city; even a partial failure of the dam could release a significant amount of water. Although the depth and extent of the inundation zone is unknown Pateros could be subjected to significant flooding, resulting in extensive damage to property, homes, structures, roadways, infrastructure, and, potentially, the loss of life. A complete failure could happen suddenly, giving residents in Pateros little time to leave the city and relocate to higher ground.
- **Grand Coulee Dam:** The Grand Coulee Dam is below Lake Roosevelt which is the largest Columbia River impoundment on the American side. Because of Lake Roosevelt's exceptional capacity, a dam failure on the Canadian side poses a minimal threat to Columbia River systems and communities on the American side. However, that also means that the failure of the Grand Coulee Dam, which is the second largest concrete dam in the world, will have significant implications for populations and development located downstream. The Chief Joseph Dam is situated between Pateros and the Grand Coulee Dam so it would likely act as a buffer and dampen flood waters; however, communities downstream will likely be affected by high water levels and extensive flooding given the volume of water behind the Grand Coulee Dam.

In addition to direct impacts there could be indirect impacts that result from a dam failure, most of which would be related to the local economy. For example, direct economic consequences include the costs of repairing damage and replacing lost items while indirect economic consequences include the loss of jobs, the loss of sales, the cost of securing alternative space for residential or business purposes, and the time required to reopen a facility or resume or restore services.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

Although there are structures at risk to riverine flooding, city services, office buildings, emergency response equipment, and communications equipment are located outside of the floodplain and are not at risk to riverine flooding. Values of at-risk structures cannot be reported at this time as flood zone data for Pateros is unavailable. City officials suspect that data is unavailable as flood zones within and around Pateros have not been previously studied. However, Okanogan County regulatory flood maps are currently being updated (early 2021); the final drafts of the maps are expected to be available for planning purposes by winter 2023/2024 (refer to Figure 75 for a draft map of Pateros).

DAM FAILURE

Pateros is at low risk for dam failure as it is unlikely that either the Chief Joseph, Grand Coulee, or Wells Dams will completely fail. However, given the sizes of the dams and the volume of water stored behind them, even a partial failure could result in the flooding of communities located downstream. The complete failure of a Columbia River dam will likely result in extensive flooding and destruction of communities located downstream and put hundreds of lives at risk.

Costs associated with the failure of either dam could include repairs to roadway infrastructure, water damage to homes and other structures, insurance claims, loss of life, and the loss of a water resource. Depending on the extent of the failure, costs could range from minimal (damage to shoreline areas) to catastrophic (extreme levels of damage to an entire community). Costs may also be indirect and include the loss of jobs, closure of businesses, reduction in tourism, and other costs related to the local economy. Specific values could not be totaled as the inundation zones associated with the failure of any dam described in this section is unknown.

EARTHQUAKE HAZARDS

Determined by representatives of the city, the following table includes earthquake hazard ratings for the City of Pateros. Pateros does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole; refer to the Earthquake Hazards section of the Okanogan County Annex for more information.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

PROBABILITY OF FUTURE OCCURRENCE

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions in the Methow Valley have a 10-15% probability; however, no specific jurisdiction has more risk than another or than the County overall within this area.¹⁴⁸

¹⁴⁸ USGS. 2008 United States National Seismic Hazard Maps. U.S. Geological Survey. U.S. Department of Interior. Available online at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>. October 2009.

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no recorded occurrences of earthquakes significantly impacting the City of Pateros; however, some minimal shaking has been felt as a result of larger earthquakes elsewhere. Overall, Pateros does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole.

Unreinforced masonry (URM) structures and unreinforced chimneys of homes will likely be damaged in the event of an earthquake. In addition to falling debris and collapsed unreinforced masonry structures, damaged or collapsed chimneys could also trigger secondary hazards such as structure fires. Nonstructural damage caused by falling and swinging objects may be considerable after any magnitude earthquake. Damage to some older, more fragile bridges and land failure causing minor slides along roadways may isolate some residents.

There are several publicly accessible unreinforced masonry structures in Pateros in addition to the numerous homes and other buildings throughout the city with unreinforced chimneys. These structures were built prior to the inclusion of articles for seismic stability in the Uniform Building Codes in 1972. The number and value of unreinforced masonry homes or homes with masonry chimneys in Pateros is unknown but estimated to include at least 20 buildings.

Many buildings in the city could be damaged or destroyed by liquefaction. The downtown business district, city hall, public works, sewer plant, and over 50 residential homes are built on 3-20' of fill (the town was raised to make way for the Wells Dam Hydro project). Lake Pateros is approximate water table, which is about 6-8' below most of the raised section of town. Consequently, several construction projects in the city were affected by sink holes and “soupy” soils, indicating that liquefaction could be a major problem in the event of a powerful earthquake.

LANDSLIDE HAZARDS

Determined by representatives of the city, the following table includes landslide hazard ratings for the City of Pateros. Refer to the Landslide Hazards section of the Okanogan County Annex for more information about landslide risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

The city of Pateros has a medium probability of experiencing damaging landslides. Slopes within Pateros are generally gentle and pose little threat to the City. However, the terrain immediately outside of the city is steep enough to present moderate levels of landslide risk to structures and infrastructure along the northern portion of the city limits. Overall, low angle slumps may be the most common type of ground movement near Pateros; however, these will be infrequent and likely the result of water saturation or a major natural disturbance such as an earthquake or human-induced disturbance such as road construction or excavation.

IMPACTS AND VALUE OF RESOURCES AT RISK

Although it is not adjacent to the city, the Pateros landslide impact zone is the closest landslide zone, of those identified by the planning team, to the City of Pateros (Figure 76). This zone encompasses 58 structures, worth approximately \$11 million, that could be affected by landslide activity.

Even though the city will not be directly affected by landslides or land movement within the Pateros landslide impact zone, residents could still be indirectly affected by a slide that blocks a road or causes other damage away from the city.

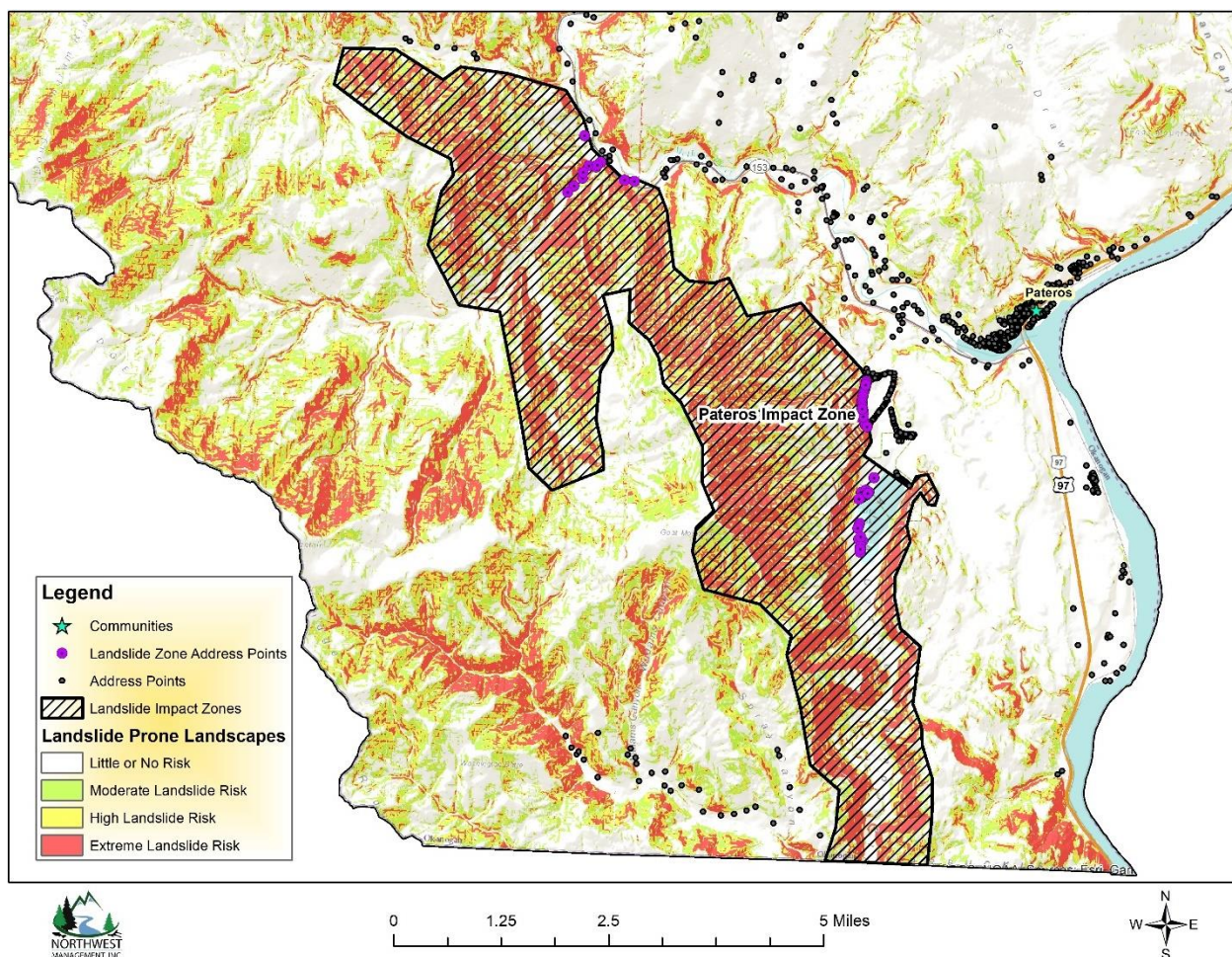


Figure 76) Pateros Landslide Impact Zone.

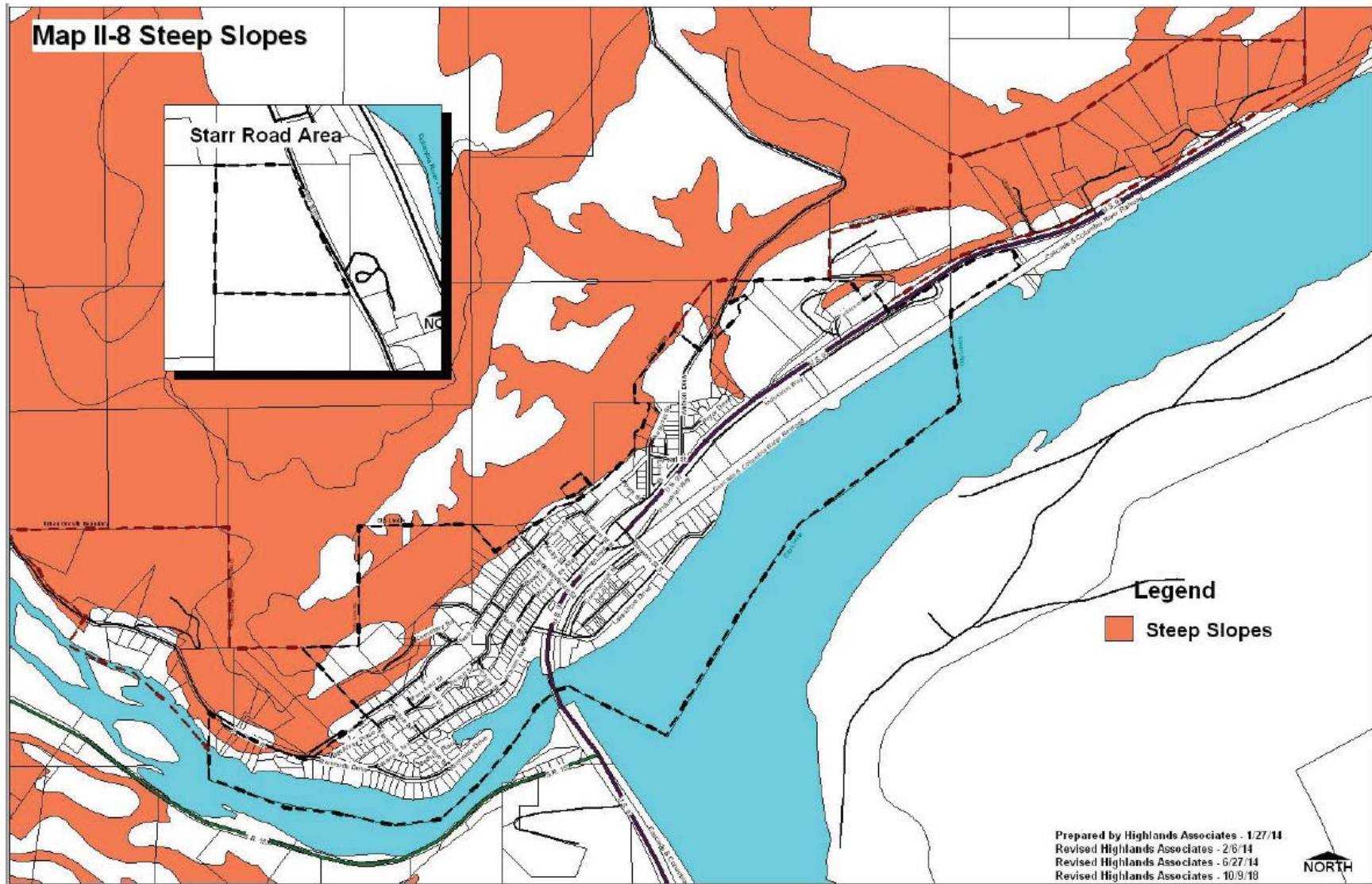


Figure 77) Slope map of Pateros, WA. Orange areas indicate slopes that are exceptionally steep.

Although not as steep as some of the terrain in the greater Pateros area, Brownlee Hill (the slopes on the north side of the city) present a moderate landslide risk to the city, especially to structures and infrastructure in the vicinity of Ives Street (Figure 77; above). Extreme rainstorms/cloud bursts have caused mudflows on Brownlee Hill but they have mostly been inconsequential; however, intense wildfires like the Carlton Complex fires could exacerbate mudflows conditions and present increased levels of risk to the city. Even though most of Pateros is situated on the foot and toe slope, there are no structures or infrastructure within Pateros city limits that are directly at risk to landslides.

SEVERE WEATHER HAZARDS

Determined by representatives of the city, the following table includes severe weather hazard ratings for the City of Pateros. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information about severe weather risk in the county.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	9 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

The City of Pateros does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. The probability of a severe weather event occurring in Pateros on an annual basis is very high. However, the impacts to the community are usually minimal and are the same as those described for Okanogan County as a whole.

IMPACTS AND VALUE OF RESOURCES AT RISK

It is difficult to estimate the cost of potential winter storm damages to structures and the economy in Pateros. Damage to roofs by heavy snow accumulations depends on the moisture content of the snow and the structural characteristics of the buildings. In general, snow in this region tends to have low moisture content because of the low temperatures and arid environment. Additionally, snow rarely accumulates for long periods of time due to regular wind events. Frozen water pipes are the most common damage to residential and business structures. Older homes tend to be at a higher risk to frozen water pipes than newer ones. Snow plowing in within the city limits is accomplished by the city's public works department. Private landowners are responsible for maintaining their own driveways or other private roads. Utility supplies are impacted during severe winter storms as power is lost on a regional basis. This has a two-fold impact on residents as not only is power cut to homes and businesses, but primary heating is lost for many residents. Gas furnaces and wood stoves supplement electrical heating,

but with wood heating the senior population is at a disadvantage. Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for several days and businesses may not open. Damages are seen in the form of structural repair and loss of economic activity. Okanogan County schools are occasionally closed during and right after a severe winter storm because of cold temperatures and snow-covered roads.

Thunderstorms are not likely to be severe enough in Pateros to cause significant damages. However, the loss potential from flooding that results from severe thunderstorms could be significant.

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property within Pateros. The most significant losses are most clearly seen in the agriculture sectors of the economy. Potential losses to agriculture can be disastrous. Crop damage from hail will also be different depending on the time of year and the type of crop. Most farmers carry insurance on their crops to help mitigate the potential financial loss resulting from a localized hail storm. Homeowners in Pateros rarely incur severe damage to structures (roofs); however, hail damage to vehicles is not uncommon. The damage to vehicles is difficult to estimate because the number of vehicles impacted by a specific ice storm is unknown. Additionally, most hail damage records are kept by various insurance agencies.

It is difficult to estimate potential losses in Pateros due to windstorms and tornadoes. Construction throughout the County has been implemented in the presence of high wind events, and therefore, the community is at a higher level of preparedness to high wind events than many other areas experiencing lower average wind speeds.

We have estimated losses based on wind and tornado damage as follows:

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)
- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 376 total parcels with 272 improvements in the City of Pateros worth just over \$47 million. Using the criteria outlined above an estimate of the impact of high winds on the city has been made. The potential wind and tornado impact on improvements values is estimated at just over \$700,000 in damage. The estimated damage to roofs (on parcels with improvements) is more than \$40,000.

Power failure often accompanies severe storms. Prolonged failure, especially during cold winter temperatures can have disastrous effects. All communities should be prepared to deal with power

failures. Community shelters equipped with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water.

WILDLAND FIRE HAZARDS

Determined by representatives of the city, the following table includes wildland fire hazard ratings for the Town of Pateros. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information about wildfire risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	4 – Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events	4 – Highly Likely	90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year
Overall Significance	11 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

The channeled scablands are a dominant landscape in Pateros. This unique geological feature was created by ice age floods that swept across eastern Washington and down the Columbia River Plateau during the Pleistocene era. The massive erosion caused by the flood events scoured the landscape down to the underlying basalt creating vast areas of rocky cliffs, river valleys, channel ways, and pothole lakes. Typical vegetation found throughout this landscape is grass, mixed shrub, and sagebrush with areas of wetlands, marsh, ponderosa pine islands, cultivated crops, and CRP fields. The channeled scablands landscape prevails in the southcentral portion of the county within the Colville Indian Reservation and along the Okanogan River, Columbia River, Tumwater Creek, and Rice Canyon. Landownership is primarily private or Tribal with areas owned by the State of Washington and the Bureau of Land Management located along the western fringes of the scablands. Tribal ownership includes numerous named and unnamed lakes that occur between the Okanogan River and Omak Lake. Private landownership includes cattle ranches and in-holdings of cultivated farmland and CRP fields. New development occurs primarily near communities and along major roads. Most of the pressure for multi-housing subdivisions occurs close to the city. Rural development is sparse and largely consists of isolated ranching headquarters, home sites, irrigation systems, and developed springs or wells. In nearly all developed areas, structures are in proximity to vegetation associated with wildfire.

Residents living in the populated center of Pateros have access to municipal water supply systems with public fire hydrants. Outside this area, development relies on individual, co-op or multiple-home well systems. Creeks, ponds and developed drafting areas provide water sources for emergency fire

suppression in the rural areas to a limited extent. Water tanks have been set up at several ranches throughout the area as a supplemental water supply during fire season. Irrigation systems can supply a limited volume of water for suppression equipment. Additional water resources within the agricultural landscape are needed to provide adequate water for fire suppression.

Public utility lines travel both above and below ground along roads and cross-country to remote facilities. Many irrigation systems and wells rely on above ground power lines for electricity. These power poles pass through areas of dense wildland fuels that could be destroyed or compromised in the event of a wildfire. Cell phone service is well established in most parts of the county with only limited dead zones.

Okanogan County Fire Protection District #15 provides structural and wildland fire protection for the City of Pateros.

PROBABILITY OF FUTURE OCCURRENCE

Pateros allows for irrigation of landscaping and agricultural crops, which not only helps keep the vegetation green and at lower propensity for ignitions, but also gives firefighters abundant access to water resources for suppression purposes. As crop production slows in the fall, the irrigation pressure tends to taper off, leaving previously lush grasses and other vegetation to dry out and become a potential fire hazard.

The sagebrush and grassland fuels that dominant this part of the County usually becomes available to burn fairly early in the summer. The growth of a productive orchard takes many years and is, therefore, a long term investment. The potential loss of these orchards and the surrounding structures to fire would severely damage the local economy as well as change the way of life for many residents.

IMPACTS OF WILDLAND FIRE EVENTS

The potential impacts from a wildfire in Pateros are similar to the impacts described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel. Individual structures, property, and livelihoods could be severely damaged or lost as a result of a fire and recovery could be long term. Smoke from a nearby wildland fire may impact sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Brewster to other communities; thus, travel and commerce may be interrupted.

Low frequency fires in the shrublands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

2014 Carlton Complex Fire

The City of Pateros was directly affected by the 2014 Carlton Complex fire that burned more than 250,000 acres (Figure 78). As of early 2021 it was the largest single wildfire in Washington state history. Below is an excerpt from the story *Recovery Room* by Ted Katauskas, featured in the January/February edition of Cityvision, describing some of the events and impacts from July 17, 2014 when the Carlton Complex Fire burned through Pateros:

JUST BEFORE THE WALL OF FIRE crested the hillside above Pateros in the early evening on Thursday, July 17, 2014, the city's entire volunteer fire department was battling another backcountry blaze in remote French Creek, 16 miles north of town. Fed by maelstrom winds, blast-furnace temperatures, and tinderbox-dry terrain, four separate wildfires that had been triggered by lightning strikes three days earlier were about to merge into a single conflagration, a 400-square-mile ring of fire stretching north along State Route 153 from Pateros to Winthrop, east along State Route 20 to Malott, and south along US Route 97 to Brewster. It would soon be known as the Carlton Complex, the largest wildfire this state has ever seen. But that evening, everybody assumed Pateros was safe, protected by a 158-acre orchard that should have served as a firebreak. They were wrong.

With fires converging simultaneously on multiple communities—melting fiber-optic trunk lines, power lines, and cell towers—and the county 911 dispatch office overwhelmed with calls for help, communicating with the outside world was a challenge for the Pateros fire crew.

"We didn't have a clue that the fire was in Pateros," says Carlene Anders, a volunteer firefighter and longtime Pateros resident.

Pateros's fire chief, who was vacationing in Alaska, received a frantic call from his son, a Skagit County sheriff's deputy, who had gone to check on the family home in Pateros and saw the fire cresting the hill and threatening the town's water supply, two tanks on the hillside just above the orchard. Somehow, the chief reached Anders, and the firefighters raced home to save

Pateros. They were shocked by what they found: At 5:40 p.m. the community was still in their homes, with a fire barreling down the mountain toward them. Within 20 minutes electricity would go out, and the town would be left in the dark. Fire crews circled town, giving evacuation orders by megaphone.

"It's hard to explain," says Anders, who started her wildland firefighting career as the state's first female smoke jumper back in the 1980s. "In 30 years, I've never seen a fire act the way it acted here. This was really indicative of a southern California firestorm. At 7 p.m. it was still 100 degrees, the wind was gusting from 50 to 70 miles per hour, and it was pitch black and tough to breathe."

After engulfing the orchard, the fire swept through town, and the Pateros firefighters—assisted by four other companies from the district—did what little they could but soon were overwhelmed. Around dusk, the city's hydrants went dry as the fire melted the water towers' electronics; anticipating that this would happen, the City of Brewster's firefighters had driven 46 miles each way to Omak and borrowed that city's portable pumps, enabling firefighters to continue battling the blaze with water from the Columbia River, a battle they ultimately lost.

"We were just watching one house burn after another after another after another. People we knew intimately were losing their homes," says Anders, who fought the blaze for five consecutive days with only a catnap. "It was really, really tough."

By dawn, the firefighters were gone, following the Carlton Complex fire, hoping to stop or at least slow the conflagration before it consumed another community.



Figure 78) Aerial view of Pateros, WA after the 2014 Carlton Complex fire.

Immediate and Long-Term Recovery

After the fire burned through Pateros the focus shifted from firefighting to recovery. Relief was needed immediately after the fire as utilities and services were disrupted and people were displaced from their homes. Once immediate relief was provided to the city, city leadership began to develop a long-term recovery strategy that focused on people, structures, infrastructure, and natural resources. *The following information and event descriptions were excerpted from a feature in Fire Disaster News, the April 2015 edition of the City Administrator Report, and the winter 2015 Pateros newsletter:*

In the following days, as residents returned a surge of need became evident. City Hall was open 12 hours a day, for two weeks including weekends to respond to the crisis. Volunteers and donations began pouring in. A team of volunteers began forming the Disaster Relief Center at the School, which is now in downtown Pateros. The relief center would temporarily be moved to Gebbers Farms, Neff Sheds. Howard Asmussen, of Super Stop and Pateros Lakeshore Inn, secured and donated the Old Grocery Store facility, which would become the relief center and Multi-Agency Resource Center (MARC) for survivor relief.

By day three, the City had reached out to Team Rubicon (TR). TR is a military and first responder-based volunteer organization that specializes in managing disasters (Figure 79). TR managed cleanup efforts, coordinated other volunteer groups, and assisted the City in the accounting of donations and volunteer hours critical for the Public Assistance Grant (PA Grant) provided by FEMA. Team Rubicon helped capture over \$350,000 in donated resources; Helped remove 331,431 cubic yards of debris; Deployed 70 volunteers; Managed 793 volunteers; Logged 14,553 volunteer man-hours.



Figure 79) Team Rubicon in Pateros, WA following the 2014 Carlton Complex Fire.

By the following spring, the City of Pateros had moved out of the initial response and relief stages and into the recovery and rebuild stages. To facilitate the long-term recovery process, a long-term recovery group (LTRG) was formed to identify, plan, and administer projects that address losses from the wildfire (Figure 80). A LTRG is a cooperative body that is made up of representatives from faith based, non-profit, government, business, and other organizations working within a community to assist individuals and families as they recover from disaster. The Pateros long-term recovery process focused on:

- Identifying individuals and families with unmet needs in the community.

- Providing case management in order to prioritize how those needs will be met.
- Delivering goods, services, and funds to meet those needs.

A statement made in the Fire Disaster News newsletter regarding the long-term recovery process in Pateros: *We can expect long term recovery to take at least three to ten years. The City is committed to the long-term recovery process, however there are many tools available to the City that will be used to speed up the process. High priority items for the City include: encouraging economic development, strengthening our infrastructure, mitigating future hazards, and finding solutions to low-income housing. The City has been actively pursuing these issues.*



Figure 80) Damage to Pateros, WA as a result of the 2014 Carlton Complex fire.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Pateros from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Pateros would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

Although it is unlikely that Pateros will be directly affected by a future wildfire, Pateros was directly impacted by the 2014 Carlton Complex wildfire. Losses were significant as the fire burned up to and within city limits. As each wildfire is different, costs associated with the Carlton Complex fire cannot be used to forecast future costs related to wildfire damage. However, those costs and impacts have helped city leadership identify vulnerabilities to wildfire and understand the types of costs that could be incurred as a result of wildfire. The following estimates for damage, repairs, and upgrades were provided to Pateros by FEMA in July 2014:

- \$4.0-4.9 million –Water system improvements
- \$115,000 -Additional Staff Required to oversee rebuilding and relief process (based on 18 months)
- Costs associated with slope stabilization and other concerns related to water/mud runoff due to fire. The City sits at the base of very steep slopes vulnerable to slides due to water.
- \$15,000-\$20,000 City staff overtime
- \$3,500-\$5,000 Fuel for generators
- \$3,500-\$5,000 Electrical work associated with generators
- \$4,000-\$6,000 Vehicle, equipment, and fuel

The following table identifies other costs associated with mitigation projects that were performed following the Carlton Complex fire. In total, more than \$1.1 million in projects were identified for the city.

Project Title	Estimated Amount	% of Completion	75% Fed Share	12.5% State Match	12.5% City Match	\$ Received
Water Tank Erosion Control Geotechnical Report	\$40,000.00	100%	\$30,000.00	\$5,000.00	\$5,000.00	\$30,000.00
Water Tank Erosion Control PS & E	\$52,600.00	100%	\$39,450.00	\$6,575.00	\$6,575.00	\$39,450.00
Water Tank Erosion Control Construction	\$228,877.00	90%	\$171,657.75	\$28,609.63	\$28,609.62	0
Water Tank Permanent Repairs	\$38,356.24	10%	\$28,767.18	\$3,595.89	\$3,595.89	0
Emergency Response/Protective Measures	\$61,340.71	100%	\$46,005.53	\$7,667.59	\$7,667.59	\$53,673.12
Debris Removal	\$196,150.55	60%	\$147,112.91	\$24,518.82	\$24,518.82	0
Equipment Damages	\$18,064.43	10%	\$13,548.32	\$2,258.05	\$2,258.05	0
FMAG	\$14,437.50	100%				\$14,437.50
Insurance	\$116,267.67 ¹	70%				\$17,451.84 ²
Donated Materials	\$358,652.19	100%			(\$358,652.19) ³	
Totals	\$1,124,746.29		\$476,541.69	\$79,423.62	(\$272,759.64)	\$155,012.46 ⁴

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that Pateros will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county. Determined by representatives of the town, the following table includes volcano hazard ratings for the City of Pateros. Refer to the Volcano Hazards section of the Okanogan County Annex for more information about volcano risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	5 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that could fall on the City of Pateros. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

General impacts to the City of Pateros are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and seismic activity are expected to have the greatest impact on the small rural cities and communities of Okanogan County.

The greatest impacts from ashfall will likely concern water quality and emergency response. Ashfall will have a significant impact on the Columbia and Methow Rivers which could affect the systems that supply drinking water to the city and other water systems. Light ashfall is not expected to cause any major damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the municipality. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the general public.

HAZARDOUS MATERIALS HAZARDS

Due to data limitations, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. Refer to the county section for a more complete analysis of hazardous materials. Determined by representatives of the city, the following table includes hazardous materials hazard ratings for the City of Pateros.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	4 – Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

There are two cleanup sites on record with the Washington Department of Ecology. There is one site that is awaiting cleanup and one that has been cleaned up and requires no further action (Table 119).

Table 119) Hazardous waste clean-up sites in Pateros, WA. Sites highlighted in blue are still active. Data is from the Washington State Department of Ecology Cleanup Site Search.

Cleanup Site ID	Site Name	Site Status	Site Rank
14977	Super Stop Store	Awaiting Cleanup	NA
3662	PATEROS CITY PARK	No Further Action	NA

PROBABILITY OF FUTURE OCCURRENCE

The probability of a large release of hazardous materials into the environment is low as there are no major processing facilities or transportation infrastructure that are set up specifically for hazardous materials. Operations that are most likely to be associated with larger spills or releases of hazardous materials into the environment include fuel stations and businesses. The probability of the release of small quantities of hazardous substances is low to moderate; typically, releases become less likely as the quantity or volume released increases.

IMPACTS OF HAZARDOUS MATERIALS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUES OF RESOURCES AT RISK

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified, other costs could include medical treatment for people have been exposed to hazardous materials, environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the Town of Pateros. Therefore, the following table, which is representative of Pateros, displays the pandemic hazard ratings that were selected by the Planning Team for Okanogan County. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

The city has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The city has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to the City of Pateros. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for the City of Pateros was 49 (4.7% of total county cases) and the virus had caused one death (7.7% of total deaths in the county). For the entire county, there were 1,042 total cases and 13 deaths recorded by that same date.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the City of Pateros. Nationwide, the pandemic will have resulted in hundreds of thousands of deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

TOWN OF NESPELEM ANNEX

FLOOD HAZARDS

Determined by representatives of the town, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the Town of Nespelem. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the Town Nespelem.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	6 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

Dam failure hazard ratings for the Town of Nespelem.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

RIVERINE FLOODING

Nespelem is an incorporated city on the Colville Indian Reservation in Okanogan County. Currently, Nespelem is not affected by a FEMA identified 100 or-500-year floodplain; thus, Nespelem has a low risk of experiencing flood events. Nespelem is also located on the eastern side of Okanogan County along State Route 155. The majority of the Nespelem community is situated along the eastern bank of the Nespelem River, a small tributary of the Columbia River; however, there is no FEMA identified floodplain associated with this waterway.

The only floodplain that may affect properties or residents on the Reservation is associated with the Okanogan River along the western Reservation boundary.

DAM FAILURE

Nespelem is located adjacent to the Nespelem River but there are no dams or major impoundments upstream that pose a threat to the town.

PROBABILITY OF FUTURE OCCURRENCE

RIVERINE FLOODING

Floods along the Nespelem River drainage are typically the result of two different types of weather events, rain-on-snow and thunderstorms. Rain-on-snow- events that affect the Nespelem River occur when significant snowpack exists in the upper reaches of the foothills and beyond of the Colville Reservation. Warm rains falling on the snowpack result in a significantly increased rate of snowmelt. Often this melting occurs while the ground is frozen and the water cannot be absorbed into the soil, resulting in increased overland flows. Flood waters recede slowly as rain-on-snow weather events tend to last for several days. Low velocity flooding occurs in several tributaries to the Columbia River on the Reservation including Stepstone Creek, North Star Creek, Mill Creek, and others almost annually during the spring runoff period.

Sandy soil and sparse vegetation combine to foster flash flooding when intense thunderstorms hit the valley. Floods from thunderstorms do not occur as frequently as those from general rain and snowmelt conditions but can be far more severe. The possibility for injury and death from flash floods is heightened because they are so uncommon that people do not recognize the potential danger. Thunderstorms generally occur in June to September while late December to February is the worst time for rain on snow events. Water levels in the Nespelem River are not generally impacted by localized thunderstorms.

Warm weather or rain after a heavy snowfall is usually responsible for high flows in the Nespelem River drainage. A high level of sediment is prevalent during periods of high runoff. This sediment tends to cause deterioration in streambeds and channels through deposition. Natural obstructions to flood waters include trees, brush, and other vegetation along the stream banks.

DAM FAILURE

As there are no dams or large impoundments located upstream from Nespelem, the town is not at risk to a dam failure.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

The potential impacts from flooding to communities located within the Colville Reservation boundary are very similar to the impacts described for Okanogan County as a whole. First responders and other volunteers aiding with emergency flood control or cleanup efforts are potentially at risk of injury due to accidents or possibly exposure to contaminated water. Depressions and low spots are likely to have

standing water during prolonged rain events and during the spring due to the high water table; thus, contaminants in the soil or on vegetation in these areas could impact the water supply.

The availability of food and other supplies is not likely to be impacted or interrupted by a flood event. Furthermore, the delivery of community services such as postal services, health care, law enforcement, and emergency response is also not likely to be impacted by flood events on the Colville Reservation. While individual homes may incur damages as a result of a flood, the economy of the communities will not be impacted by this type of hazard.

Environmental damages resulting from a flood event are not likely to occur. In fact, this type of event will likely improve established wetland areas.

DAM FAILURE

As there are no dams or large impoundments located upstream from Nespelem, the town will not be affected by a dam failure.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

Although there are no communities on the Colville Reservation that are directly affected by a 100-year floodplain, the Colville Tribe does have several assets at risk to flooding along the Okanogan River. Within the 100-year floodplain, properties have a 1% chance of experiencing a flood in any given year.

Table5.5. Assets on Colville Reservation within 100 Year Floodplain.	
Owner	Number of Acres
City	0
County	2.9
Federal	0.6
Public Utilities District	147.4
Private	524.5
Railroad Right of Way	6.9
Right of Way	15.2
Tribal	189.7
Tribal Allotment	150.8
Tribal Trust	98.7

There are an estimated 48 improvements on parcels within the 100-year floodplain on the Colville Reservation with an estimated value of \$2,365,600.

There are very few critical facilities located in the floodplain of the Okanogan River on the Reservation. City and tribal services, office buildings, emergency response equipment and communications equipment are located outside of the floodplain and are not at direct risk of damage.

Roads and bridges are the major infrastructural element that is affected by flooding. There are currently two bridges crossing the Nespelem River and Little Nespelem River within the Colville Reservation; one is located in Nespelem, and the other is located just south of Colville Indian Agency.

DAM FAILURE

As there are no dams or large impoundments located upstream from Nespelem, there are no resources in town that are at risk to a dam failure.

EARTHQUAKE HAZARDS

Determined by representatives of the city, the following table includes earthquake hazard ratings for the Town of Nespelem. Nespelem does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole; refer to the Earthquake Hazards section of the Okanogan County Annex for more information.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	5 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions on the eastern border of the County have a 6-10% probability of experiencing an earthquake in the next 50 years; however, no specific jurisdiction has more risk than another or than the County overall within these areas.¹⁴⁹

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no recorded occurrences of earthquakes significantly impacting the Nespelem; however, some minimal shaking has been felt as a result of larger earthquakes elsewhere. The Nespelem does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole.

Unreinforced masonry (URM) structures and unreinforced chimneys of homes will likely be damaged in the event of an earthquake. There are a few publicly accessible unreinforced masonry structures in Nespelem in addition to the numerous homes and other buildings throughout the Reservation with

¹⁴⁹ USGS. 2008 United States National Seismic Hazard Maps. U.S. Geological Survey. U.S. Department of Interior. Available online at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>. October 2009.

unreinforced chimneys. Damaged or collapsed chimneys could result in the secondary hazard of fire. Nonstructural damage caused by falling and swinging objects may be considerable after any magnitude earthquake. Damage to some older, more fragile bridges and land failure causing minor slides along roadways may isolate some residents.

In Nespelem, a few of the downtown structures are assumed to be unreinforced masonry. These structures were built prior to the inclusion of articles for seismic stability in the Uniform Building Codes in 1972. The number and value of unreinforced masonry homes or homes with masonry chimneys in Nespelem is unknown but estimated to include at least 10 buildings.

LANDSLIDE HAZARDS

Determined by representatives of the town, the following table includes landslide hazard ratings for the Town of Nespelem. Refer to the Landslide Hazards section of the Okanogan County Annex for more information about landslide risk in the county.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	4 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

The community of Nespelem has a low risk of damage caused by landslides. Most of the potential risk in this area comes from unstable soils. Soils composed mostly of schist and granite, as they are in this part of Okanogan County, are typically at higher risk of slumping than other soil types. Slides in this area would be expected along cut and fill slopes and potentially in crop fields or on construction sites where there has been disturbance. These will tend to be smaller scale slides; however, there is some potential for larger events.

IMPACTS AND VALUE OF RESOURCES AT RISK

There is little direct landslide risk to communities on the eastern edge of the county; however, individual landowners could be affected. Road systems may also be damaged as small slides limit vehicle access.

The Confederated Tribes of the Colville Reservation and the Nespelem REA utilities district provided services in this area; however, none of their facilities or assets are at direct risk of landslides. Most of Tribe’s governmental facilities are located in Nespelem; thus, slides in the area would likely require a response or assistance from their public offices.

SEVERE WEATHER HAZARDS

Determined by representatives of the city, the following table includes severe weather hazard ratings for the Town of Nespelem. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information about severe weather risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	4 – Highly Likely	90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

The town of Nespelem does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. The probability of a severe weather event occurring in Nespelem on an annual basis is very high. However, the impacts to the community are usually minimal and are the same as those described for Okanogan County as a whole.

IMPACTS AND VALUE OF RESOURCES AT RISK

It is difficult to estimate the cost of potential winter storm damages to structures and the economy in Nespelem. Damage to roofs by heavy snow accumulations depends on the moisture content of the snow and the structural characteristics of the buildings. In general, snow in this region tends to have low moisture content because of the low temperatures and arid environment. Additionally, snow rarely accumulates for long periods of time due to regular wind events. Frozen water pipes are the most common damage to residential and business structures. Older homes tend to be at a higher risk to frozen water pipes than newer ones. Snow plowing in within the town limits is accomplished by the town’s public works department. Private landowners are responsible for maintaining their own driveways or other private roads. Utility supplies are impacted during severe winter storms as power is lost on a regional basis. This has a two-fold impact on residents as not only is power cut to homes and businesses, but primary heating is lost for many residents. Gas furnaces and wood stoves supplement electrical heating, but with wood heating the senior population is at a disadvantage. Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for several days and businesses may not open. Damages are seen in the form of structural repair and loss of economic activity. Okanogan County schools are occasionally closed during and right after a severe winter storm because of cold temperatures and snow covered roads.

Thunderstorms are not likely to be severe enough in Nespelem to cause significant damages. However, the loss potential from flooding that results from severe thunderstorms could be significant.

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property within Nespelem. The most significant losses are most clearly seen in the agriculture sectors of the economy. Potential losses to agriculture can be disastrous. Crop damage from hail will also be different depending on the time of year and the type of crop. Most farmers carry insurance on their crops to help mitigate the potential financial loss resulting from a localized hail storm. Homeowners in Nespelem rarely incur severe damage to structures (roofs); however, hail damage to vehicles is not uncommon. The damage to vehicles is difficult to estimate because the number of vehicles impacted by a specific ice storm is unknown. Additionally, most hail damage records are kept by various insurance agencies.

It is difficult to estimate potential losses in Nespelem due to windstorms and tornadoes. Construction throughout the County has been implemented in the presence of high wind events, and therefore, the community is at a higher level of preparedness to high wind events than many other areas experiencing lower average wind speeds.

We have estimated losses based on wind and tornado damage as follows:

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)
- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 135 total parcels with 47 improvements in the Town of Nespelem worth just under \$1.9 million. Using the criteria outlined above an estimate of the impact of high winds on the city has been made. The potential wind and tornado impact on improvements values is estimated at just over \$28,000 in damage. The estimated damage to roofs (on parcels with improvements) is more than \$7,000.

Power failure often accompanies severe storms. Prolonged failure, especially during cold winter temperatures can have disastrous effects. All communities should be prepared to deal with power failures. Community shelters equipped with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water.

WILDLAND FIRE HAZARDS

Determined by representatives of the town, the following table includes wildland fire hazard ratings for the Town of Nespelem. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information about wildfire risk in the county.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	4 – Extreme	Extreme classification on scientific scale, immediate onset or extended duration, resulting in catastrophic damage and uninhabitable conditions
Probability of Future Events	4 – Highly Likely	90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year
Overall Significance	12 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

The Town of Nespelem is located in the southeastern tip of Okanogan County. The Town of Nespelem includes the communities of Nespelem and Colville Agency with most of the structures occurring nearby.

Fuels in Nespelem are fairly consistent. Much of this area is covered by low growing grasses and sagebrush with some scattered ponderosa pine in the draws. Dense riparian fuels including black cottonwoods and willows are prominent along the Nespelem River and the Little Nespelem River. Fires occurring throughout these communities would be expected to spread very rapidly, but burn with a moderate intensity through the flashy fuels. The riparian vegetation along the waterways may support a more intense fire later in the summer as the water levels go down and fuels become dry.

The north end of Nespelem is partially forested with ponderosa pine and Douglas-fir being the primary overstory species. Several landowners have conducted both commercial and pre-commercial thinnings along State Route 155, which, with slash treatment, helps reduce the potential for an intense fire around homes in this area.

The primary access route through the Nespelem and Coulee Dam Neighborhoods is State Route 155, a paved, two-lane highway. The Columbia River Road is also a paved, two-lane highway traveling from Colville Agency west along the Columbia River. There are several secondary roads throughout the area accessing homes or recreational areas. These roads are typically regularly maintained, graveled routes. Gold Lake Road and Cache Creek Road are graveled routes heading from Nespelem north and east, respectively, into neighboring Ferry County. Other secondary roads include Moses Road, Buffalo Lake Road, Rebecca Lake Road, Peter Dan Road

Residents in the community of Nespelem has access to the municipal water system. Homes outside of the city limits rely on personal well systems.

Two Bonneville Power Administration transmission lines are located within the Nespelem and Coulee Dam Communities. One of these lines ends at Colville Agency, while the other passes through the bottom half of the Coulee Dam Community.

Grand Coulee Dam on the Columbia River is located in the southwestern tip of the Coulee Dam Neighborhood. The Grand Coulee Dam, located on the Columbia River in central Washington, is the largest concrete structure in the United States. It forms the centerpiece of the Columbia Basin Project, a multipurpose endeavor managed by the U.S. Bureau of Reclamation. In addition to producing up to 6.5 million kilowatts of power, the dam irrigates over half a million acres of Columbia River basin farmland and provides abundant wildlife and recreation areas.

Structures in the communities of Nespelem and Colville Agency currently have no organized structural fire protection. The Bureau of Indian Affairs provides wildland fire protection on all lands within the Confederated Tribes of the Colville Reservation.

State lands are the sole responsibility of the Washington Department of Natural Resources (suppression & reciprocal agreements may apply). Federal lands are the sole responsibility of the Federal management agency (reciprocal agreement may apply). Much of the private lands in Okanogan County are within joint jurisdiction between the County fire protection districts and the WA DNR.

The DNR provides wildfire protection during the fire season between April and October with a varying degree of resources available in the early spring and late autumn months. The U.S. Forest Service seasonally responds to all wildland fires on their jurisdiction and may also respond to wildland fires on private lands based on a reciprocal agreement with the DNR.

PROBABILITY OF FUTURE OCCURRENCE

The Community in Nespelem is at moderate risk of wildland fire. Most of the structures in this community is located within or very near the community center. Residents generally keep the grass and other fuels around their homes to a minimum by mowing or grazing livestock.

The highly productive vegetation in the Nespelem River, Little Nespelem River, and other drainages has the potential to burn very intensely. A severe fire in these corridors has an increased possibility of damaging the ecosystem of the waterway as this type of vegetation is not usually very resilient after a burn. Furthermore, a fire in these fuels could potentially threaten many homes as it spreads through the dense fuels along the stream and riverbanks.

All residents in Nespelem are currently without rural fire protection. This could lead to delayed response times as resources are called from out of the area to respond to a structural or wildland fire situation.

IMPACTS OF WILDLAND FIRE EVENTS

The potential impacts from a wildfire in Nespelem are very similar to the impacts described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel. Individual structures, property, and livelihoods could be severely damaged or lost as a result of a fire; however, the community is not likely to suffer severe or long-term economic losses.

A fire in the shrublands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

Smoke from a nearby wildland fire may impact sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Nespelem to other communities; thus, travel and commerce may be interrupted.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Nespelem from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Nespelem would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that Nespelem will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county. Determined by representatives of the town, the following table includes volcano hazard ratings for the Town of Nespelem. Refer to the Volcano Hazards section of the Okanogan County Annex for more information about volcano risk in the county.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that could fall on the Town of Nespelem. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

General impacts to the Town of Nespelem are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and seismic activity are expected to have the greatest impact on the small rural cities and communities of Okanogan County.

The greatest impacts from ashfall will likely concern emergency response. Light ashfall is not expected to cause any major damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents. Residents may need to shelter in place until help and supplies arrive.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the municipality. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the public.

HAZARDOUS MATERIALS HAZARDS

Due to data limitations, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. Refer to the county section for a more complete analysis of hazardous materials. Determined by representatives of the town, the following table includes hazardous materials hazard ratings for the Town of Nespelem.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	8 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

LOCAL EVENT HISTORY

Currently, there are no cleanup sites on record with the Washington State Department of Ecology. According to the Washington Department of Ecology “What’s In My Neighborhood” search tool, there are no cleanup sites within ten miles of Nespelem.

PROBABILITY OF FUTURE OCCURRENCE

The probability of a large release of hazardous materials into the environment is low as there are no major processing facilities or transportation infrastructure that are set up specifically for hazardous materials. Operations that are most likely to be associated with larger spills or releases of hazardous materials into the environment include fuel stations and other businesses. The probability of the release of small quantities of hazardous substances is low to moderate; typically, releases become less likely as the quantity or volume released increases.

IMPACTS OF HAZARDOUS MATERIALS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUES OF RESOURCES AT RISK

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified, other costs could include medical treatment for people have been exposed to hazardous materials, environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the Town of Nespelem. Therefore, the following table, which is representative of Nespelem, displays the pandemic hazard ratings that were selected by the Planning Team for Okanogan County. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	4 – Extensive	75 to 100% of the planning area or consistent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

LOCAL EVENT HISTORY

The city has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The city has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to the Town of Nespelem. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for the Town of Nespelem was 16 (1.5% of total county cases) and the virus had caused zero deaths. For the entire county, there were 1,042 total cases and 13 deaths recorded by that same date.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the Town of Nespelem. Nationwide, the pandemic will have resulted in hundreds of thousands of deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

TOWN OF ELMER CITY ANNEX

FLOOD HAZARDS

Determined by representatives of the town, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the Town of Elmer City. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the Town of Elmer City.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	4 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

Dam failure hazard ratings for the Town of Elmer City.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	4 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

RIVERINE FLOODING

Elmer City is one of the few incorporated cities on the Colville Reservation in Okanogan County. Elmer City is not affected by a FEMA identified 100 or 500-year floodplain; thus, they have very little to no risk of experiencing flood events. A FEMA Flood Insurance Rate Map has been developed for Elmer City; however, this map does not delineate any 100 or 500-year floodplain. The community of Elmer City is located along the rim of the Columbia River canyon at elevations equivalent or well above the top of Grand Coulee Dam and several hundred feet above the high-water mark of the Columbia River.

Although the probability of occurrence is low, there is some concern that Elmer City could be affected by flash flooding. An exceptional amount of runoff could flood the drainage that cuts through the middle of

town and overwhelm the culvert. The resulting flooding could cause damage to nearby structures, homes, and infrastructure.

DAM FAILURE

Elmer City is in the southeast corner of the county between two major dams; it is upstream from Chief Joseph Dam and downstream from Grand Coulee Dam. Given the size of the dams and the volume of water behind them, both dams have a Downstream Hazard rating of 1A which means that more than 300 lives would be at risk if either dam were to fail.

The failure of a Columbia River Dam could result in the release of a substantial volume of water, especially because the system of dams creates a series of impoundments which form the river. In general, the damage will be the greatest at the point of release (at the dam) and more subtle downstream as flood waters lose momentum and disperse as they enter other large impoundments. Close to the dam, sediment deposition and erosion may impact shorelines, causing extensive damage to both the natural environment and human development. Downstream from the failure, the most notable change will likely be rising water levels which could approach flood stage if enough water were released by the failure of the dam.

Once the impoundment is drained, flood waters downstream from the dam will slowly recede and resemble pre-failure flow levels (assuming the next dam downstream was not damaged as well). The most significant changes will be above the dam where water was impounded. After the dam failure, water levels above the dam will be lower and may be closer to pre-construction levels. Water levels above the dam will be permanently reduced unless the dam is rebuilt or replaced.

PROBABILITY OF FUTURE OCCURRENCE

RIVERINE FLOODING

Floods in Elmer City are typically the result of two different types of events, rain-on-snow and thunderstorms. Rain-on-snow- events that affect Elmer City occur when significant snowpack exists in the Colville Indian Reservation or when large regional rain-on-snow or major spring runoff events occur in the Columbia River basin. Warm rains falling on the snowpack result in a significantly increased rate of snowmelt. Often this melting occurs while the ground is frozen and the water cannot be absorbed into the soil, resulting in increased overland flows. Due to large area, flood waters along the Columbia would likely recede slowly; however, due to the numerous dams and varying capacity of reservoirs, it is difficult to estimate the extent of the potential damage.

DAM FAILURE

Overall, Elmer City is at low risk to a dam failure as a complete failure of a Columbia River Dam is highly unlikely to occur. However, the failure of a large dam, such as the Grand Coulee Dam, will almost certainly have devastating impacts on a community like Elmer City which is only about three miles downstream. As it is the first dam upstream from Elmer City, the Grand Coulee Dam poses the greatest downstream threat to Elmer City. However, since the dam generates electricity and provides water for irrigation it is regularly inspected and maintained, minimizing risk associated with an unexpected failure.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

The potential impacts from flooding to communities located within the Colville Reservation boundary are very similar to the impacts described for Okanogan County as a whole. First responders and other volunteers aiding with emergency flood control or cleanup efforts are potentially at risk of injury due to accidents or possibly exposure to contaminated water. Depressions and low spots are likely to have standing water during prolonged rain events and during the spring due to the high-water table; thus, contaminants in the soil or on vegetation in these areas could impact the water supply.

The availability of food and other supplies is not likely to be impacted or interrupted by a flood event. Furthermore, the delivery of community services such as postal services, health care, law enforcement, and emergency response is also not likely to be impacted by flood events on the Colville Reservation. While individual homes may incur damages as a result of a flood, the economy of the communities will not be impacted by this type of hazard.

Environmental damages resulting from a flood event are not likely to occur. In fact, this type of event will likely improve established wetland areas.

Flash flooding in the drainage that runs through the center of town could result in the flooding of nearby buildings and homes as well as cover roadways and cause damage to road surfaces. Depending on the volume of water and the degree to which the culvert is overwhelmed, erosion may also cause significant damage to the immediate area.

DAM FAILURE

Elmer City is located downstream from Grand Coulee Dam and upstream from Chief Joseph Dam. Both dams have a Downstream Hazard rating of 1A as a failure could put more than 300 lives at risk. The failure of the Grand Coulee Dam is the greatest threat to Elmer City, but the failure of Chief Joseph Dam could also directly and indirectly affect Elmer City.

The failure of a Columbia River dam would most likely be the result of the age of the structure, inadequate spillway capacity, or structural damage caused by an earthquake or flood. A complete failure would, consequently, release a massive quantity of water which could cause human casualties, economic loss, and environmental damage. A failure could occur rapidly, providing little warning and evacuation time for people living downstream; this is particularly true for Elmer City as it is so close to the dam. Although most of the impoundments and dams on the Columbia River are large, they could be overwhelmed by the flows resulting from a dam failure which could result in extensive flooding. This last scenario is unlikely as the next dam above Grand Coulee Dam, the Hugh Keenleyside Dam near Castlegar, British Columbia, is nearly 180 miles away.

There are several possible dam failure scenarios that could impact Elmer City. As the Columbia River is a series of dams and impoundments, the failure of one dam will likely have implications for the dams above and below it:

- **Chief Joseph Dam:** Because it is located downstream from Elmer City, a Chief Joseph Dam failure should have minimal direct impacts on the town. The failure of the Chief Joseph Dam will cause water levels around Elmer City to drop so flooding will not be an issue. However, the sudden drop in water levels could cause slumping along the shoreline which could cause damage to property, roadways, or other types of infrastructure. As the town is located on the Columbia River, a significant drop in water levels could affect recreation and tourism and, therefore, have an impact on the local economy. There are likely to be other impacts to the city as well that would result from a dramatic change to a large water resource such as the Columbia River.
- **Grand Coulee Dam:** As it is the closest dam upstream from Elmer City, the failure of the Grand Coulee Dam would have significant impacts on the city; even a partial failure of the dam could release a significant amount of water. Although the depth and extent of the inundation zone is unknown Elmer City could be subjected to significant flooding, resulting in extensive damage to property, homes, structures, roadways, infrastructure, and, potentially, the loss of life. A complete failure could happen suddenly, giving residents in Elmer City little time to leave the city and relocate to higher ground.
- **Dams Further Upstream:** The Grand Coulee Dam is below Lake Roosevelt which is the largest Columbia River impoundment on the American side. Because of Lake Roosevelt's exceptional capacity, a dam failure on the Canadian side poses a minimal threat to Columbia River systems and communities on the American side. However, that also means that the failure of the Grand Coulee Dam, which is the second largest concrete dam in the world, will have significant implications for populations and development located downstream.

In addition to direct impacts there could be indirect impacts that result from a dam failure, most of which would be related to the local economy. For example, direct economic consequences include the cost of repairing damage and replacing lost items while indirect economic consequences include the loss of jobs, the loss of sales, the cost of securing alternative space for residential or business purposes, and the time required to reopen a facility or resume or restore services.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

There are no critical facilities located in the floodplain of the Columbia River in Elmer City. City and tribal services, office buildings, emergency response equipment and communications equipment are located outside of the floodplain and are not at direct risk of damage.

Roads and bridges are the major infrastructural element that is affected by flooding. There are currently no bridge crossings that are at risk in Elmer City.

DAM FAILURE

Elmer City is at low risk for dam failure as it is unlikely that either the Grand Coulee Dam or Chief Joseph Dam will completely fail. However, given the sizes of the dams and the volume of water stored behind them, even a partial failure could result in the flooding of communities located downstream. The complete

failure of a Columbia River dam will likely result in extensive flooding and destruction of communities located downstream and put hundreds of lives at risk.

Costs associated with the failure of either dam could include repairs to roadway infrastructure, water damage to homes and other structures, insurance claims, loss of life, and the loss of a water resource. Depending on the extent of the failure, costs could range from minimal (damage to shoreline areas) to catastrophic (extreme levels of damage to an entire community). Costs may also be indirect and include the loss of jobs, closure of businesses, reduction in tourism, and other costs related to the local economy. Specific values could not be totaled as the inundation zones associated with the failure of any dam described in this section are unknown.

EARTHQUAKE HAZARDS

Determined by representatives of the town, the following table includes earthquake hazard ratings for the Town of Elmer City. Elmer City does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole; refer to the Earthquake Hazards section of the Okanogan County Annex for more information.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	5 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions in the eastern part of Okanogan County have a 6-10% probability of experiencing an earthquake in the next 50 years; however, no specific jurisdiction has more risk than another or than the County overall within these areas.¹⁵⁰

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no recorded occurrences of earthquakes significantly impacting the Elmer City; however, some minimal shaking has been felt as a result of larger earthquakes elsewhere. Elmer City does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole.

¹⁵⁰ USGS. 2008 United States National Seismic Hazard Maps. U.S. Geological Survey. U.S. Department of Interior. Available online at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>. October 2009.

Unreinforced masonry (URM) structures and unreinforced chimneys of homes will likely be damaged in the event of an earthquake. There are a few publicly accessible unreinforced masonry structures in Elmer City in addition to the numerous homes and other buildings throughout the Reservation with unreinforced chimneys. Damaged or collapsed chimneys could result in the secondary hazard of fire. Nonstructural damage caused by falling and swinging objects may be considerable after any magnitude earthquake. Damage to some older, more fragile bridges and land failure causing minor slides along roadways may isolate some residents.

In Elmer City, there are a few downtown structures that are assumed to be unreinforced masonry. These structures were built prior to the inclusion of articles for seismic stability in the Uniform Building Codes in 1972. The number and value of unreinforced masonry homes or homes with masonry chimneys in Elmer City is unknown, but estimated to include at least 10 buildings.

LANDSLIDE HAZARDS

Determined by representatives of the town, the following table includes landslide hazard ratings for the Town of Elmer City. Refer to the Landslide Hazards section of the Okanogan County Annex for more information about landslide risk in the county.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

The community of Elmer City has a low risk of damage caused by landslides. Most of the potential risk in this area as well comes from unstable soils. Soils composed mostly of schist and granite, as they are in this part of Okanogan County, are typically at higher risk of slumping than other soil types. Slides in this area would be expected along cut and fill slopes and potentially in crop fields or on construction sites where there has been disturbance. These will tend to be smaller scale slides; however, there is some potential for larger events.

IMPACTS AND VALUE OF RESOURCES AT RISK

There is little direct landslide risk to communities on the eastern edge of the County; however, individual landowners could be affected. Road systems may also be damaged as small slides limit vehicle access.

The Confederated Tribes of the Colville Reservation and the Elmer City REA utilities district provided services in this area; however, none of their facilities or assets are at direct risk of landslides.

SEVERE WEATHER HAZARDS

Determined by representatives of the town, the following table includes severe weather hazard ratings for the Town of Elmer City. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information about severe weather risk in the county.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	6 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

The Town of Elmer City does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. The probability of a severe weather event occurring in Elmer City on an annual basis is moderate. However, the impacts to the community are usually minimal and are the same as those described for Okanogan County as a whole.

IMPACTS AND VALUE OF RESOURCES AT RISK

It is difficult to estimate the cost of potential winter storm damages to structures and the economy in Elmer City. Damage to roofs by heavy snow accumulations depends on the moisture content of the snow and the structural characteristics of the buildings. In general, snow in this region tends to have low moisture content because of the low temperatures and arid environment. Additionally, snow rarely accumulates for long periods of time due to regular wind events. Frozen water pipes are the most common damage to residential and business structures. Older homes tend to be at a higher risk to frozen water pipes than newer ones. Snow plowing in within the town limits is accomplished by the town's public works department. Private landowners are responsible for maintaining their own driveways or other private roads. Utility supplies are impacted during severe winter storms as power is lost on a regional basis. This has a two-fold impact on residents as not only is power cut to homes and businesses, but primary heating is lost for many residents. Gas furnaces and wood stoves supplement electrical heating, but with wood heating the senior population is at a disadvantage. Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for several days and businesses may not open. Damages are seen in the form of structural repair and loss of economic activity. Okanogan County schools are occasionally closed during and right after a severe winter storm because of cold temperatures and snow-covered roads.

Thunderstorms are not likely to be severe enough in Elmer City to cause significant damages. However, the loss potential from flooding that results from severe thunderstorms could be significant.

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property within Elmer City. The most significant losses are most clearly seen in the agriculture sectors of the economy. Potential losses to agriculture can be disastrous. Crop damage from hail will also be different depending on the time of year and the type of crop. Most farmers carry insurance on their crops to help mitigate the potential financial loss resulting from a localized hail storm. Homeowners in Elmer City rarely incur severe damage to structures (roofs); however, hail damage to vehicles is not uncommon. The damage to vehicles is difficult to estimate because the number of vehicles impacted by a specific ice storm is unknown. Additionally, most hail damage records are kept by various insurance agencies.

It is difficult to estimate potential losses in Elmer City due to windstorms and tornadoes. Construction throughout the County has been implemented in the presence of high wind events, and therefore, the community is at a higher level of preparedness to high wind events than many other areas experiencing lower average wind speeds.

We have estimated losses based on wind and tornado damage as follows:

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)
- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 255 total parcels with 122 improvements in the Town of Nespelem worth just under \$7.9 million. Using the criteria outlined above an estimate of the impact of high winds on the city has been made. The potential wind and tornado impact on improvements values is estimated at just over \$118,000 in damage. The estimated damage to roofs (on parcels with improvements) is more than \$18,000.

Power failure often accompanies severe storms. Prolonged failure, especially during cold winter temperatures can have disastrous effects. All communities should be prepared to deal with power failures. Community shelters equipped with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water.

WILDLAND FIRE HAZARDS

Determined by representatives of the town, the following table includes wildland fire hazard ratings for the Town of Elmer City. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information about wildfire risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	9 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

The Town of Elmer City is located in the southeastern tip of Okanogan County and occurs within the Colville Reservation.

Fuels in Elmer City are fairly consistent. Much of this area is covered by low growing grasses and sagebrush with some scattered ponderosa pine in the draws. Fires occurring throughout this community would be expected to spread very rapidly, but burn with a moderate intensity through the flashy fuels. The riparian vegetation along the waterways may support a more intense fire later in the summer as the water levels go down and fuels become dry.

The primary access route through Elmer City is State Route 155, a paved, two-lane highway. The Columbia River Road is also a paved, two-lane highway traveling from Colville Agency west along the Columbia River. There are several secondary roads throughout the area accessing homes or recreational areas. These roads are typically regularly maintained, graveled routes. Secondary roads include Moses Road, Buffalo Lake Road, Rebecca Lake Road, Peter Dan Road

Residents in the community of Elmer City have access to the municipal water system. Homes outside of the city limits rely on personal well systems.

Two Bonneville Power Administration transmission lines are located within the Nespelem and Coulee Dam Communities. One of these lines ends at Colville Agency, while the other passes through the bottom half of the Coulee Dam Community.

Grand Coulee Dam on the Columbia River is located in the southwestern tip of the Coulee Dam Neighborhood. The Grand Coulee Dam, located on the Columbia River in central Washington, is the largest concrete structure in the United States. It forms the centerpiece of the Columbia Basin Project, a multipurpose endeavor managed by the U.S. Bureau of Reclamation. In addition to producing up to 6.5

million kilowatts of power, the dam irrigates over half a million acres of Columbia River basin farm land and provides abundant wildlife and recreation areas.

Okanogan County Fire Protection District #2 is responsible for structural and wildland fire protection within and immediately surrounding the town of Elmer City. The Bureau of Indian Affairs provides wildland fire protection on all lands within the Confederated Tribes of the Colville Reservation.

State lands are the sole responsibility of the Washington Department of Natural Resources (suppression & reciprocal agreements may apply). Federal lands are the sole responsibility of the Federal management agency (reciprocal agreement may apply). Much of the private lands in Okanogan County are within joint jurisdiction between the County fire protection districts and the WA DNR.

The DNR provides wildfire protection during the fire season between April and October with a varying degree of resources available in the early spring and late autumn months. The U.S. Forest Service seasonally responds to all wildland fires on their jurisdiction and may also respond to wildland fires on private lands based on a reciprocal agreement with the DNR.

PROBABILITY OF FUTURE OCCURRENCE

The potential impacts from a wildfire in Elmer City are very similar to the impacts described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel. Individual structures, property, and livelihoods could be severely damaged or lost as a result of a fire; however, the community is not likely to suffer severe or long-term economic losses.

A fire in the shrublands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

Smoke from a nearby wildland fire may impact sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Elmer City to other communities; thus, travel and commerce may be interrupted.

IMPACTS OF WILDLAND FIRE EVENTS

The potential impacts from a wildfire in Elmer City are very similar to the impacts described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel. Individual structures, property, and livelihoods could be severely damaged or lost as a result of a fire; however, the community is not likely to suffer severe or long-term economic losses.

A fire in the grasslands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

Smoke from a nearby wildland fire may impact sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Davenport to other communities; thus, travel and commerce may be interrupted.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Elmer City from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Elmer City would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no value estimates were made for this hazard.

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that Elmer City will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county. Determined by representatives of the town, the following table includes volcano hazard ratings for the Town of Elmer City. Refer to the Volcano Hazards section of the Okanogan County Annex for more information about volcano risk in the county.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	4 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that could fall on the Town of Elmer City. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

General impacts to the Town of Elmer City are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and seismic activity are expected to have the greatest impact on the small rural cities and communities of Okanogan County.

The greatest impacts from ashfall will likely concern water quality and emergency response. Ashfall will have a significant impact on the Columbia River which could affect the systems that supply drinking water to the city and other water systems. Light ashfall is not expected to cause any major damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the municipality. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the general public.

HAZARDOUS MATERIALS HAZARDS

Due to data limitations, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. Refer to the county section for a more complete analysis of hazardous materials. Determined by representatives of the town, the following table includes hazardous materials hazard ratings for the Town of Elmer City.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	6 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

LOCAL EVENT HISTORY

Currently, there are no cleanup sites on record with the Washington State Department of Ecology. According to the Washington Department of Ecology “What’s In My Neighborhood” search tool, there are no cleanup sites within two miles of Nespelem.

PROBABILITY OF FUTURE OCCURRENCE

The probability of a large release of hazardous materials into the environment is low as there are no major processing facilities or transportation infrastructure that are set up specifically for hazardous materials. Operations that are most likely to be associated with larger spills or releases of hazardous materials into the environment include fuel stations, businesses, and commerce. The probability of the release of small quantities of hazardous substances is low to moderate; typically, releases become less likely as the quantity or volume released increases.

IMPACTS OF HAZARDOUS MATERIALS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUES OF RESOURCES AT RISK

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified, other costs could include medical treatment for people have been exposed to hazardous materials, environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the Town of Elmer City. Selected by representatives of the Town, the following table includes hazard ratings for pandemic for the Town of Elmer City. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

LOCAL EVENT HISTORY

The city has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The city has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to the Town of Elmer City. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for the Town of Elmer City was four (0.4% of total county cases) and the virus had caused zero deaths. For the entire county, there were 1,042 total cases and 13 deaths recorded by that same date.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the Town of Elmer City. Nationwide, the pandemic will have resulted in hundreds of thousands of deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

TOWN OF COULEE DAM ANNEX

FLOOD HAZARDS

Determined by representatives of the town, the following tables include riverine (top) and dam failure (bottom) flood hazard ratings for the Town of Coulee Dam. Refer to the Flood Hazard section of the Okanogan County Annex for more information about NFIP Flood Zones and Dam Failure (including high impact dams, the Downstream Hazard ratings, etc.) in the county.

Riverine flooding hazard ratings for the Town of Coulee Dam.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

Dam failure hazard ratings for the Town of Coulee Dam.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

RIVERINE FLOODING

Located just below the Grand Coulee Dam, the Town of Coulee Dam is an incorporated city on the Colville Indian Reservation. Even though Coulee Dam is situated on the east and west banks of the Columbia River, the town would not be affected by a FEMA identified 100 or 500-year flood. Therefore, the town is at little to no risk of experiencing flood events.

The Town of Coulee Dam is located along the rim of the Columbia River canyon at elevations equivalent or well above the top of Grand Coulee Dam and several hundred feet above the high-water mark of the Columbia River.

DAM FAILURE

Note: The Town of Coulee Dam recognizes that the probability of a complete failure of the Grand Coulee Dam is so low that it is almost zero. The dam has been in operation since June of 1942 and is regularly inspected and upgraded so there is no reason to suspect that the dam will fail in its current condition.

Coulee Dam is in the southeast corner of the county between two major dams; it is upstream from Chief Joseph Dam and downstream from Grand Coulee Dam. Given the size of the dams and the volume of water behind them, the Washington Department of Ecology has assigned both dams a Downstream Hazard rating of 1A which means that more than 300 lives would be at risk if either dam were to fail.

PROBABILITY OF FUTURE OCCURRENCE

RIVERINE FLOODING

Because of the capacity of both the Columbia River and Lake Roosevelt, flash flooding events are rare in Coulee Dam. Runoff produced by rain-on-snow events is readily absorbed by the river and the reservoir and only in rare, isolated cases has minor flash flooding resulted in town due to thunderstorms. Higher water levels on the Columbia River are mostly the result of water releases from behind Canadian dams. However, water levels on the Columbia River are monitored closely and controlled by the Grand Coulee Dam so high-water levels are rarely a concern for the town.

DAM FAILURE

Overall, the Grand Coulee Dam poses an extremely low hazard risk to the Town of Coulee Dam. Although the probability of a failure or partial failure is not zero, representatives of the Town understand that it is highly unlikely that the Grand Coulee Dam, or any of the other major Columbia River dams, will fail in their current condition.

IMPACTS OF FLOOD EVENTS

RIVERINE FLOODING

The potential impacts from flooding to communities located within the Colville Reservation boundary are similar to the impacts described for Okanogan County as a whole. First responders and other volunteers aiding with emergency flood control or cleanup efforts are potentially at risk of injury due to accidents or possibly exposure to contaminated water. People who commute to Coulee Dam to work, purchase goods, or conduct business could experience other impacts from flooding and be adversely affected. Those individuals may not be able to travel to town because of flooding in their homes or flooding across roadways and they may also be affected by contaminated drinking water and other similar impacts.

Although it is unlikely that Coulee Dam will be directly affected by flooding, services from outside of town could be disrupted or delayed due to flooding in neighboring areas (outside of Coulee Dam limits). The delivery of in-community services such as, health care, law enforcement, and emergency response are not likely to be disrupted, but the delivery of food and other supplies from outside of Coulee Dam could be disrupted by a flood event. Overall, it is unlikely that the local economy will be affected by this type of hazard.

Environmental damages resulting from a flood event are not likely to occur. In fact, this type of event will likely improve established wetland areas.

DAM FAILURE

The Washington Department of Ecology has assigned the Grand Coulee Dam a downstream hazard of 1A which means that more than 300 people that could be affected by a dam breach. However, representatives of the Town of Coulee Dam understand the probability of a breach to be so low that it is almost zero.

VALUE OF RESOURCES AT RISK

RIVERINE FLOODING

There are no critical facilities located in the floodplain of the Columbia River in Coulee Dam. City and tribal services, office buildings, emergency response equipment and communications equipment are located outside of the floodplain and are not at direct risk of damage.

Roads and bridges are the major infrastructural elements that could be affected by flooding. Although it is at low risk, the bridge is in the floodplain and is a critical piece of infrastructure.

DAM FAILURE

The Town of Coulee Dam is at low risk for dam failure as it is unlikely that either the Grand Coulee Dam or Chief Joseph Dam will completely fail. However, if a breach were to occur the resulting losses could include damage to infrastructure, water damage to buildings, insurance claims, loss of life, and the loss of a water resource. Costs may also be indirect and include the loss of jobs, closure of businesses, reduction in tourism, and other costs related to the local economy. Specific values could not be totaled as the inundation zones associated with the failure of any dam described in this section are unknown.

EARTHQUAKE HAZARDS

Determined by representatives of the city, the following table includes earthquake hazard ratings for the Town of Coulee Dam. Coulee Dam does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole; refer to the Earthquake Hazards section of the Okanogan County Annex for more information.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	5 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

Overall, the County has a 6-15% chance of experiencing an earthquake in the next 50 years. Jurisdictions in the eastern part of Okanogan County have a 6-10% probability of experiencing an earthquake in the next 50 years; however, no specific jurisdiction has more risk than another or than the County overall within these areas.¹⁵¹ According to the USGS peak ground acceleration models (Figure 28), there is a 2% chance that Coulee Dam will experience ground shaking that is approximately 7 to 8 %g over the next 50 years (which is similar to the ground shaking produced at the epicenter of a 4 to 5 magnitude earthquake).

IMPACTS AND VALUE OF RESOURCES AT RISK

There are no recorded occurrences of earthquakes significantly impacting the town of Coulee Dam; however, some minimal shaking has been felt as a result of larger earthquakes elsewhere. The town of Coulee Dam does not have any differing issues or levels of risk associated with this hazard than Okanogan County as a whole.

Unreinforced masonry (URM) structures and unreinforced chimneys of homes will likely be damaged in the event of an earthquake. There are several publicly accessible unreinforced masonry structures in the town of Coulee Dam in addition to the numerous homes and other buildings throughout the community with unreinforced chimneys. Damaged or collapsed chimneys could result in the secondary hazard of fire. Nonstructural damage caused by falling and swinging objects may be considerable after any magnitude earthquake. Damage to some older, more fragile bridges and land failure causing minor slides along roadways may isolate some residents.

In Coulee Dam, there are approximately 5 downtown structures that are assumed to be unreinforced masonry. These structures were built prior to the inclusion of articles for seismic stability in the Uniform Building Codes in 1972. The number and value of unreinforced masonry homes or homes with masonry chimneys in the town of Coulee Dam is unknown but estimated to include at least 25 buildings.

LANDSLIDE HAZARDS

Determined by representatives of the city, the following table includes landslide hazard ratings for the Town of Coulee Dam. Refer to the Landslide Hazards section of the Okanogan County Annex for more information about landslide risk in the county.

The community of Coulee Dam has a low risk of damage caused by landslides. Soils composed mostly of schist and granite, as they are in this part of Okanogan County, are typically at higher risk of slumping than other soil types. Slides in this area would be expected along cut and fill slopes and potentially in crop fields or on construction sites where there has been disturbance. These will tend to be smaller scale slides; however, there is some potential for larger events.

¹⁵¹ USGS. 2008 United States National Seismic Hazard Maps. U.S. Geological Survey. U.S. Department of Interior. Available online at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>. October 2009.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

IMPACTS AND VALUE OF RESOURCES AT RISK

There is little direct landslide risk to communities on the eastern edge of the county; however, individual landowners could be affected. Road systems may also be damaged as small slides limit vehicle access.

There is a very low probability that a landslide could affect the power system in Coulee Dam or the water/sewer system.

SEVERE WEATHER HAZARDS

Determined by representatives of the town, the following table includes severe weather hazard ratings for the Town of Coulee Dam. Refer to the Severe Weather Hazards section of the Okanogan County Annex for more information about severe weather risk in the county.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	3 – Likely	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Overall Significance	7 – Medium	The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating

The town of Coulee Dam does not have any differing levels of risk associated with this hazard than Okanogan County as a whole. The probability of a significant weather event occurring in Coulee Dam on an annual basis is very high. However, the impacts to the community are usually minimal and are the same as those described for Okanogan County as a whole.

IMPACTS AND VALUE OF RESOURCES AT RISK

Although it is difficult to estimate costs associated with storm damage, impacts from storms within the Town of Coulee Dam are usually minimal. The Town only receives, on average, approximately 15.5 inches

of snowfall every year; however, temperatures can drop well below freezing which can cause issues with frozen pipes and threaten vulnerable populations. Older homes tend to be at a higher risk to frozen water pipes than newer ones. Snow plowing in within the town limits is accomplished by the town's public works department. Private landowners are responsible for maintaining their own driveways or other private roads. Utility supplies are seldom impacted during severe winter storms as power is generated locally at the dam. Power outages within Coulee Dam are typically short as power is often restored quickly. Emergency response to severe winter storms includes site visits by police or fire department personnel, opening of shelters, or assistance with shopping, medical attention, and communications. The economic losses caused by severe winter storms may frequently be greater than structural damages. Employees may not be able to travel to work for several days and businesses may not open. Damages are seen in the form of structural repair and loss of economic activity. Okanogan County schools are occasionally closed during and right after a severe winter storm because of cold temperatures and snow-covered roads.

Thunderstorms are not likely to be severe enough in the town of Coulee Dam to cause significant damages. Because of the nearby dam, reservoir, and river impacts from thunderstorm flooding are negligible as all three waterway features help to contain and control excess runoff produced by severe weather.

Although the financial impacts of hail can be substantial and extended, accurately quantifying these impacts is problematic. Hail typically causes direct losses to structures and other personal property within the town of Coulee Dam. Outside of the Town, the most significant losses are most clearly seen in the agriculture sectors of the economy. Potential losses to agriculture can be disastrous. Crop damage from hail will also be different depending on the time of year and the type of crop. Most farmers carry insurance on their crops to help mitigate the potential financial loss resulting from a localized hail storm. Homeowners in the town of Coulee Dam rarely incur severe damage to structures (roofs); however, hail damage to vehicles is not uncommon. The damage to vehicles is difficult to estimate because the number of vehicles impacted by a specific ice storm is unknown. Additionally, most hail damage records are kept by various insurance agencies.

It is difficult to estimate potential losses in the town of Coulee Dam due to windstorms. The county has set standards for construction and building practices through the adoption of the latest International Building Codes. These codes consider various severe weather conditions, including high winds, and are likely to be sufficient for structures in the county. However, exceptional storm events producing significant wind speeds can cause power outages and topple trees onto houses, cars, and other structures. Older buildings that have not been updated with modern building materials will likely be the most vulnerable to such an event.

Therefore, the following calculations were used to estimate both structural damage and roof damage resulting from high winds.

- 3% of the buildings damaged causing 50% of value loss (loss could be from downed or damaged trees, damaged outbuildings, damaged fences/poles, damage to siding, damaged landscaping etc.)

- 5% of the buildings received damage to roof (requiring replacement of roof equaling \$3,000)

Damages associated with critical or essential facilities (schools, hospitals, etc.) have not been estimated. We have also not estimated the potential for a large-scale wildfire event associated with high winds. Based on the data provided by the County, there are 440 total parcels with 379 improvements in the Town of Coulee Dam worth almost \$53 million. Using the criteria outlined above an estimate of the impact of high winds on the city has been made. The potential wind and tornado impact on improvements values is estimated at just under \$800,000 in damage. The estimated damage to roofs (on parcels with improvements) is almost \$57,000.

Power failure often accompanies severe storms. Prolonged failure, especially during cold winter temperatures can have disastrous effects. All communities should be prepared to deal with power failures. Community shelters equipped with alternative power sources will help local residents stay warm and prepare food. A community-based system for monitoring and assisting elderly or disabled residents should also be developed. All households should maintain survival kits that include warm blankets, flashlights, extra batteries, nonperishable food items, and clean drinking water.

WILDLAND FIRE HAZARDS

Determined by representatives of the town, the following table includes wildland fire hazard ratings for the Town of Coulee Dam. Refer to the Wildland Fire Hazards section of the Okanogan County Annex for more information about wildfire risk in the county.

Category	Rating	Definition
Location	3 – Significant	25 to 75% of the planning area or frequent single-point occurrences
Maximum Probable Extent	3 – Severe	Severe classification on scientific scale, fast speed of onset or long duration, resulting in devastating damage and loss of services for weeks or months
Probability of Future Events	4 – Highly Likely	90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year
Overall Significance	10 – High	The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area

The Town of Coulee Dam is located in the southeastern tip of Okanogan County and partially lies within the Colville Reservation.

Fuels near Coulee Dam are fairly consistent. Much of this area is covered by low growing grasses and sagebrush. Fires occurring throughout this area would be expected to spread very rapidly, but burn with a moderate intensity through the flashy fuels. The riparian vegetation along the waterways may support a more intense fire later in the summer as the water levels drop and fuels become dry. The town of Coulee Dam does not contain the same kinds of fuels as the surrounding area.

The primary access route through Coulee Dam is State Route 155, a paved, two-lane highway.

Residents in the community of Coulee Dam have access to the municipal water system. Homes outside of the city limits rely on personal well systems.

Grand Coulee Dam on the Columbia River is located in the southwestern tip of the Coulee Dam Neighborhood. The Grand Coulee Dam, located on the Columbia River in central Washington, is the largest concrete structure in the United States. It forms the centerpiece of the Columbia Basin Project, a multipurpose endeavor managed by the U.S. Bureau of Reclamation. In addition to producing up to 6.5 million kilowatts of power, the dam irrigates over half a million acres of Columbia River basin farm land and provides abundant wildlife and recreation areas.

Okanogan County Fire Protection District #2 is responsible for structural and wildland fire protection surrounding the Town of Coulee Dam to the north. Rural residents to the west are protected by Douglas County RFPD 3, and residents to the south are protected through mutual aid agreements with US Bureau of Rec, Grand Coulee, and town of Coulee Dam. The Bureau of Indian Affairs provides wildland fire protection on all lands within the Confederated Tribes of the Colville Reservation.

State lands are the sole responsibility of the Washington Department of Natural Resources (suppression & reciprocal agreements may apply). Federal lands are the sole responsibility of the Federal management agency (reciprocal agreement may apply). Much of the private lands in Okanogan County are within joint jurisdiction between the County fire protection districts and the WA DNR.

The DNR provides wildfire protection during the fire season between April and October with a varying degree of resources available in the early spring and late autumn months. The U.S. Forest Service seasonally responds to all wildland fires on their jurisdiction and may also respond to wildland fires on private lands based on a reciprocal agreement with the DNR.

PROBABILITY OF FUTURE OCCURRENCE

The potential impacts from a wildfire in the area around Coulee Dam are very similar to the impacts described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel. Individual structures, property, and livelihoods could be severely damaged or lost as a result of a fire; however, the community is not likely to suffer severe or long-term economic losses.

A fire in the shrublands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

Smoke from a nearby wildland fire may impact sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Coulee Dam to other communities; thus, travel and commerce may be interrupted.

IMPACTS OF WILDLAND FIRE EVENTS

The potential impacts from a wildfire in Coulee Dam are very similar to the impacts described for Okanogan County as a whole. All fires pose a significant safety risk to residents and emergency service personnel. Individual structures, property, and livelihoods could be severely damaged or lost as a result of a fire; however, the community is not likely to suffer severe or long-term economic losses.

A fire in the grasslands surrounding the community may benefit the ecological environment as nutrients are recycled into the soil. Generally, grass and forbs are rejuvenated by a low intensity fire and grow back quickly; however, heavy rains immediately after a fire could cause erosion.

Smoke from a nearby wildland fire may impact sensitive populations within the community due to degraded air quality conditions. Smoke and/or flames will also impact transportation corridors connecting Coulee Dam to other communities; thus, travel and commerce may be interrupted.

VALUE OF RESOURCES AT RISK

It is difficult to estimate potential losses in Coulee Dam from wildland fire due to the unpredictability of wildfire behavior and the nature of ignition sources. It is unlikely that more than a few structures or other properties within the city limits of Coulee Dam would be lost or damaged by a wildland fire; however, residents in the immediate vicinity may be directly impacted. Electrical Feeder #4 is located west of town and damage to it would impact many people in Coulee Dam and the surrounding area. Past wildfire damage to the line resulted in roughly \$100,000 in damage but future damage could be much higher. It is impossible to forecast the path a wildfire will take and what type of assets and resources, manmade and ecological, will be at risk. Thus, no total value estimates were made for this hazard.

VOLCANO HAZARDS

Given the regional scale of the volcano-related impacts that are expected to affect Okanogan County, there is a high probability that Coulee Dam will be affected by volcanic activity in a similar manner as the rest of the populated areas in the county. Determined by representatives of the town, the following table includes volcano hazard ratings for the Town of Coulee Dam. Refer to the Volcano Hazards section of the Okanogan County Annex for more information about volcano risk in the county.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

PROBABILITY OF FUTURE OCCURRENCE

The probability of an eruption happening is the same as what was described for the county. However, the location of the erupting volcano and the direction of the prevailing winds at the time of eruption could have ramifications concerning the amount of ash that could fall on the Town of Coulee Dam. For example, in a scenario with prevailing westerly winds, a Mount Baker eruption could deposit more ash in the northern half of the county while a Glacier Peak eruption could deposit more ash in the southern half of the county.

IMPACTS OF VOLCANIC EVENTS

General impacts to the Town of Coulee Dam are expected to be like those described for the county; refer to the Okanogan County Annex for more information about impacts that are most likely to result from a volcanic eruption. As lahars will follow major river systems and flow to the west, tephra, ashfall, and seismic activity are expected to have the greatest impact on the small rural cities and communities of Okanogan County.

The greatest impacts from ashfall will likely concern water quality and emergency response. Ashfall will have a significant impact on the Columbia River which could affect the systems that supply drinking water to the city and other water systems. Light ashfall is not expected to cause any major damage to buildings, but it could delay emergency response efforts and be a health concern for sensitive residents.

VALUES OF RESOURCES AT RISK

It is difficult to estimate the value of resources at risk during a volcanic eruption. Costs associated with ash-related damage would likely depend on the duration of exposure and quantity of ash that settles within the municipality. Ash can collapse the roofs of buildings, impact water resources and infrastructure, clog vehicle engines, ground or damage airplanes, harm or kill livestock, crops, and other vegetation, and have adverse impacts on human and animal health. As indicated by the aftermath of the Mount St. Helens eruption in 1980, the damage caused by an eruption can total in the billions of dollars.

In addition to any kind of damage to infrastructure, there will be, depending on the volume of ash fall, high costs associated with clean-up efforts, the need for additional medical supplies, food and water, temporary shelter and transportation needs, and any other emergency supplies needed for both emergency responders and the general public.

HAZARDOUS MATERIALS HAZARDS

Due to data limitations, this section is supplemental to the Hazardous Materials Hazards section in the Okanogan County Annex. Refer to the county section for a more complete analysis of hazardous materials. Determined by representatives of the city, the following table includes hazardous materials hazard ratings for the Town of Coulee Dam.

Category	Rating	Definition
Location	1 – Negligible	Less than 10% of planning area or isolated single-point occurrences
Maximum Probable Extent	1 – Weak	Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
Probability of Future Events	1 – Unlikely	Less than 1% probability of occurrence in the next year or a recurrence interval of greater than every 100 years
Overall Significance	3 – Low	Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

LOCAL EVENT HISTORY

There is one cleanup site on record with the Washington Department of Ecology that is within the vicinity of Coulee Dam. There is one Level-2 site that is awaiting cleanup, the Brett Pit may have up to nine different contaminants in ground water and surface water in the area. However, this is a US Bureau of Rec installation and it is not located within the town.

Table 120) Hazardous waste clean-up sites in Coulee Dam, WA. Sites highlighted in blue are still active. Data is from the Washington State Department of Ecology Cleanup Site Search.

Cleanup Site ID	Site Name	Site Status	Site Rank
3751	Brett Pit	Awaiting Cleanup	2 - Moderate-High Risk

PROBABILITY OF FUTURE OCCURRENCE

The probability of a large release of hazardous materials into the environment is low as there are no major processing facilities or transportation infrastructure that are set up specifically for hazardous materials. Operations that are most likely to be associated with larger spills or releases of hazardous materials into the environment include mining, fuel stations, and commerce. The probability of the release of small quantities of hazardous substances is low to moderate; typically, releases become less likely as the quantity or volume released increases.

IMPACTS OF HAZARDOUS MATERIALS

The impacts associated with the release of hazardous materials into the environment is the same as those described in the county section. Refer to the Hazardous Materials Hazards section in the Okanogan County Annex for more information.

VALUES OF RESOURCES AT RISK

Aside from the cost of cleanup and disposal, it is difficult to assign dollar values to the resources that are potentially at risk to a release of hazardous materials. Even though specific costs cannot be identified, other costs could include medical treatment for people have been exposed to hazardous materials, environmental damage, contamination of drinking water, property damage, adverse impacts to wildlife, and even the cost of legal action.

PANDEMIC HAZARDS

As the approach to addressing a pandemic will largely be a county and state-wide effort, the impacts and risk described for pandemics in the Okanogan County Annex will also apply to the Town of Coulee Dam. Selected by representatives of the Town, the following table includes hazard ratings for pandemic for the Town of Coulee Dam. Refer to the Okanogan County Annex for a more complete analysis of hazards and risk related to pandemics.

Category	Rating	Definition
Location	2 – Limited	10 to 25% of the planning area or limited single-point occurrences
Maximum Probable Extent	2 – Moderate	Moderate classification on scientific scale, moderate speed of onset or moderate duration, resulting in some damage and loss of services for days
Probability of Future Events	2 – Occasional	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Overall Significance	6 – Medium	The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating

LOCAL EVENT HISTORY

The city has the same history with pandemics as the rest of the county. Refer to Local Event History in the Pandemic Hazards section of the Okanogan County Annex for more information.

PROBABILITY OF FUTURE OCCURRENCE

The city has the same probability of being affected by a pandemic as the rest of the county. Refer to Probability of Future Occurrence in the Pandemic Hazards section of the Okanogan County Annex for more information.

IMPACTS OF A PANDEMIC

The impacts of a pandemic described in the Okanogan County Annex apply to the Town of Coulee Dam. Refer to the County annex for more information.

As of September 21, 2020, the cumulative COVID-19 case count for the Town of Coulee Dam was 10 (1% of total county cases) and the virus had caused zero deaths. For the entire county, there were 1,042 total cases and 13 deaths recorded by that same date.

VALUES OF RESOURCES AT RISK

As was described for the county, this plan was updated during the COVID-19 pandemic so a value for resources at risk could not be provided. Even when it is determined that the pandemic is over, it may not be possible to provide more than a general estimate of the magnitude of economic impacts that affected the Town of Coulee Dam. Nationwide, the pandemic will have resulted in hundreds of thousands of

deaths, the loss of millions of jobs, the closure of businesses, trillions of dollars in government spending, and billions or trillions of dollars in lost economic productivity. The economic and financial impacts from the pandemic could last for decades.

FIRE DEPARTMENTS & FIRE DISTRICTS

This section includes the risk assessments for each fire department and fire district that intends to adopt the 2022 Okanogan County Multi-Hazard Mitigation Plan. The risk assessments address the hazards that were described earlier in the plan; however, these are simplified assessments that are intended to supplement the risk assessments that were performed for the towns, cities, and portions of the county that overlap each department and district jurisdiction. For instance, the information included in each department and district annex is specific to department and district resources or operations. However, it is likely that there are other assets (e.g., homes, towns, cities, infrastructure, etc.) natural features, and natural hazard areas within a department or district jurisdiction that have already been addressed in the annexes of other adopting jurisdictions. To reduce the amount of informational redundancy in the plan, the summary tables included in each department and district risk assessment will reference the other annexes in the plan where more information can be found regarding assets, natural features, and natural hazard areas that fall within that fire department or district jurisdiction. The fire departments and districts that intend to adopt this plan are listed in Table 121, along with some additional information, and they are mapped in Figure 81.

Table 121) Fire departments and districts within Okanogan County, WA that intend to adopt the 2022 Okanogan County Multi-Hazard Mitigation Plan. Included in the table is the approximate size of each jurisdiction (square miles) and the approximate number of address points and any cities, towns, and communities located within each jurisdiction.

Department or District	Square Miles	Address Points	Cities, Towns, Communities
Okanogan City Fire Department	3.2	1155	Okanogan
Omak City Fire Department	3.3	2525	Omak
Town of Conconully Fire Department	0.4	237	Conconully
Coulee Dam Fire Department	0.7	427	Coulee Dam
Fire District 1	30.0	2260	Oroville
Fire District 2	8.0	307	Elmer City
Fire District 3	71.0	2807	Malott, Okanogan-area, Omak-area
Fire District 4	174.0	2030	Ellisford, Tonasket
Fire District 6	350.0	4856	Carlton, Mazama, Twisp, Winthrop
Fire District 7	33.0	573	Riverside
Fire District 8	250.0	127	Lafleur, Timentwa
Fire District 9	64.0	211	Conconully
Fire District 10	24.0	235	Loomis
Fire District 11	111.0	524	Molson
Fire District 12	16.0	333	
Fire District 13	140.0	27	
Fire District 14	124.0	36	
Fire District 15	230.0	2590	Brewster, Methow, Monse, Pateros
Fire District 16	51.5	672	

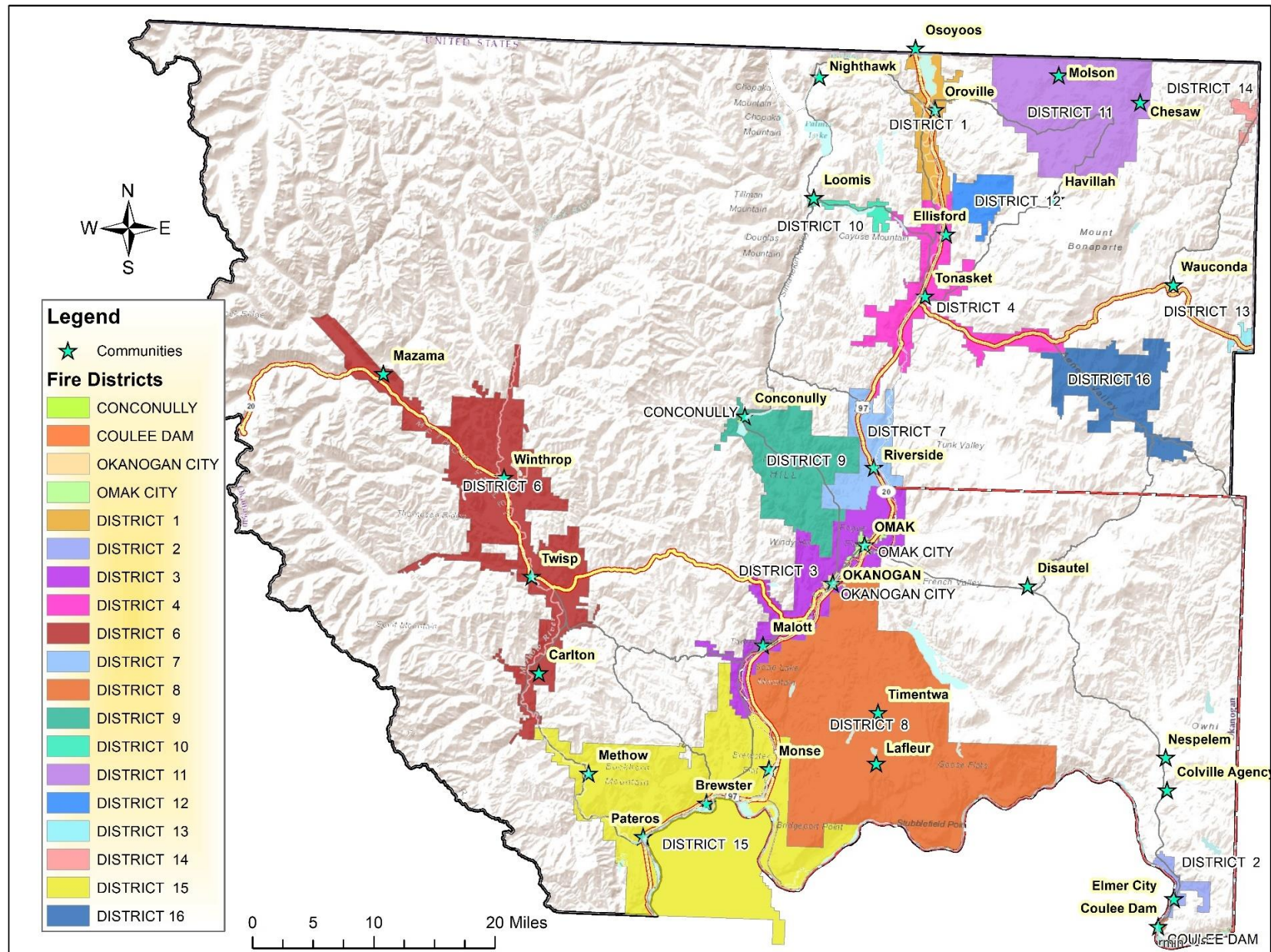


Figure 81) Map of Okanogan County, WA fire department and fire district jurisdictional boundaries.

NFIP Flood Zones

Some fire department and district facilities are in proximity to NFIP flood zones. Maps that include the locations of fire stations and NFIP flood zones are included in the risk assessments of those fire departments and districts. Refer to Table 122 (below) for definitions of the different NFIP flood zones that could be included in the maps of those fire facilities.

Table 122) Definitions of NFIP flood zones identified in Okanogan County, WA.

ZONE	FLOOD TYPE	DESCRIPTION
A	100-Year	High Risk: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	100-Year	High Risk: Areas subject to a one percent or greater annual chance of flooding in any given year. Base flood elevations are shown as derived from detailed hydraulic analyses (Zone AE is used on new and revised maps in place of Zones A1-A30)
AO	100-Year	High Risk: River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
X500	500-Year	Low to Moderate Risk: Areas of moderate flood hazard from the principal source of flood in the area, determined to be within the limits of one percent and 0.2 percent annual chance floodplain. (Shaded Zone X is used on new and revised maps in place of Zone B.)

CITY OF OKANOGAN FIRE DEPARTMENT

The Okanogan Fire Department covers about 3.2 square miles and operates out of one facility located at 235 Oak Street. Much of the risk posed by natural hazards to the Okanogan Fire Department station and jurisdiction has already been described for the City of Okanogan. Therefore, this section is supplemental to the more detailed analyses provided in those other annexes.

PROBABILITY OF FUTURE OCCURRENCE

As the fire station is located within Okanogan city limits and the department jurisdiction matches the city boundary, the probability that the fire department will be affected by natural hazards is the same as what was described for the City of Okanogan.

IMPACTS OF HAZARD EVENTS

Table 127 describes risk and impacts that are specific to the Okanogan fire station; flood and landslide hazard areas around the fire station are depicted in Figure 82. Refer to the City of Okanogan and Okanogan County Annexes for a geographically broader analysis of hazards, which includes descriptions and maps for various other hazards, that could affect the fire station as well as the Department's jurisdiction.

Table 123) Summary of potential impacts and risk presented to Okanogan Fire Department assets and personnel stationed at the Okanogan fire station. This information is supplemented by the risk assessments in the City of Okanogan Annex.

Okanogan FD	Okanogan
Address	235 Oak Street
Flood	Overall risk is low as the station is not located in NFIP Flood Zones
Landslide	As it is in the city, the Okanogan fire station is not directly at risk to landslides
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for the City of Okanogan and Okanogan County. However, the impacts from these hazards, which are described in those other sections, may affect the Department's ability to respond during a natural hazard event.
Severe Weather	
Wildland Fire	
Volcano	
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.
Pandemic	The Department's ability to respond to emergencies could be limited due to the spread of illness amongst personnel. Illness could potentially spread amongst firefighters while responding to an incident.

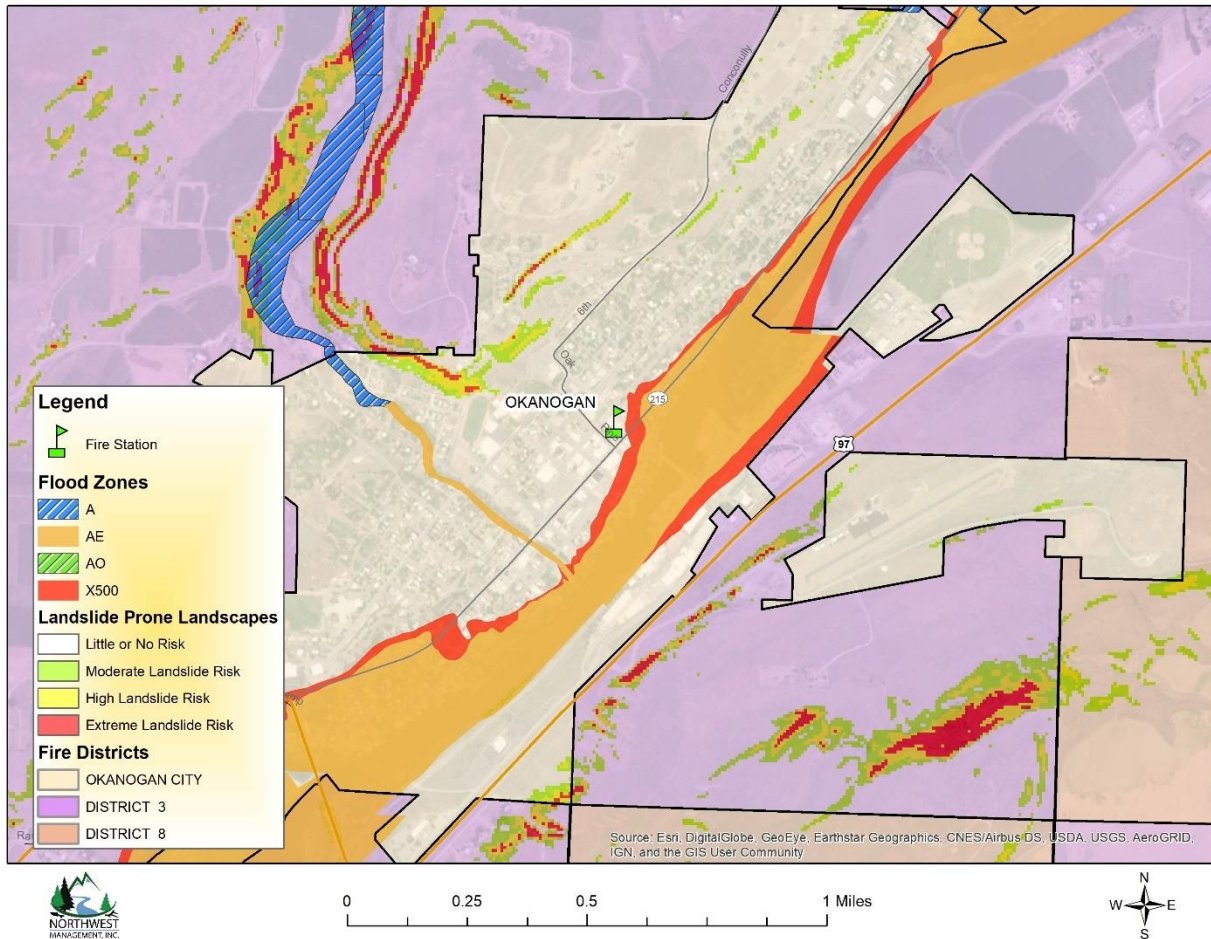


Figure 82) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Okanogan Fire Station in Okanogan, WA.

VALUE OF RESOURCES AT RISK

All Okanogan Fire Department assets and equipment stored at the Okanogan Fire Station are potentially at risk to a hazard event. However, it is unlikely that any damage or losses will occur at the fire station as a result of a hazard event.

The at-risk assets/values in the Okanogan Fire Department jurisdiction are not owned by the fire department; however, the Department responds to fires and other incidents that threaten life and property. As the Department is mostly concerned with structure fires, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in the Okanogan Fire Department jurisdiction, there are approximately 1,155 address points within the jurisdiction (Figure 83). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

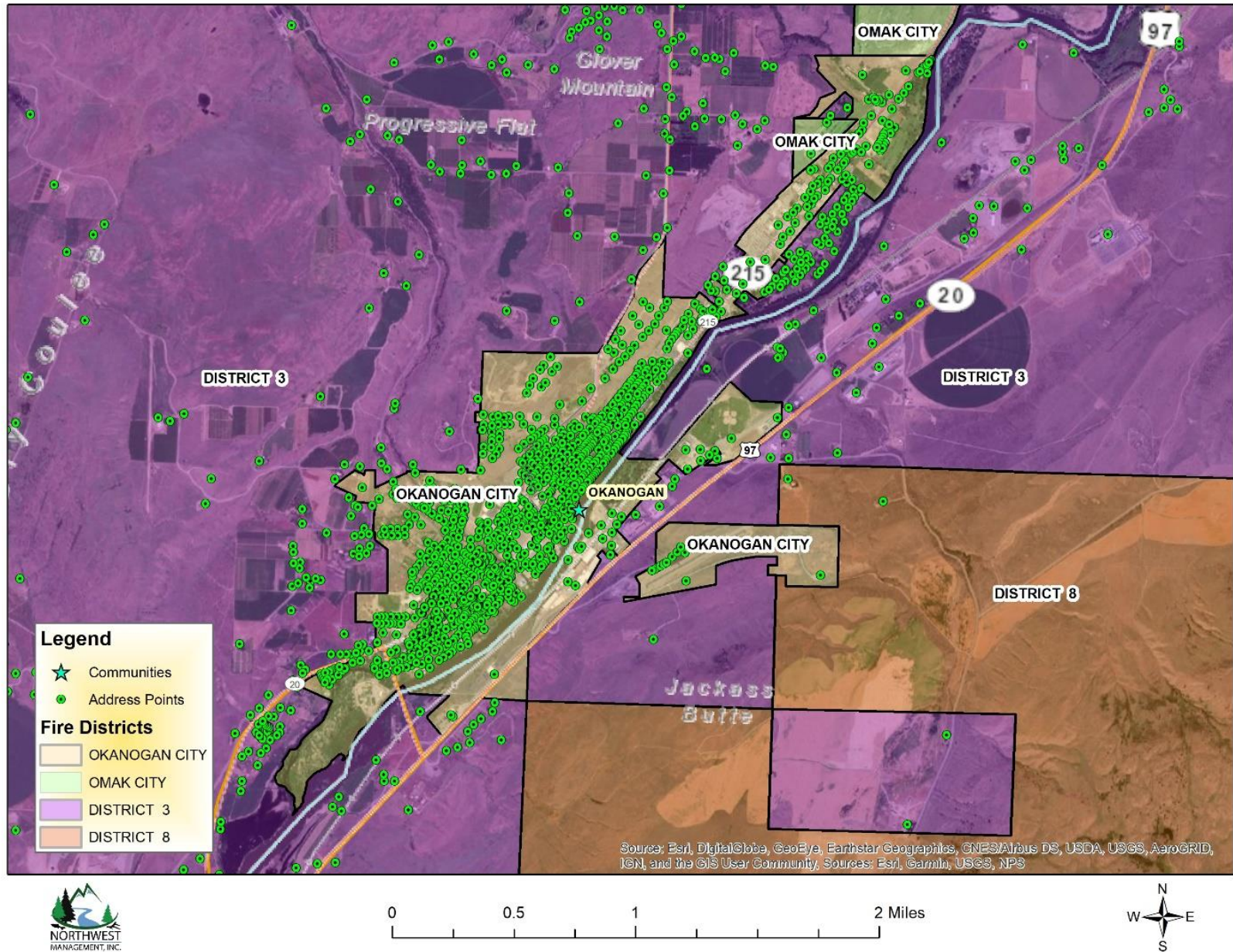


Figure 83) Distribution of address points in the Okanogan Fire Department jurisdiction and in surrounding areas in Okanogan, WA.

CITY OF OMAK FIRE DEPARTMENT

The Okanogan Fire Department covers about 3.0 square miles and operates out of one facility located at 16 Ash Street North. Much of the risk posed by natural hazards to the Omak Fire Department station and jurisdiction has already been described for the City of Omak. Therefore, this section is supplemental to the more detailed analyses provided in those other annexes.

PROBABILITY OF FUTURE OCCURRENCE

As the fire station is located within Omak city limits and the department jurisdiction matches the city boundary, the probability that the fire department will be affected by natural hazards is the same as what was described for the City of Omak.

IMPACTS OF HAZARD EVENTS

Table 124 describes risk and impacts that are specific to the Omak fire station; flood and landslide hazard areas around the fire station are depicted in Figure 84. Refer to the City of Omak and Okanogan County Annexes for a geographically broader analysis of hazards, which includes descriptions and maps for various other hazards, that could affect the fire station as well as the Department's jurisdiction.

Table 124) Summary of potential impacts and risk presented to Omak Fire Department assets and personnel stationed at the Omak fire station. This information is supplemented by the risk assessments in the City of Omak Annex.

Omak FD	Omak
Address	16 Ash Street North
Flood	Flood risk is low to moderate as the station is located within an X500 NFIP flood zone. These zones are determined to be within the limits of one percent and 0.2 percent annual chance floodplain.
Landslide	As it is in the city, the Omak fire station is not at risk to landslides
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for the City of Omak and Okanogan County. However, the impacts from these hazards, which are described in those other sections, may affect the District's ability to respond during a natural hazard event.
Severe Weather	
Wildland Fire	
Volcano	
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.
Pandemic	The District's ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.

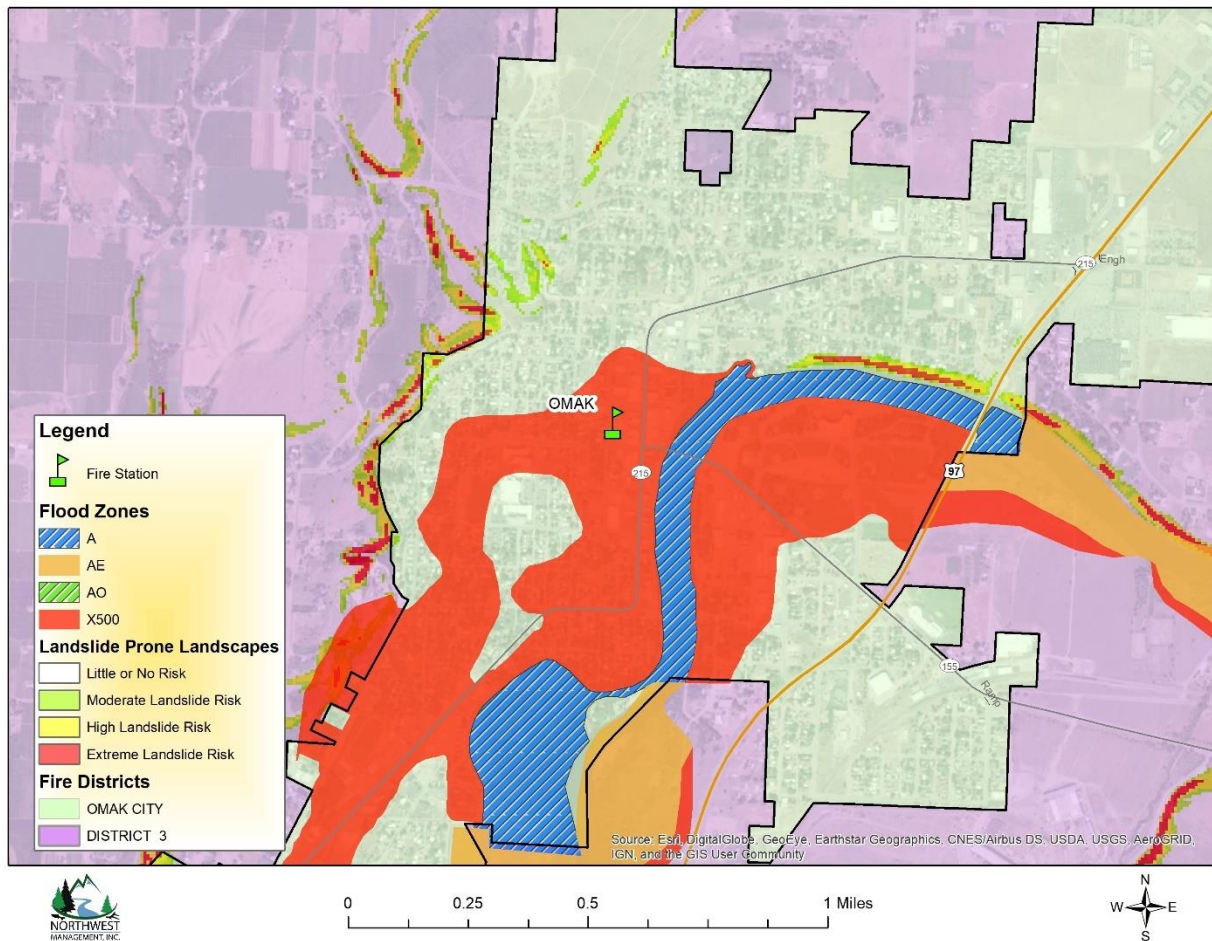


Figure 84) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Omak Fire Station in Omak, WA.

VALUE OF RESOURCES AT RISK

All Omak Fire Department assets and equipment stored at the Omak Fire Station are potentially at risk to a hazard event. However, it is unlikely that any damage or losses will occur at the fire station as a result of a hazard event.

The at-risk assets/values in the Omak Fire Department jurisdiction are not owned by the fire department; however, the Department responds to fires and other incidents that threaten life and property. As the Department is mostly concerned with structure fires, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in the Omak Fire Department jurisdiction, there are approximately 2,525 address points within the jurisdiction (Figure 85). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

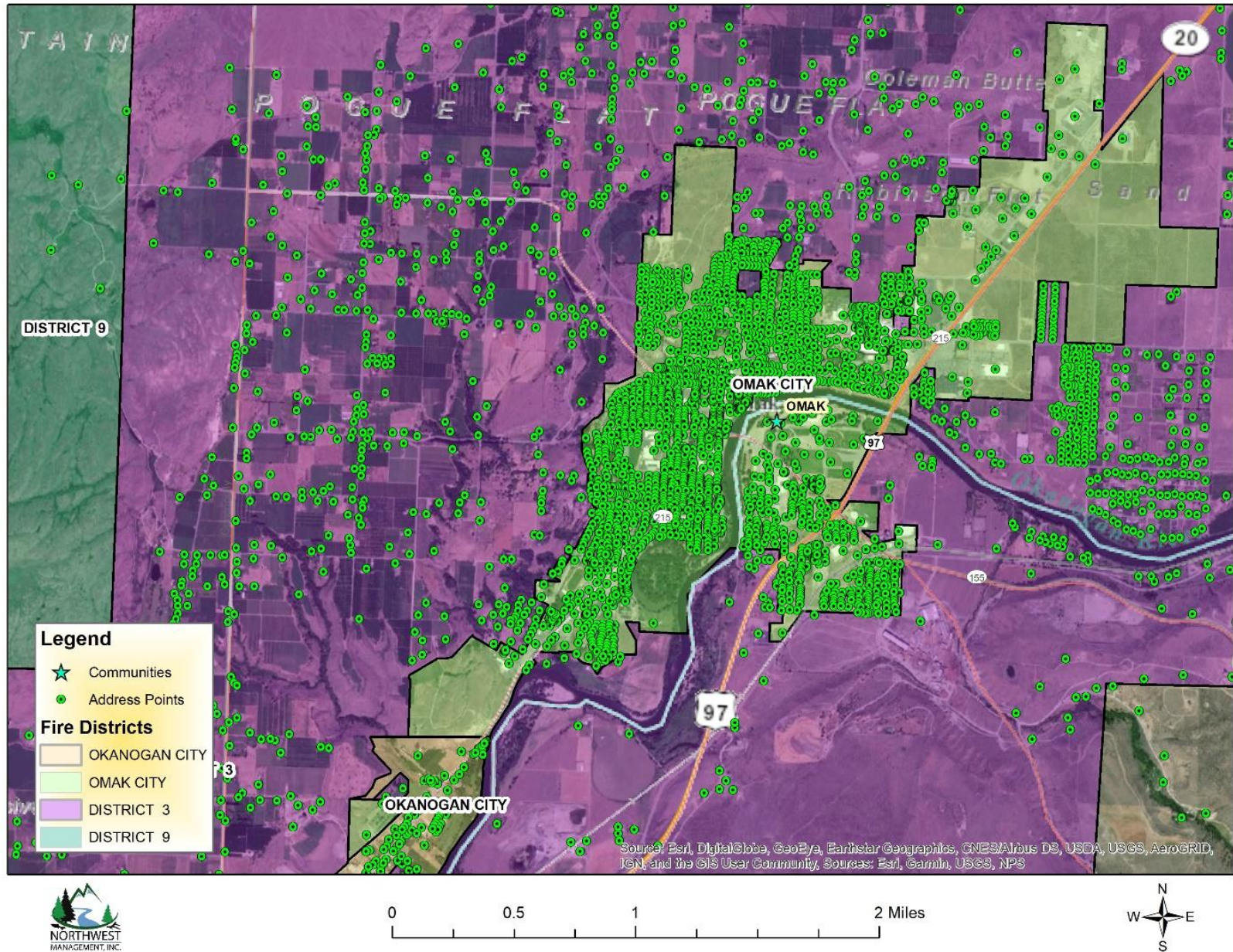


Figure 85) Distribution of address points in the Omak Fire Department jurisdiction and in surrounding areas in Okanogan, WA.

TOWN OF CONCONULLY FIRE DEPARTMENT

The Conconully Fire Department covers about 0.4 square miles and operates out of one facility located at 220 North Main Street. Much of the risk posed by natural hazards to the Conconully Fire Department station and jurisdiction has already been described for the Town of Conconully and Okanogan County. Therefore, this section is supplemental to the more detailed analyses provided in those other annexes.

PROBABILITY OF FUTURE OCCURRENCE

As the fire station is located within Conconully and the department jurisdiction matches the boundary of the town, the probability that the fire department will be affected by natural hazards is the same as what was described for the Town of Conconully. The probability that the Conconully Fire Department jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 125 describes risk and impacts that are specific to the Conconully fire station; flood and landslide hazard areas around the fire station are depicted in Figure 90. Refer to the Town of Conconully and Okanogan County Annexes for a geographically broader analysis of hazards, which includes descriptions and maps for various other hazards, that could affect the fire station as well as the Department's jurisdiction.

Table 125) Summary of potential impacts and risk presented to Conconully Fire Department assets and personnel stationed at the Conconully fire station. This information is supplemented by the risk assessments in the Town of Conconully Annex.

Conconully FD	Conconully
Address	220 North Main Street
Flood	Risk to seasonal flooding is low as the station is not located within or adjacent to an NFIP flood zone. Although a failure is unlikely, flood risk posed to the station by a dam failure is high.
Landslide	The fire station is centrally located in the Town of Conconully away from landslide hazard areas. However, there are landslide hazard areas adjacent to the town that could affect the department indirectly.
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for the Town of Conconully and Okanogan County. However, the impacts from these hazards, which are described in those other sections, may affect the District's ability to respond during a natural hazard event.
Severe Weather	
Wildland Fire	
Volcano	
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.
Pandemic	The District's ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.

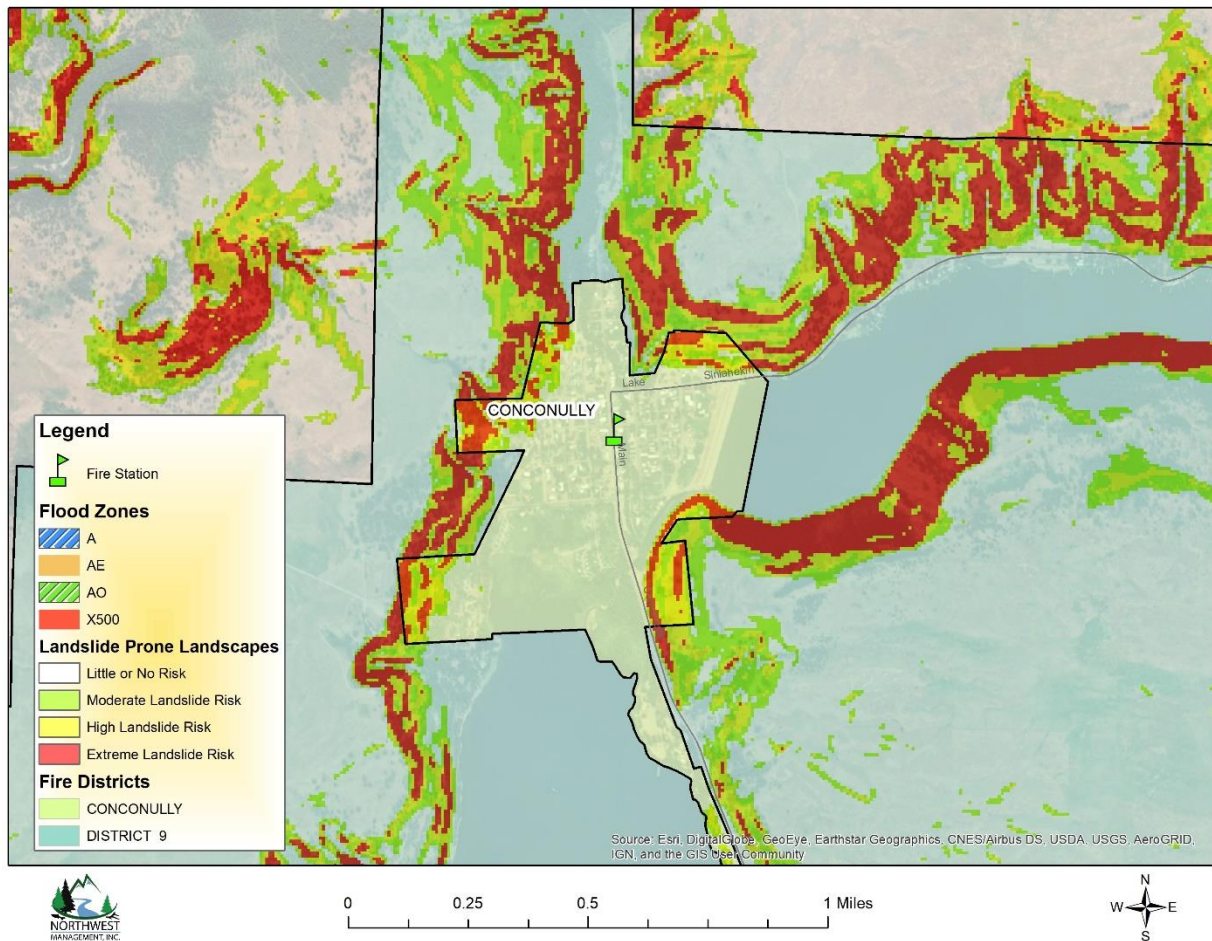


Figure 86) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Conconully Fire Station in Conconully, WA.

VALUE OF RESOURCES AT RISK

All Conconully Fire Department assets and equipment stored at the Conconully Fire Station are potentially at risk to a hazard event. However, it is unlikely that any damage or losses will occur at the fire station as a result of a hazard event.

The at-risk assets/values in the Conconully Fire Department jurisdiction are not owned by the fire department; however, the Department responds to fires and other incidents that threaten life and property. As the Department is mostly concerned with structure fires, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in the Conconully Fire Department jurisdiction, there are approximately 237 address points within the jurisdiction (Figure 91). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

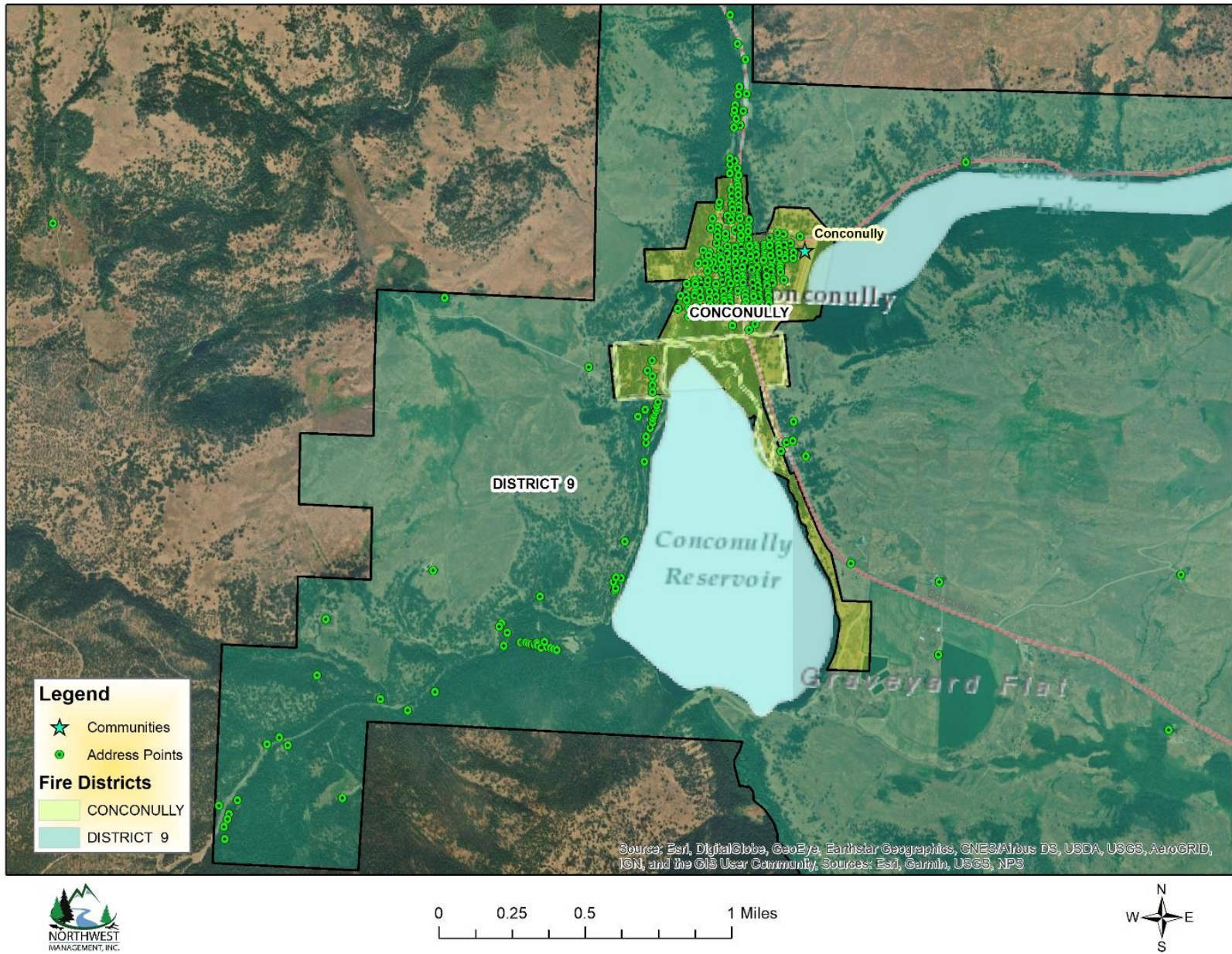


Figure 87) Distribution of address points in the Conconully Fire Department jurisdiction and in surrounding areas in Okanogan, WA.

TOWN OF COULEE DAM FIRE DEPARTMENT

The Coulee Dam Fire Department covers about 0.7 square miles and operates out of one facility located at 515 River Drive. Much of the risk posed by natural hazards to the Coulee Dam Fire Department station and jurisdiction has already been described for the Town of Coulee Dam and Okanogan County. Therefore, this section is supplemental to the more detailed analyses provided in those other annexes.

PROBABILITY OF FUTURE OCCURRENCE

As the fire station is located within Coulee Dam and the department jurisdiction matches the boundary of the town, the probability that the fire department will be affected by natural hazards is the same as what was described for the Town of Coulee Dam. The probability that the Coulee Dam Fire Department jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 126 describes risk and impacts that are specific to the Coulee Dam fire station; flood and landslide hazard areas around the fire station are depicted in Figure 88. Refer to the Town of Coulee Dam and Okanogan County Annexes for a geographically broader analysis of hazards, which includes descriptions and maps for various other hazards, that could affect the fire station as well as the Department's jurisdiction.

Table 126) Summary of potential impacts and risk presented to Coulee Dam Fire Department assets and personnel stationed at the Coulee Dam fire station. This information is supplemented by the risk assessments in the Town of Coulee Dam Annex.

Coulee Dam FD	Coulee Dam
Address	515 River Drive
Flood	Risk to seasonal flooding is low as the station is not located within or adjacent to an NFIP flood zone. Although a failure is unlikely, flood risk posed to the station by a dam failure is extremely high.
Landslide	Although there are some landslide hazard areas in the vicinity of the fire station, overall risk to the station is low.
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for the Town of Coulee Dam and Okanogan County. However, the impacts from these hazards, which are described in those other sections, may affect the District's ability to respond during a natural hazard event.
Severe Weather	
Wildland Fire	
Volcano	
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.
Pandemic	The District's ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.

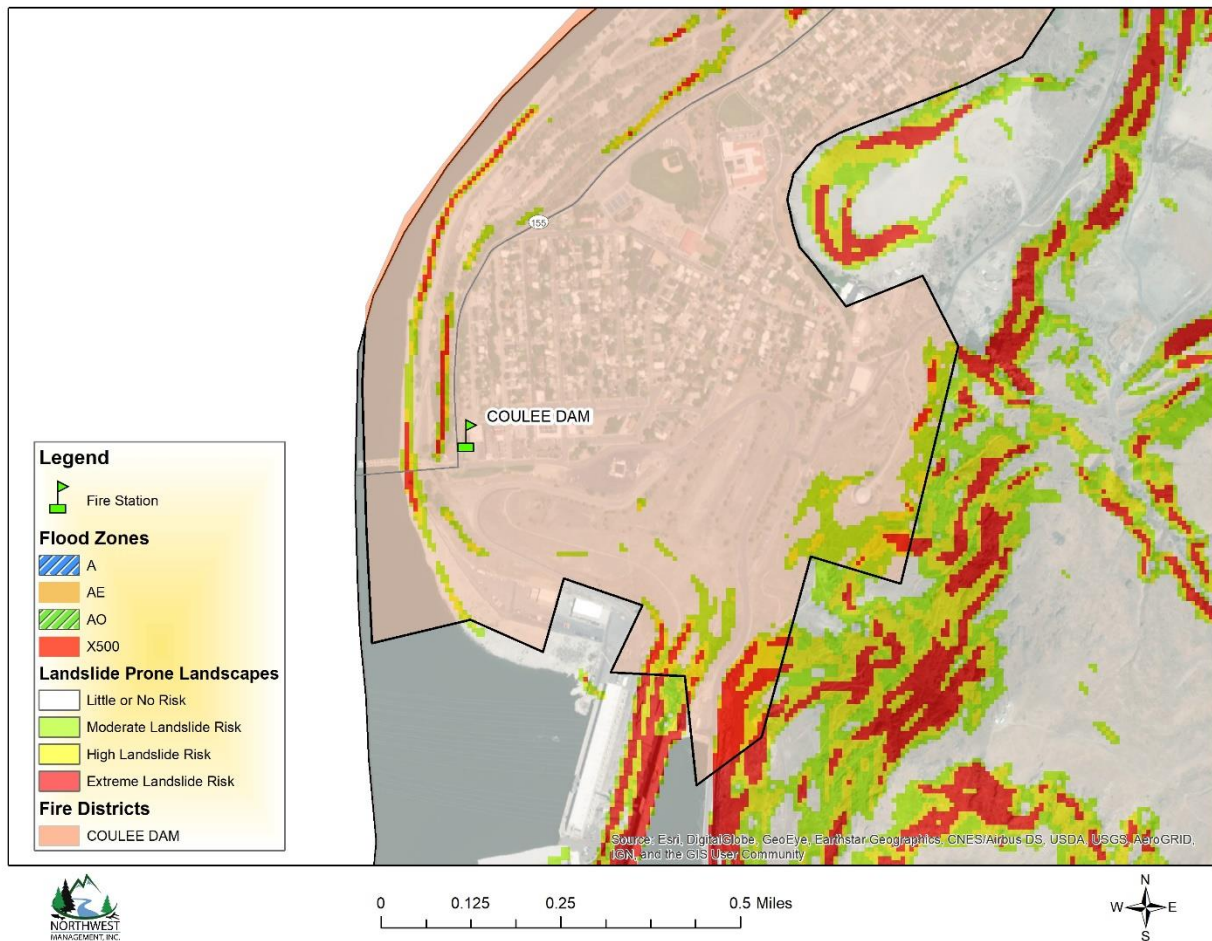


Figure 88) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Coulee Dam Fire Station in Coulee Dam, WA.

VALUE OF RESOURCES AT RISK

All Coulee Dam Fire Department assets and equipment stored at the Coulee Dam Fire Station are potentially at risk to a hazard event. However, it is unlikely that any damage or losses will occur at the fire station as a result of a hazard event.

The at-risk assets/values in the Coulee Dam Fire Department jurisdiction are not owned by the fire department; however, the Department responds to fires and other incidents that threaten life and property. As the Department is mostly concerned with structure fires, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in the Coulee Dam Fire Department jurisdiction, there are approximately 427 address points within the jurisdiction (Figure 89). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

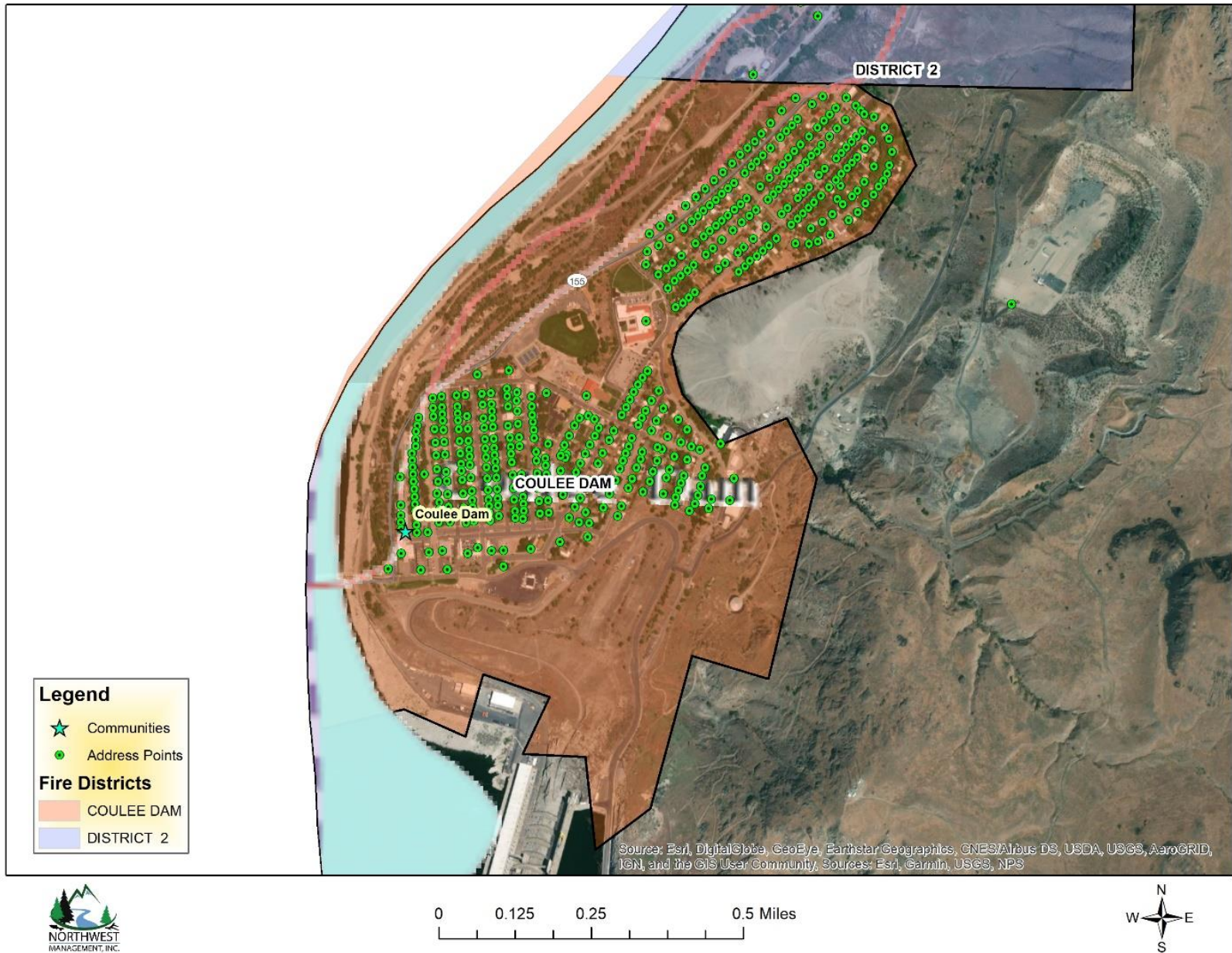


Figure 89) Distribution of address points in the Coulee Dam Fire Department jurisdiction and in surrounding areas in Okanogan, WA.

OKANOGAN COUNTY FIRE DISTRICT #1

Okanogan County Fire District #1 includes the City of Oroville and almost 28.0 square miles of unincorporated area in the county. The district operates out of the Oroville Fire Department fire station located in the City of Oroville. Much of the risk posed by natural hazards to the Oroville fire station (where Fire District #1 assets are stored) and the District’s jurisdiction has already been described for the City of Oroville and Okanogan County. Therefore, this section is supplemental to the more detailed analyses provided in those other annexes.

PROBABILITY OF FUTURE OCCURRENCE

The probability that Fire District #1 assets will be affected by natural hazards is the same as what was described for the City of Oroville. The probability that the Fire District #1 jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 127 describes risk and impacts that are specific to the District’s assets stored at the Oroville fire station as well as references to other sections where broader, more detailed risk analyses that pertain to the fire station can be found. Flood and landslide hazard areas around the Oroville fire station are depicted in Figure 90. The potential impacts to the District’s jurisdiction are the same as what was described for the County; Refer to the Okanogan County Annex for maps and other information related to risk within the Fire District #1 jurisdiction.

Table 127) Summary of potential impacts and risk presented to Fire District #1 assets and personnel stationed at the fire station in Oroville, WA. This information is supplemented by the risk assessments in the City of Oroville Annex.

District 1 Facility	Oroville
Address	1300 Ironwood St.
Flood	Overall risk is extremely low as the station is not located in NFIP Flood Zones
Landslide	As it is in the city, the Oroville fire station is not at risk to landslides
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for the City of Oroville and Okanogan County. However, the impacts from these hazards, which are described in those other sections, may affect the District’s ability to respond during a natural hazard event.
Severe Weather	
Wildland Fire	
Volcano	
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.
Pandemic	The District’s ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.

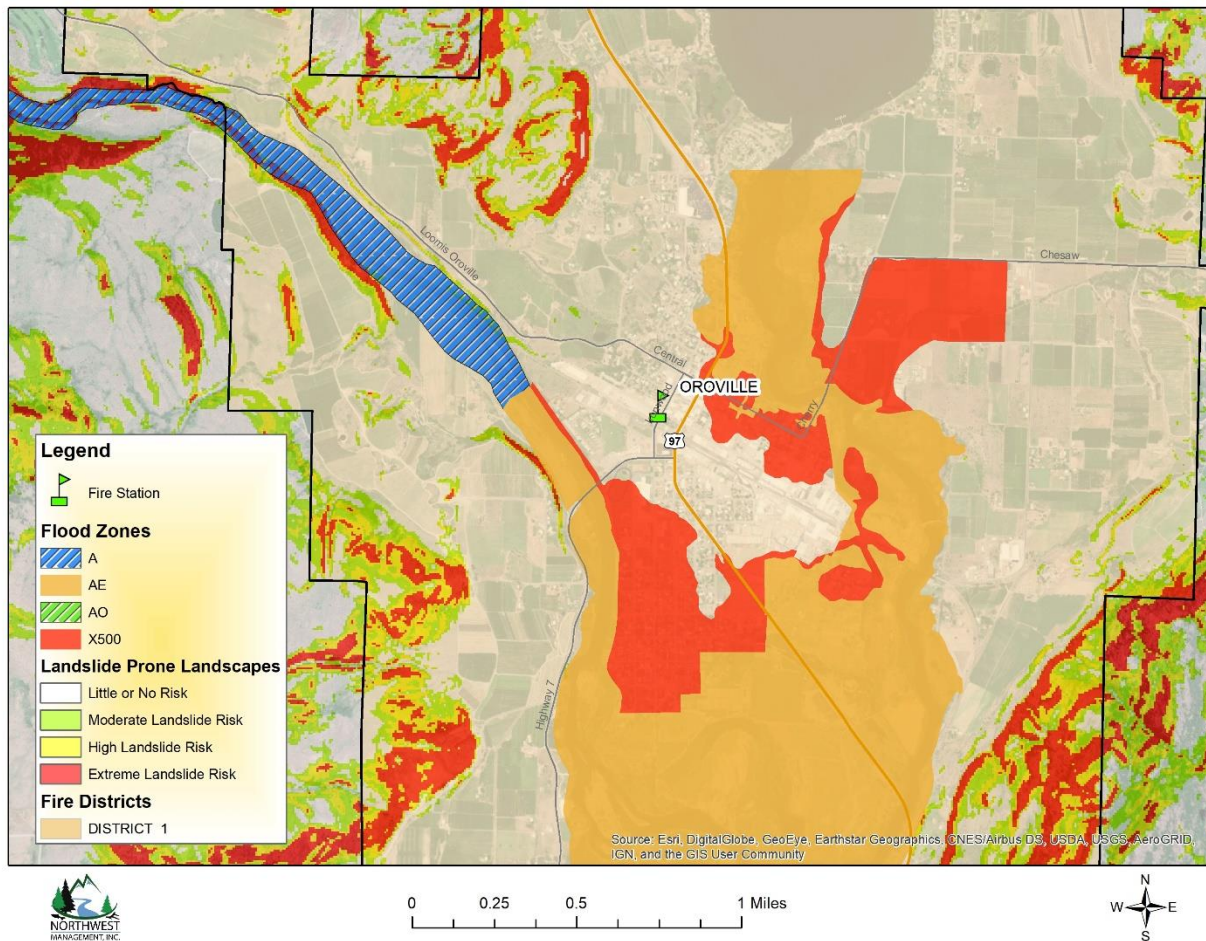


Figure 90) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Oroville Fire Station in Oroville, WA.

VALUE OF RESOURCES AT RISK

All Fire District #1 assets and equipment stored at the Oroville Fire Station are potentially at risk to a hazard event. However, it is unlikely that any damage or losses will occur at the fire station as a result of a hazard event.

The at-risk assets/values in Fire District #1 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in Fire District #1, there are approximately 2,260 address points within the District (Figure 91). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

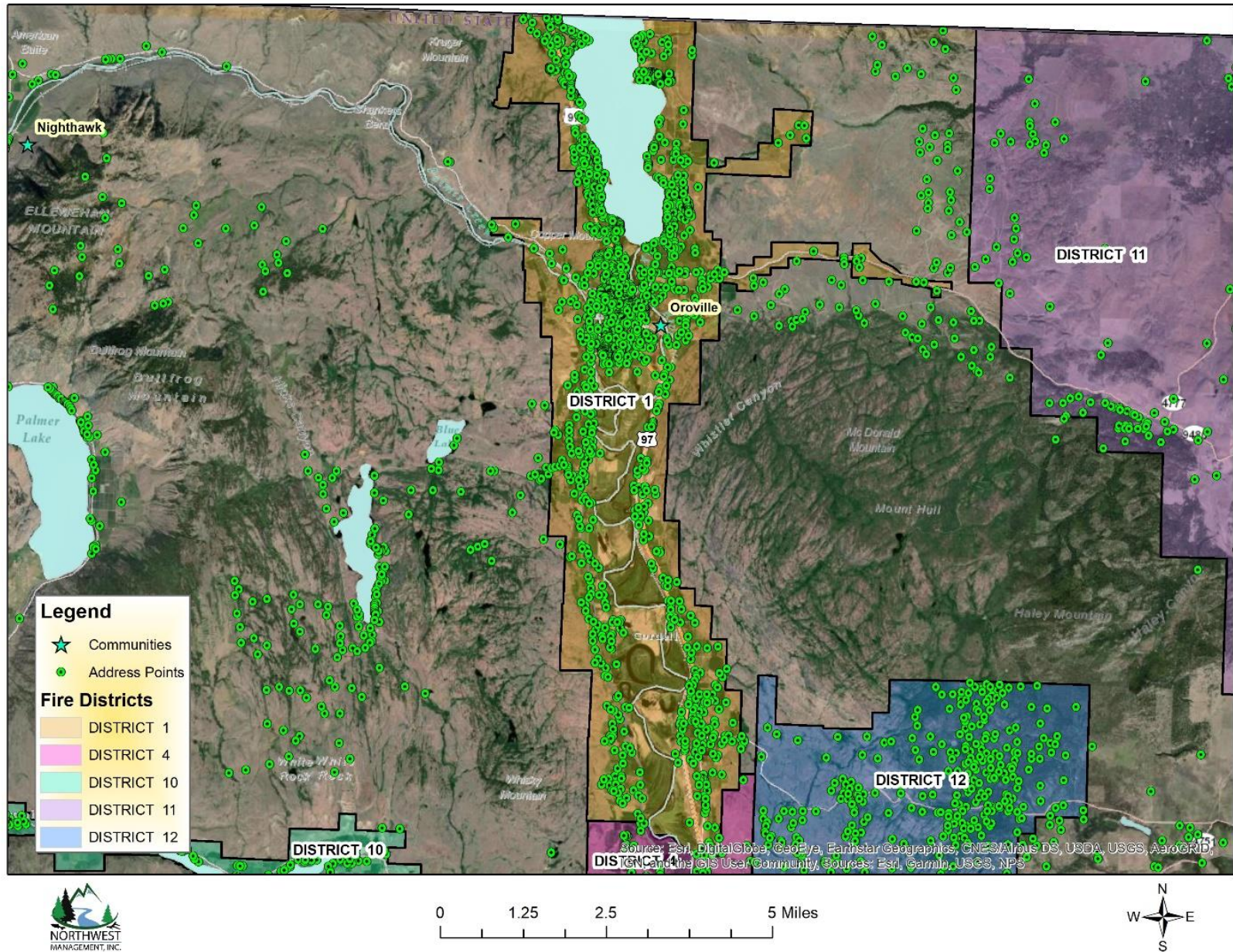


Figure 91) Distribution of address points in Fire District #1 and in surrounding areas in Okanogan County, WA.

OKANOGAN COUNTY FIRE DISTRICT #2

Okanogan County Fire District #2 includes the Town of Elmer City and approximately 8.0 square miles of unincorporated area in the county. The district operates out of a facility in Elmer City, WA. Much of the risk posed by natural hazards to the Fire District #2 facility and assets in Elmer City and the District jurisdiction has already been described for the Town of Elmer City and Okanogan County, respectively. Therefore, this section is supplemental to the more detailed analyses provided in those other annexes.

PROBABILITY OF FUTURE OCCURRENCE

The probability that the Fire District #2 facility or assets will be affected by natural hazards is the same as what was described for the Town of Elmer City. The probability that the Fire District #2 jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 128 describes risk and impacts that are specific to the District’s assets stored at the fire facility in Elmer City as well as references to other sections where broader, more detailed risk analyses that pertain to the fire facility and can be found. Flood and landslide hazard areas around the fire facility in Elmer City are depicted in Figure 92. The potential impacts to the District’s jurisdiction are the same as what was described for the County; Refer to the Okanogan County Annex for maps and other information related to risk within the Fire District #2 jurisdiction.

Table 128) Summary of potential impacts and risk presented to Fire District #2 assets and personnel stationed at the fire station in Elmer City, WA. This information is supplemented by the risk assessments in the Town of Elmer City Annex.

District 2 Facility	Elmer City
Address	201 S Williams St.
Flood	Overall risk is extremely low as the station is not located in NFIP Flood Zones. However, flood risk from dam failure is extremely high.
Landslide	The fire station is located within Elmer City limits where landslide risk is low.
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for the Town of Elmer City and Okanogan County. However, the impacts from these hazards, which are described in those other sections, may affect the District’s ability to respond during a natural hazard event.
Severe Weather	
Wildland Fire	
Volcano	
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.
Pandemic	The District’s ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.

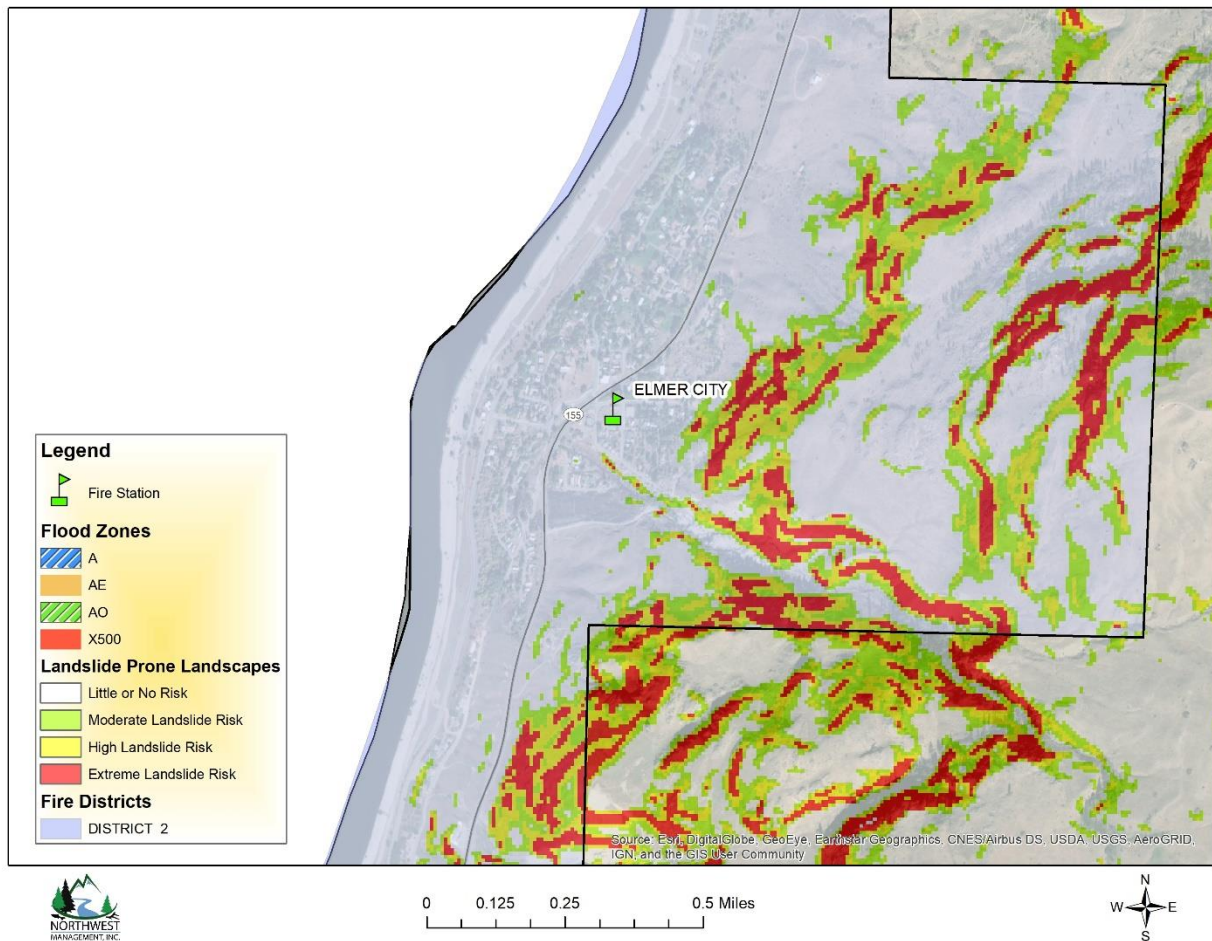


Figure 92) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Fire District #2 fire facility in Elmer City, WA.

VALUE OF RESOURCES AT RISK

All Fire District #2 assets and equipment stored at the Elmer City Fire Facility are potentially at risk to a hazard event. However, it is unlikely that any damage or losses will occur at the fire station as a result of a hazard event.

The at-risk assets/values in Fire District #2 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in Fire District #2, there are approximately 307 address points within the District (Figure 93). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

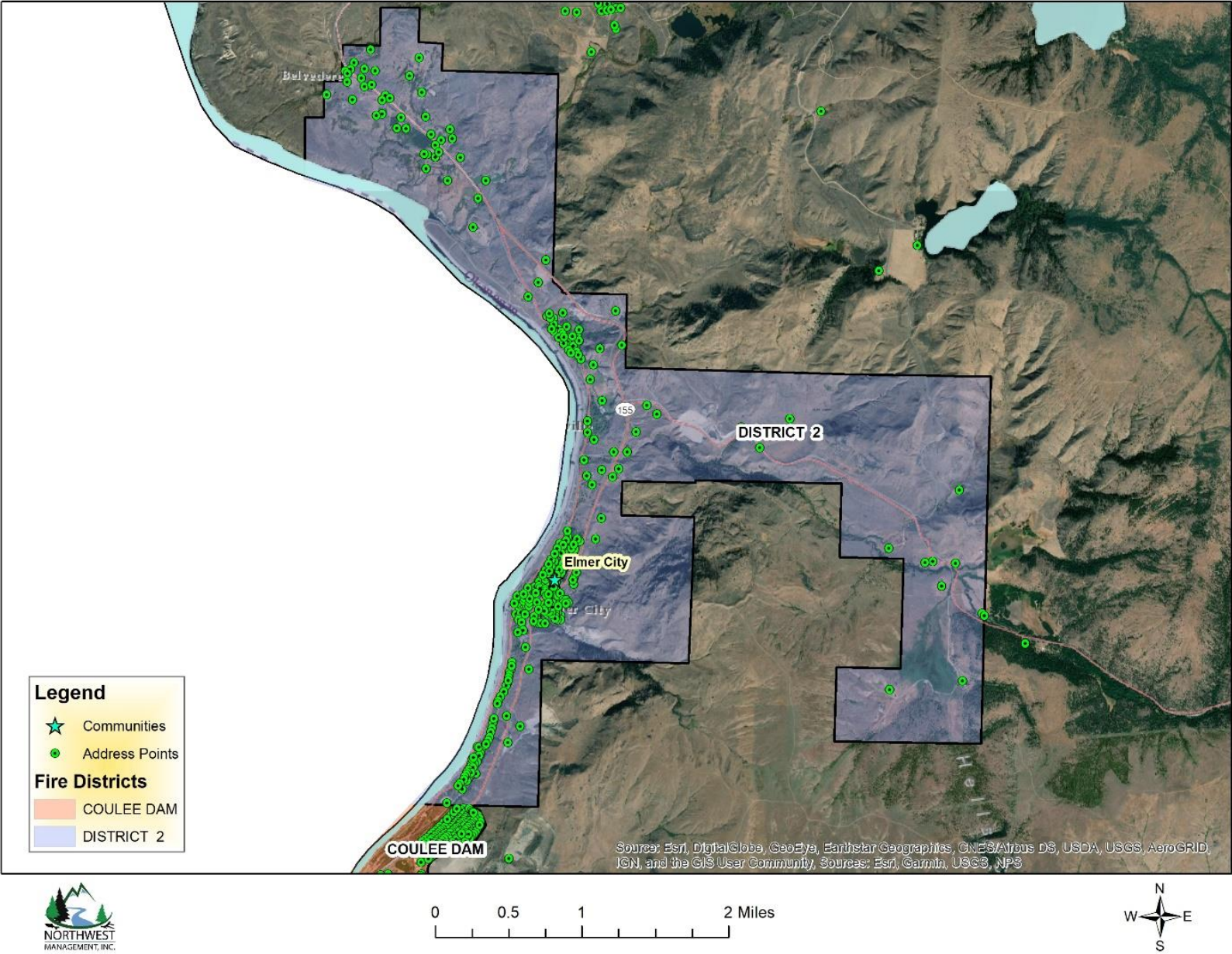


Figure 93) Distribution of address points in Fire District #2 and in surrounding areas in Okanogan County, WA.

OKANOGAN COUNTY FIRE DISTRICT #3

Okanogan County Fire District #3 encompasses the Town of Malott, the City of Okanogan, the City of Omak, and approximately 78.0 square miles of unincorporated area in the county. The district has its own facility in Malott and rents space from the Cities of Okanogan and Omak; both cities have their own fire departments. Much of the risk posed by natural hazards to district facilities, assets, and jurisdiction has already been described for the City of Okanogan, the City of Omak, and Okanogan County. Therefore, this section is supplemental to the more detailed analyses provided in those other annexes.

PROBABILITY OF FUTURE OCCURRENCE

The probability that Fire District #3 assets will be affected by natural hazards is the same as what was described for the Cities of Okanogan and Omak. The probability that the Fire District #3 jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 129 describes risk and impacts that are specific to the District’s assets in Malott as well as references to other sections where broader, more detailed risk analyses that pertain to the fire station can be found. Flood and landslide hazard areas around the Malott fire station are depicted in Figure 94. The potential impacts to the District’s jurisdiction are the same as what was described for the County; Refer to the Okanogan County Annex for maps and other information related to risk within the Fire District #3 jurisdiction. Refer to the City of Okanogan and City of Omak Fire Department annexes for risk assessments for Fire District #3 assets and equipment stored at the Okanogan and Omak fire stations.

Table 129) Summary of potential natural hazard impacts that could affect Fire District #3 fire stations. This information is supplemental to the risk assessments in the City of Okanogan and Omak Annexes.

District 3 Facility	Malott	Omak	Okanogan
Address	3 Columbia Street	16 Ash Street N	235 Oak Street
Flood	Flood risk is low as the station is not located in NFIP Flood Zones.	Refer to the City of Omak Fire Department Annex for a risk assessment for this location.	Refer to the City of Okanogan Fire Department Annex for a risk assessment for this location.
Landslide	The fire station is not directly at risk to landslide hazards.		
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for Okanogan County. However, the impacts from these hazards, which are described in the County Annex, may affect the District’s ability to respond during a natural hazard event.		
Severe Weather			
Wildland Fire			
Volcano			
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.		
Pandemic	The District’s ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.		

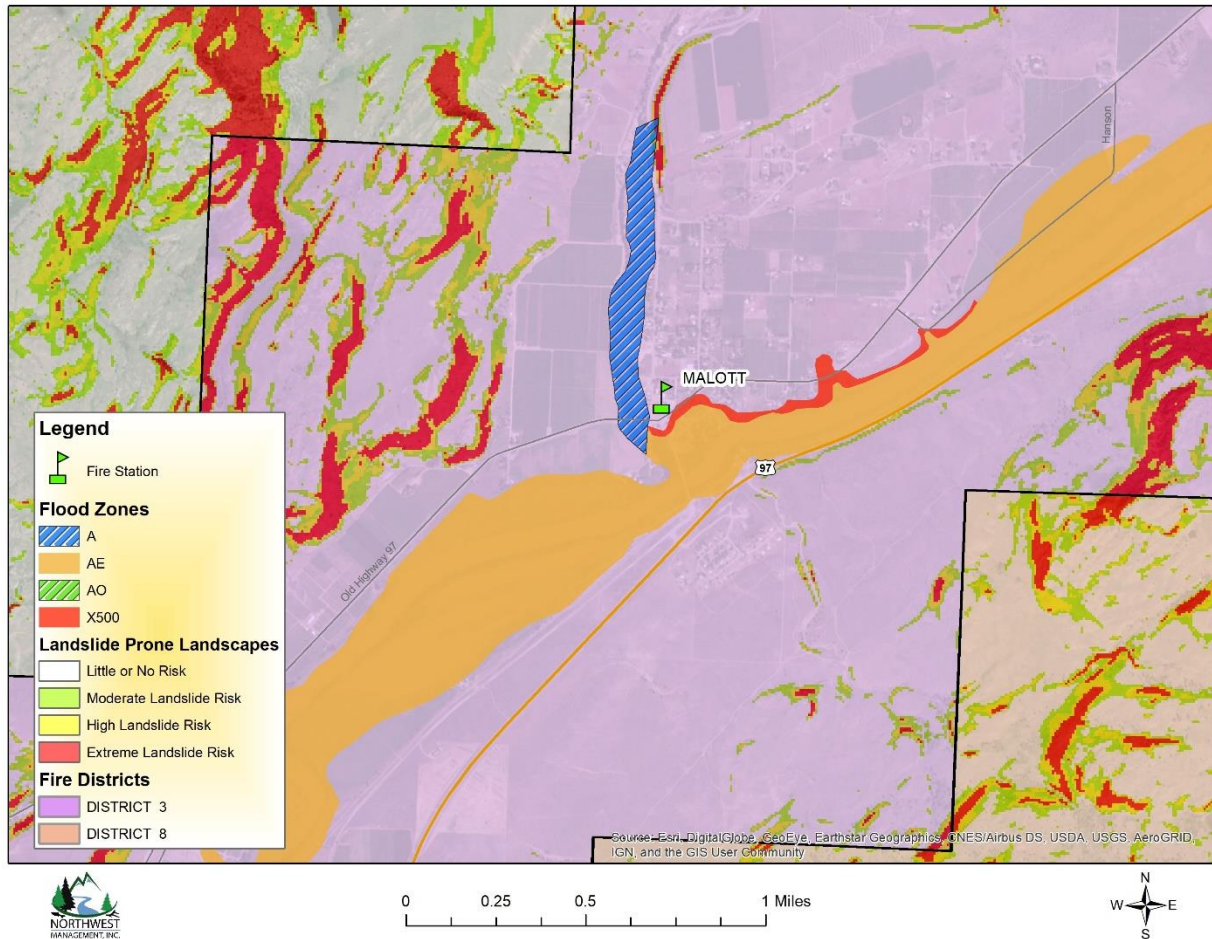


Figure 94) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Fire District #3 fire station in Malott, WA.

VALUE OF RESOURCES AT RISK

All Fire District #3 assets and equipment stored at the Malot, Okanogan, and Omak Fire Station are potentially at risk to a hazard event. However, it is unlikely that any damage or losses will occur at any of the fire stations as a result of a hazard event.

The at-risk assets/values in Fire District #3 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will most likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in Fire District #3, there are approximately 2,807 address points within the District (Figure 95). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

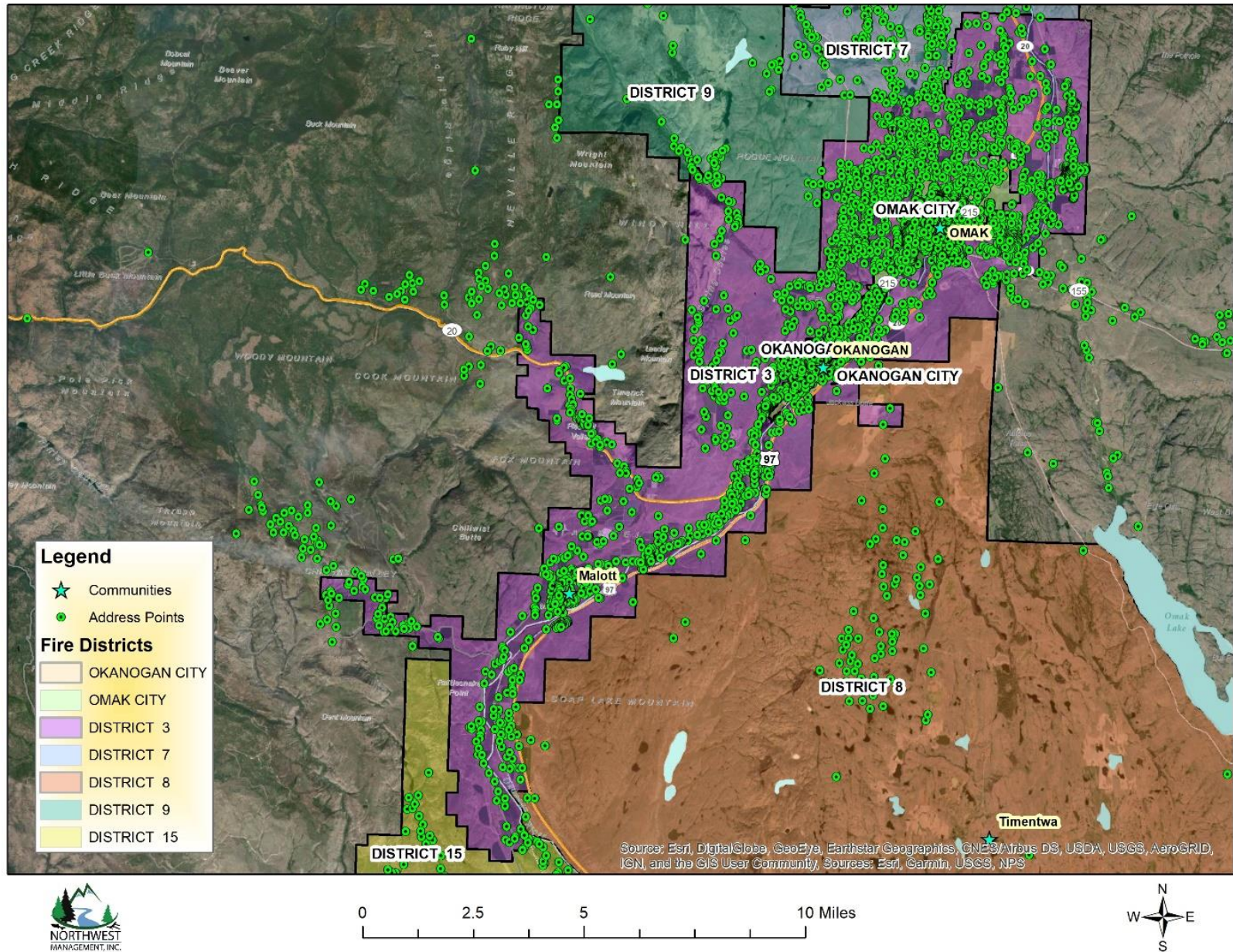


Figure 95) Distribution of address points in Fire District #3 and in surrounding areas in Okanogan County, WA.

OKANOGAN COUNTY FIRE DISTRICT #4

Okanogan County Fire District #4 includes the City of Tonasket and approximately 51.2 square miles of unincorporated area in the county. The District operates out of the Fire District #4 fire station located in Tonasket. Much of the risk posed by natural hazards to the District fire station in Tonasket and the District jurisdiction has already been described for the City of Tonasket and Okanogan County, respectively. Therefore, this section is supplemental to the more detailed analyses provided in those other annexes.

PROBABILITY OF FUTURE OCCURRENCE

The probability that the Fire District #4 fire station will be affected by natural hazards is the same as what was described for the City of Tonasket. The probability that the District jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 130 describes risk and impacts that are specific to the District fire station in Tonasket; flood and landslide hazard areas around the fire station are depicted in Figure 96. Refer to the City of Tonasket Annex for a geographically broader analysis of hazards that could affect the fire station. Potential impacts to the District's jurisdiction are the same as what was described for the County; Refer to the Okanogan County Annex for maps and other information related to risk within the Fire District #4 jurisdiction.

Table 130) Summary of potential natural hazard impacts that could affect the Fire District #4 fire station. This information is supplemental to the risk assessment in the City of Tonasket Annex.

District 4 Facility	Tonasket
Address	520 S Western Ave
Flood	Overall risk is extremely low as the station is not located in NFIP Flood Zones
Landslide	As it is in the city, the fire station is not at risk to landslides
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for the City of Tonasket. However, the impacts from these hazards, which are described in the City of Tonasket Annex, may affect the District's ability to respond during a natural hazard event.
Severe Weather	
Wildland Fire	
Volcano	
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.
Pandemic	The District's ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.

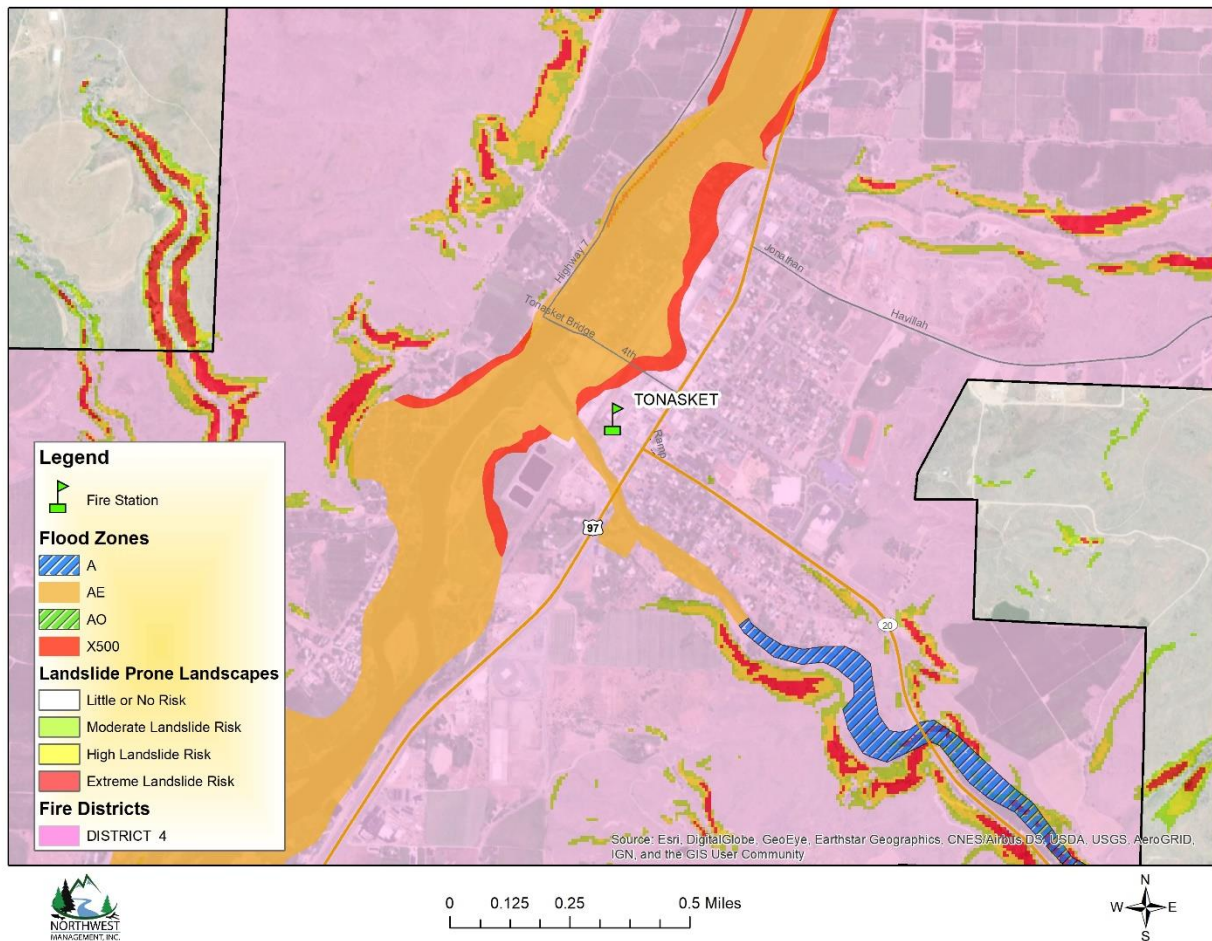


Figure 96) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Fire District #4 fire station in Tonasket, WA.

VALUE OF RESOURCES AT RISK

Even though the Fire District #4 facility, equipment, and other assets could be affected by any of the hazards described in this plan it is highly unlikely that any losses will result from a hazard event.

The at-risk assets/values in Fire District #4 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in Fire District #4, there are approximately 2,030 address points within the District (Figure 97). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

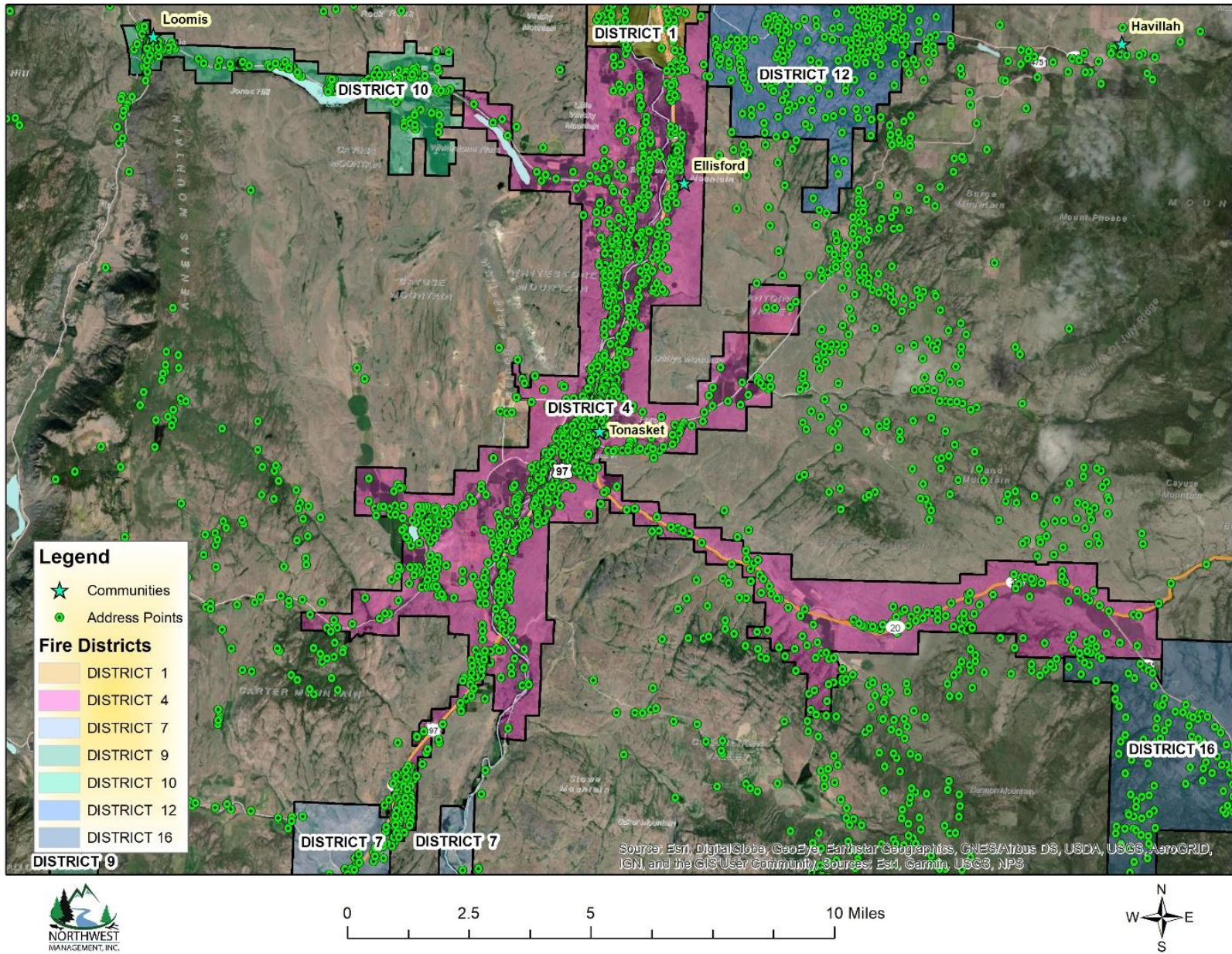


Figure 97) Distribution of address points in Fire District #4 and in surrounding areas in Okanogan County, WA.

OKANOGAN COUNTY FIRE DISTRICT #6

Okanogan County Fire District #6 includes the Towns of Twisp and Winthrop (both adopting jurisdictions), the communities of Carlton and Mazama, and approximately 350 square miles of unincorporated area in the county. The District operates out of the Fire District #6 fire stations located in Carlton, Mazama, Twisp, and Winthrop. Much of the risk posed by natural hazards to the District fire stations and the District jurisdiction has already been described for the towns of Twisp and Winthrop and Okanogan County, respectively. Therefore, this section is supplemental to the more detailed analyses provided in those other annexes.

PROBABILITY OF FUTURE OCCURRENCE

The probability that Fire District #6 fire stations will be affected by natural hazards is the same as what was described for the communities of the Methow Valley (Twisp and Winthrop annexes). The probability that the Fire District #6 jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 131 describes risk and impacts that are specific to the District fire stations in Carlton, Mazama, Twisp, and Winthrop; flood and landslide hazard areas around the fire stations are depicted in Figure 98 (see note, after Figure 99, about NFIP flood zones). Refer to the Twisp, Winthrop, and County annexes for a geographically broader analysis of hazards that could affect each fire station. Potential impacts to the District's jurisdiction are the same as what was described for the County; Refer to the Okanogan County Annex for maps and other information related to risk within the Fire District #6 jurisdiction.

Table 131) Summary of potential natural hazard impacts that could affect the Fire District #6 fire stations. This information is supplemental to the risk assessments in the Twisp, Winthrop, and County annexes.

District 6 Facility	Carlton	Mazama	Twisp	Winthrop
Address	3 Columbia Street	17958 Highway 20	434 2 nd Ave	223 Englar Street
Flood	Risk is low to none; none of the fire stations are in NFIP flood zones.			
Landslide	None	None	Low; there is a hazard area on the south side of 2 nd Ave.	None
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for Okanogan County. However, the impacts from these hazards, which are described in the County Annex, may affect the District's ability to respond during a natural hazard event.			
Severe Weather				
Wildland Fire				
Volcano				
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.			
Pandemic	The District's ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.			

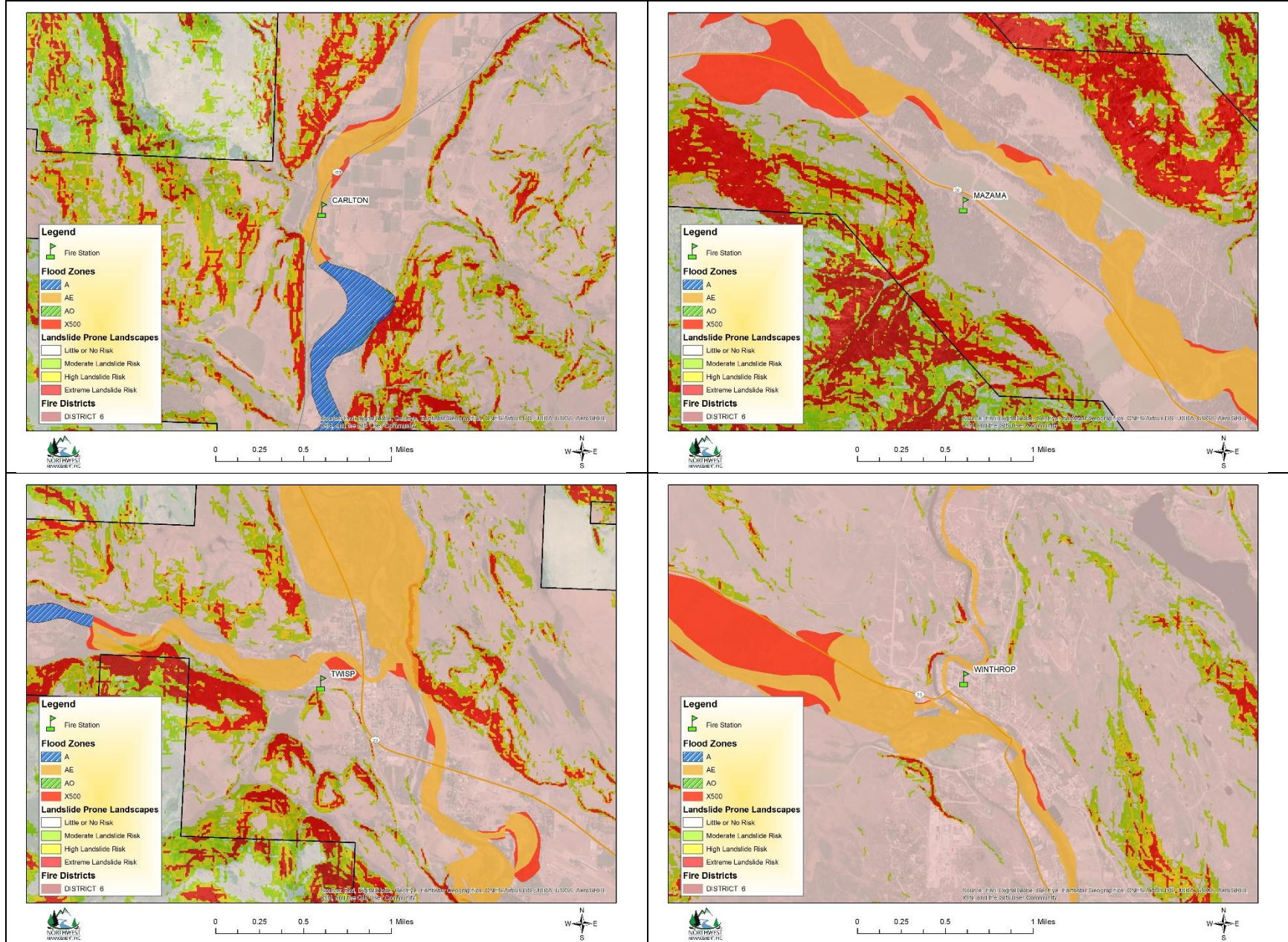


Figure 98) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Fire District #6 fire stations in Carlton (upper-left), Mazama (upper-right), Twisp (lower-left), and Winthrop (lower-right), WA. *SEE NOTE BELOW ABOUT FLOOD MAPS.

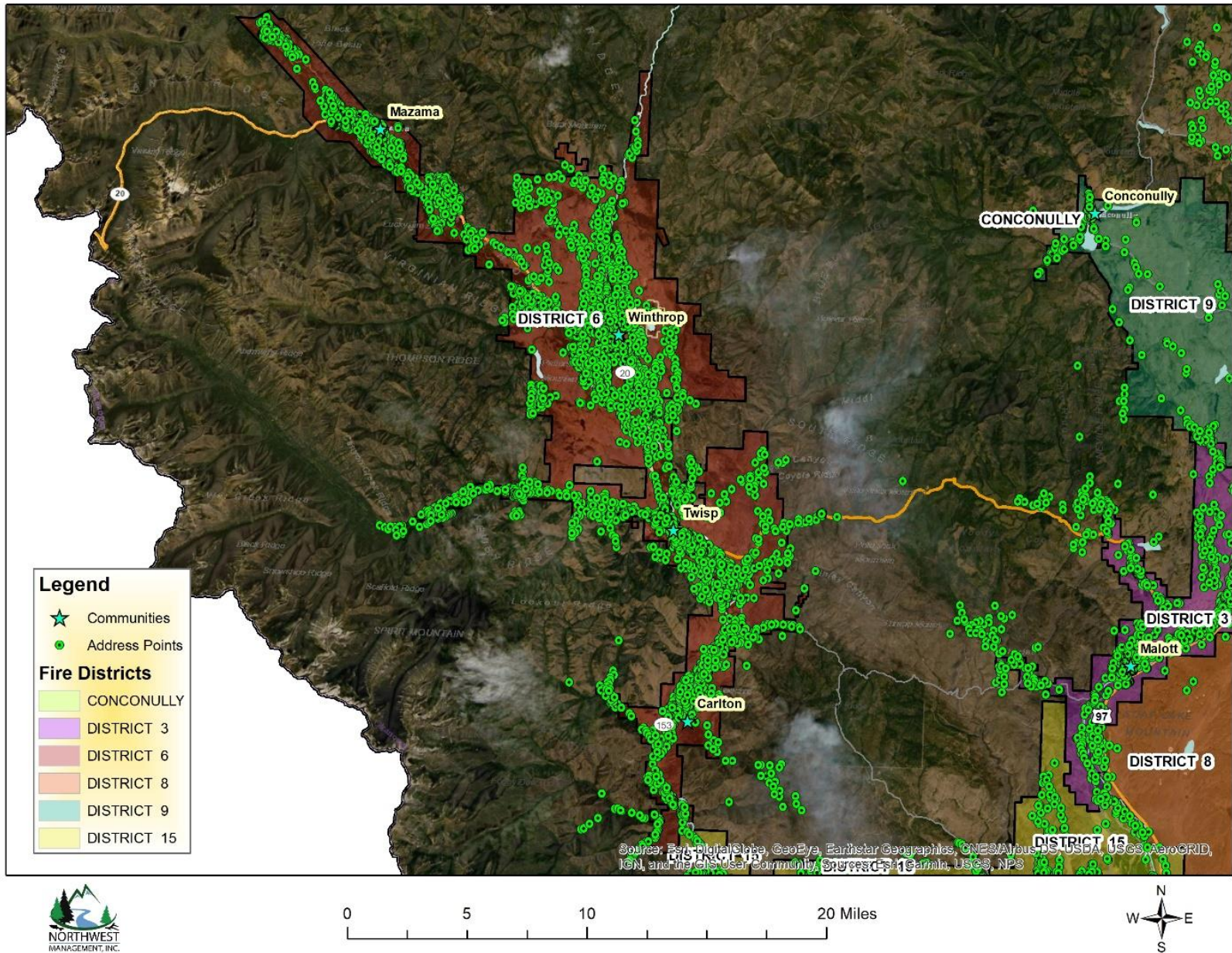


Figure 99) Distribution of address points in Fire District #6 and in surrounding areas in Okanogan County, WA.

****It should be noted that the NFIP flood zones depicted in Figure 98 do not appear to line up with the baselayer map (the Winthrop map is probably the most obvious example of the four maps). Therefore, some of the maps may suggest that some of the fire stations and indentifiable features in the basemap are closer to the flood zones than they actually are. For example, the fire station in Carlton appears to be immediately adjance to an NFIP flood zone when, in reality, it is probalby outside of it. This inconsistency also appears on the web-based flood zone maps found on the Washington Department of Ecology website. This issue should be resolved once the county flood maps are updated (maps are expected to be completed by the winter of 2023/2024).***

VALUE OF RESOURCES AT RISK

Even though the Fire District #6 facilities, equipment, and other assets could be affected by any of the hazards described in this plan it is highly unlikely that any losses will result from a hazard event.

The at-risk assets/values in Fire District #6 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in Fire District #6, there are approximately 4,856 address points within the District (Figure 99, above). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

OKANOGAN COUNTY FIRE DISTRICT #7

Okanogan County Fire District #7 covers approximately 32.6 square miles and includes the Town of Riverside. The District operates out of the Fire District #7 fire station located in Riverside. Much of the risk posed by natural hazards to the District fire station and jurisdiction has already been described for the Town of Riverside and Okanogan County, respectively. Therefore, this section is supplemental to the more detailed analyses provided in those other annexes.

PROBABILITY OF FUTURE OCCURRENCE

The probability that the Fire District #7 fire station will be affected by natural hazards is the same as what was described for the Town of Riverside. The probability that the District jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 132 describes risk and impacts that are specific to the District fire station in Riverside; flood and landslide hazard areas around the fire station are depicted in Figure 100. Refer to the Town of Riverside Annex for a geographically broader analysis of hazards that could affect the fire station. Potential impacts to the District’s jurisdiction are the same as what was described for the County; Refer to the Okanogan County Annex for maps and other information related to risk within the Fire District #7 jurisdiction.

Table 132) Summary of potential natural hazard impacts that could affect the Fire District #7 fire station. This information is supplemental to the risk assessment in the Town of Riverside Annex.

District 7 Facility	Riverside
Address	101 1 st Street
Flood	Overall risk is low as the station is not located in an NFIP flood zone (it is adjacent to an X500 flood zone which is low to moderate risk).
Landslide	As it is in the city, the fire station is not directly at risk to landslides
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for the Town of Riverside. However, the impacts from these hazards, which are described in the Town of Riverside Annex, may affect the District’s ability to respond during a natural hazard event.
Severe Weather	
Wildland Fire	
Volcano	
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.
Pandemic	The District’s ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.

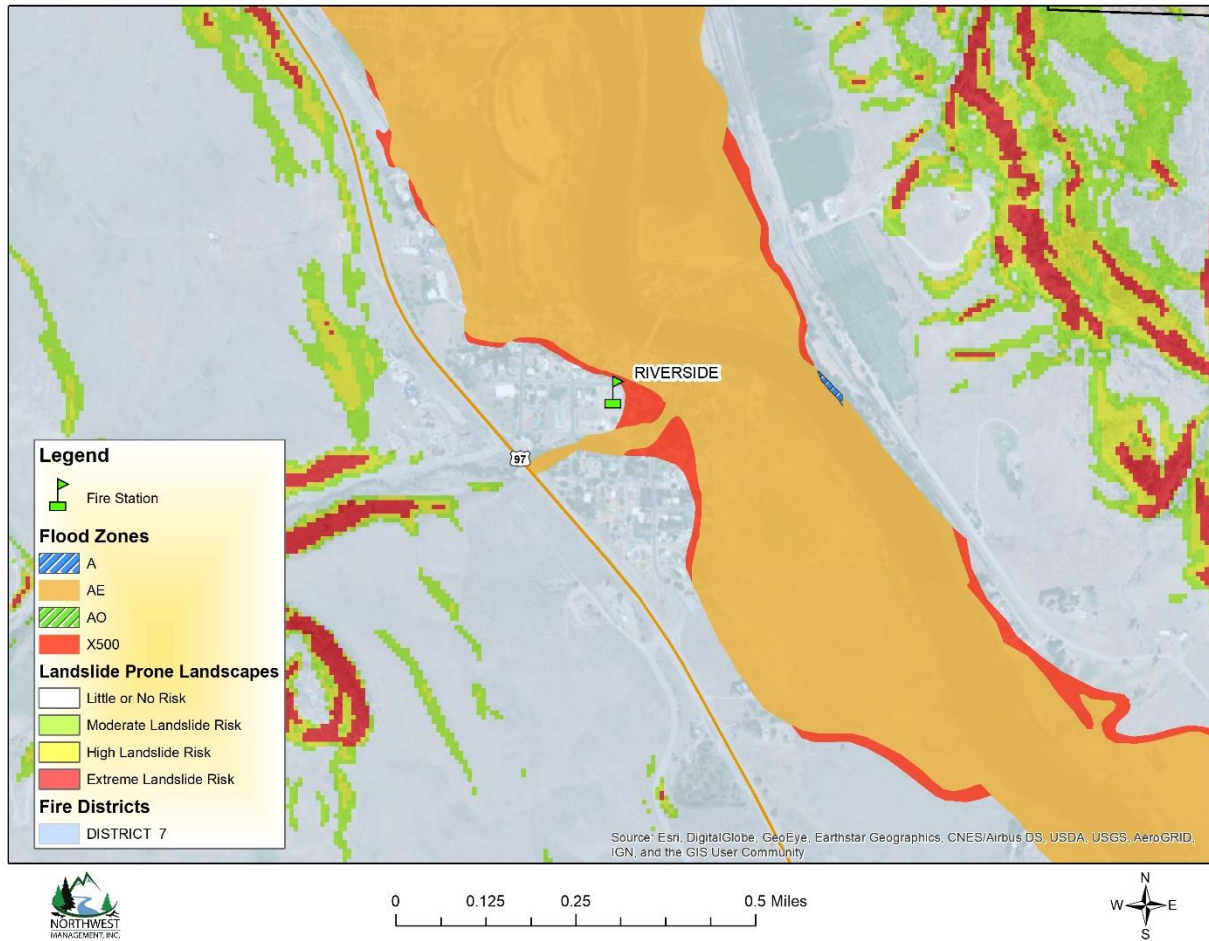


Figure 100) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Fire District #7 fire station in Riverside, WA.

VALUE OF RESOURCES AT RISK

Even though the Fire District #7 facility, equipment, and other assets could be affected by any of the hazards described in this plan it is highly unlikely that any losses will result from a hazard event.

The at-risk assets/values in Fire District #7 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in Fire District #7, there are approximately 573 address points within the District (Figure 101). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

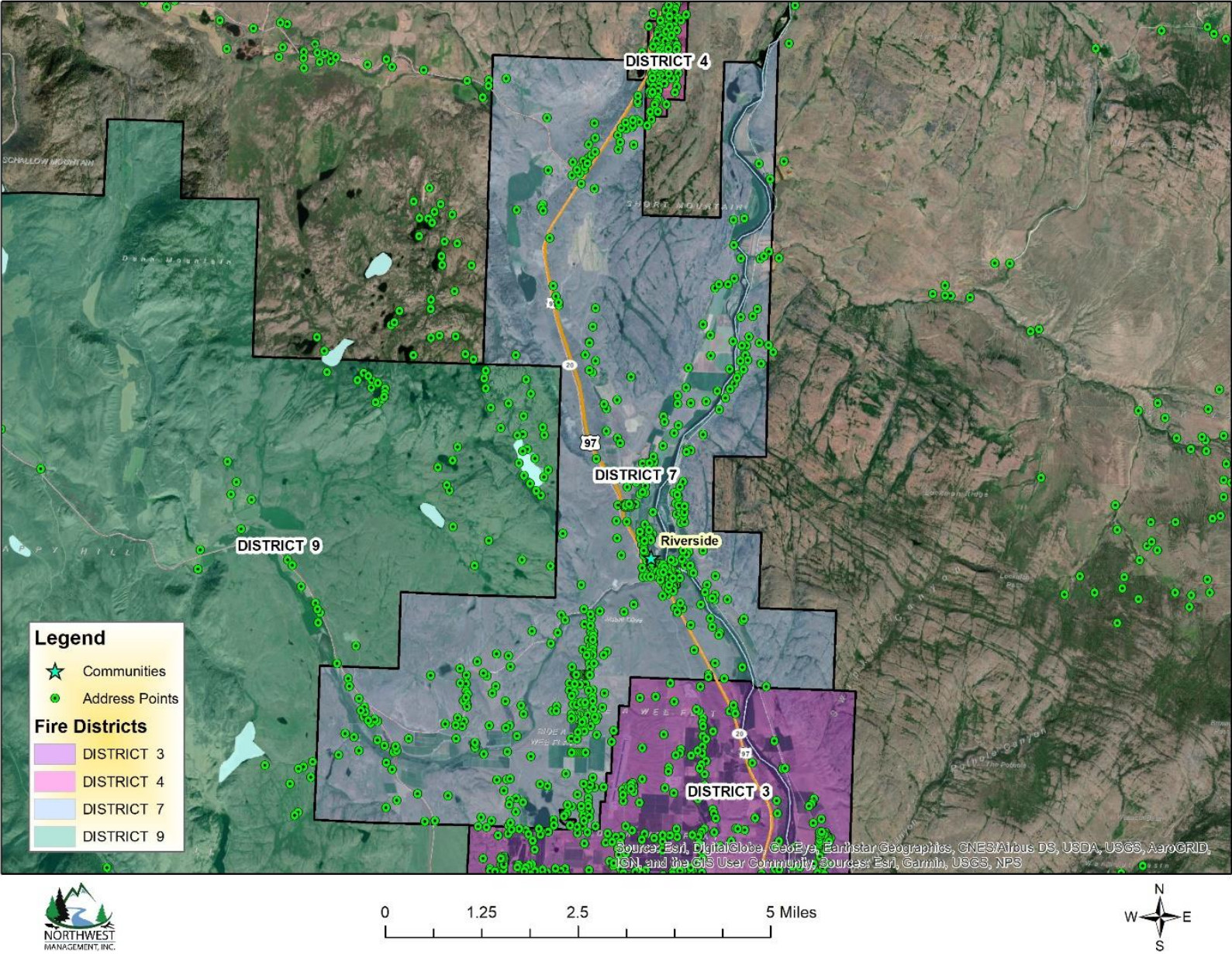


Figure 101) Distribution of address points in Fire District #7 and in surrounding areas in Okanogan County, WA.

OKANOGAN COUNTY FIRE DISTRICT #8

Okanogan County Fire District #8 covers approximately 293.3 square miles and includes the communities of Timentwa and Lafleur. The district does not have a central fire station; vehicles are stationed at the homes of firefighters and meetings are held at the home of the district chief. Much of the risk posed by natural hazards to the locations where District vehicles and equipment are stored, and the jurisdiction has already been described in the Okanogan County Annex. Therefore, this section is supplemental to the more detailed analyses provided in the county annex.

PROBABILITY OF FUTURE OCCURRENCE

The probability that the locations at which Fire District #8 vehicles and equipment are stored or that the district jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 133 describes risk and impacts that are specific to District #8's primary meeting and storage location; flood and landslide hazard areas are depicted in Figure 102. Refer to the Okanogan County Annex for a geographically broader analysis of hazards that could affect the property. Potential impacts to the District's jurisdiction are the same as what was described for the County; Refer to the Okanogan County Annex for maps and other information related to risk within the Fire District #8 jurisdiction.

Table 133) Summary of potential natural hazard impacts that could affect the Fire District #8 meeting, training, and storage location. This information is supplemental to the risk assessment in the Okanogan County Annex.

District 8	Primary meeting, training, and storage location
Address	2707 Cameron Lake Rd.
Flood	Flood risk is low as the location is not within or near any NFIP Flood Zones.
Landslide	There are some landslide hazard areas to the east of the location on the opposite side of Cameron Lake Road. Although the slopes could slump under certain conditions, it is likely that they pose a low risk to the location and the road.
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for the Okanogan County. However, the impacts from these hazards, which are described in the Okanogan County Annex, may affect the District's ability to respond during a natural hazard event.
Severe Weather	
Wildland Fire	
Volcano	
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the location, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.
Pandemic	The District's ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.

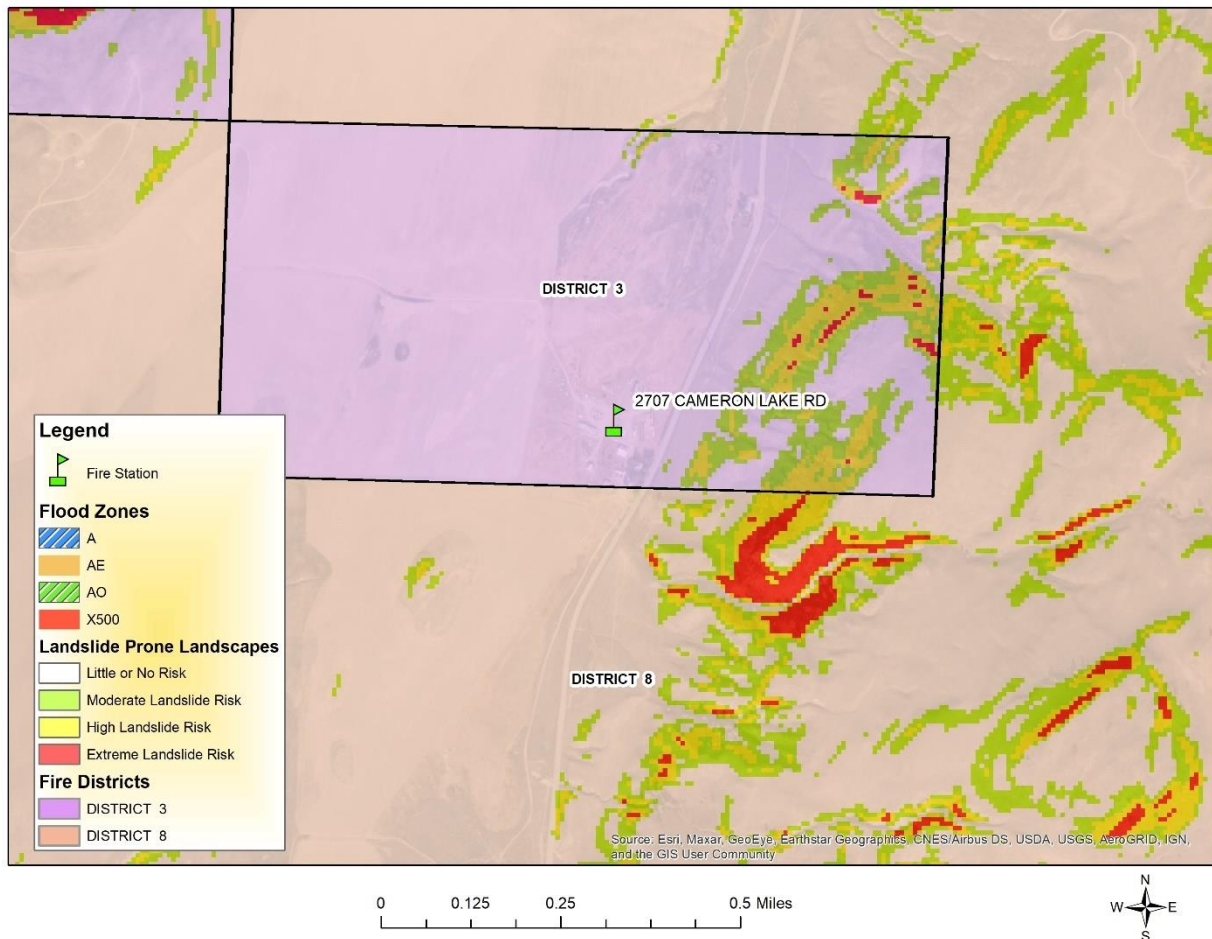


Figure 102) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Fire District #8 meeting, training, and storage location just outside of Okanogan, WA.

VALUE OF RESOURCES AT RISK

Even though the Fire District #8 facility, equipment, and other assets could be affected by any of the hazards described in this plan it is highly unlikely that any losses will result from a hazard event.

The at-risk assets/values in Fire District #8 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in Fire District #8, there are approximately 127 address points within the District (Figure 103). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

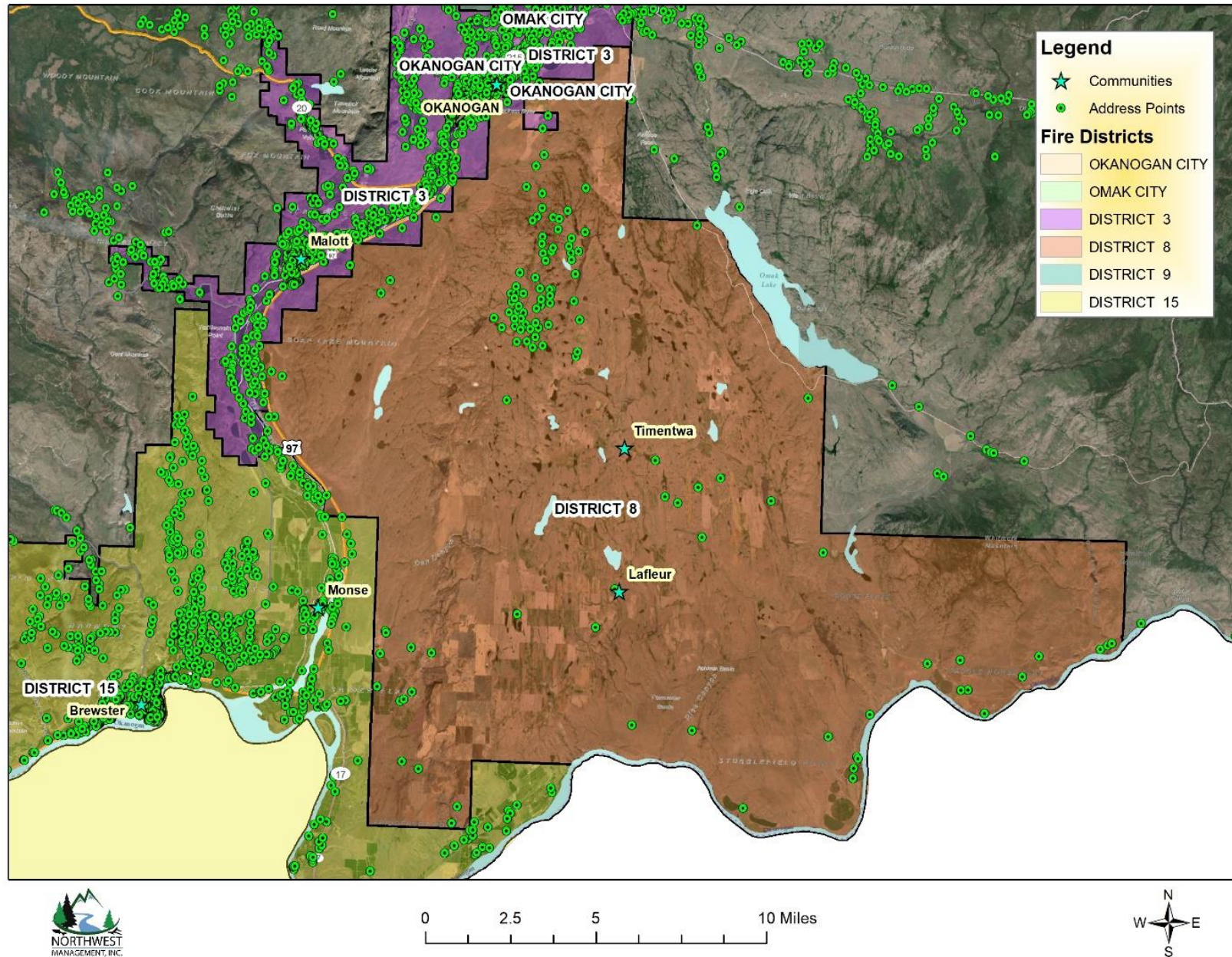


Figure 103) Distribution of address points in Fire District #8 and in surrounding areas in Okanogan County, WA.

OKANOGAN COUNTY FIRE DISTRICT #9

Okanogan County Fire District #9 is approximately 71.5 square and encompasses the Town of Conconully which has its own fire department and jurisdiction. Fire District #9 operates out of a facility located along Hess Lake Road. Much of the risk posed by natural hazards to the district facility, assets, and jurisdiction has already been described for the Town of Conconully and Okanogan County. Therefore, this section is supplemental to the more detailed analyses provided in those other annexes.

PROBABILITY OF FUTURE OCCURRENCE

The probability that the Fire District #9 facility, assets, and jurisdiction will be affected by natural hazards is the same as what was described for the Town of Conconully and Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 134 describes risk and impacts that are specific to the District's assets at the Hess road facility; flood and landslide hazard areas around the fire station are depicted in Figure 104. Refer to the Town of Riverside Annex for a geographically broader analysis of hazards that could affect the fire station. Potential impacts to the District's jurisdiction are the same as what was described for the County; Refer to the Okanogan County Annex for maps and other information related to risk within the Fire District #9 jurisdiction. As it is contained within the District's jurisdiction, the risk assessment for the Town of Conconully Fire Department can be referenced for more information about hazards and risk in the area.

Table 134) Summary of potential natural hazard impacts that could affect the Fire District #9 facility. This information is supplemental to the risk assessments in the Okanogan County annex.

District 9 Facility	Hess Lake Road (Conconully)
Address	8 Hess Lake Rd
Flood	Flood risk is low as the station is not located in NFIP Flood Zones.
Landslide	Although there are landslide hazard areas nearby, the fire facility is not directly at risk to landslide hazards.
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for Okanogan County. However, the impacts from these hazards, which are described in the County Annex, may affect the District's ability to respond during a natural hazard event.
Severe Weather	
Wildland Fire	
Volcano	
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.
Pandemic	The District's ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.

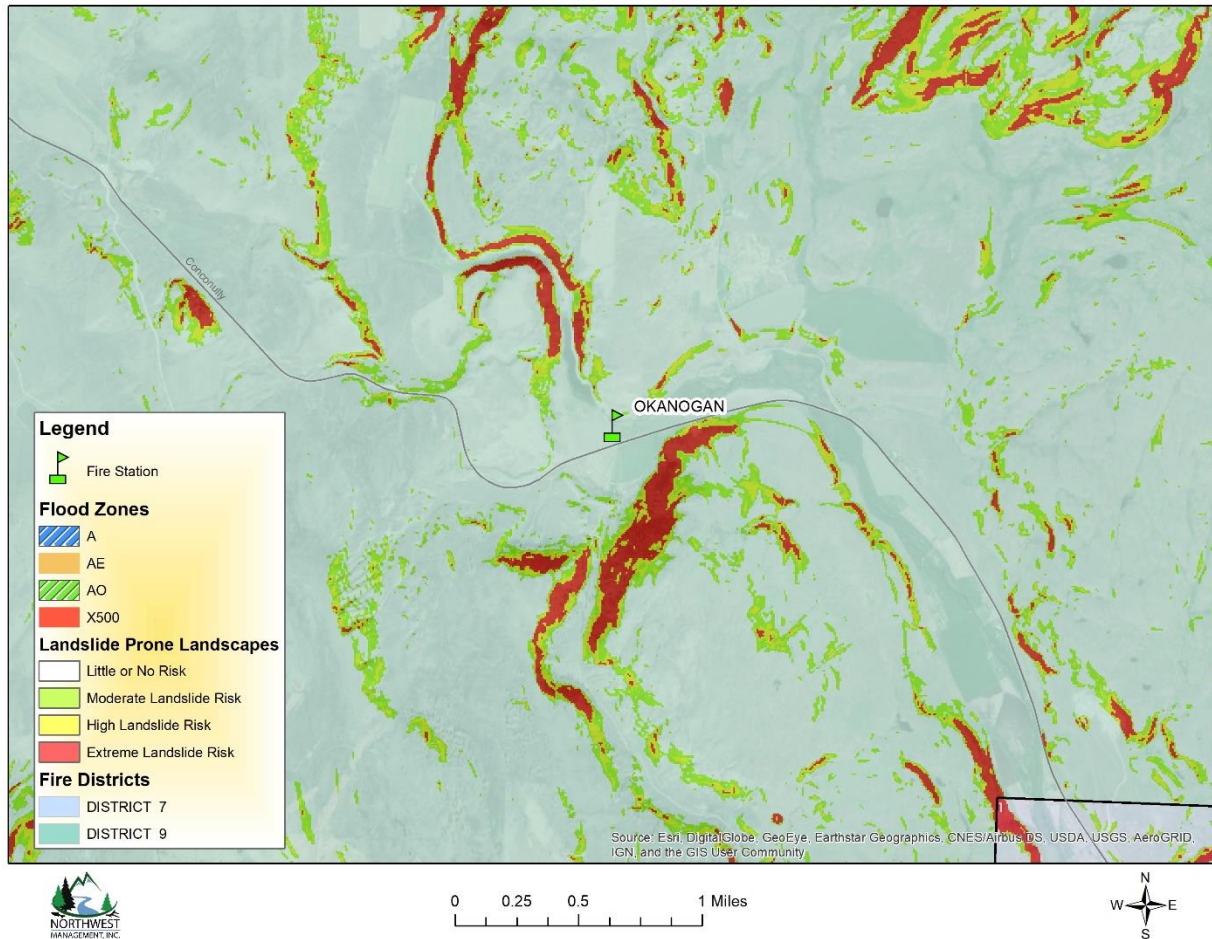


Figure 104) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Fire District #9 facility off Hess Road in Okanogan County, WA.

VALUE OF RESOURCES AT RISK

Even though the Fire District #9 facility, equipment, and other assets could be affected by any of the hazards described in this plan it is highly unlikely that any losses will result from a hazard event.

The at-risk assets/values in Fire District #9 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in Fire District #9, there are approximately 211 address points within the District (Figure 105). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

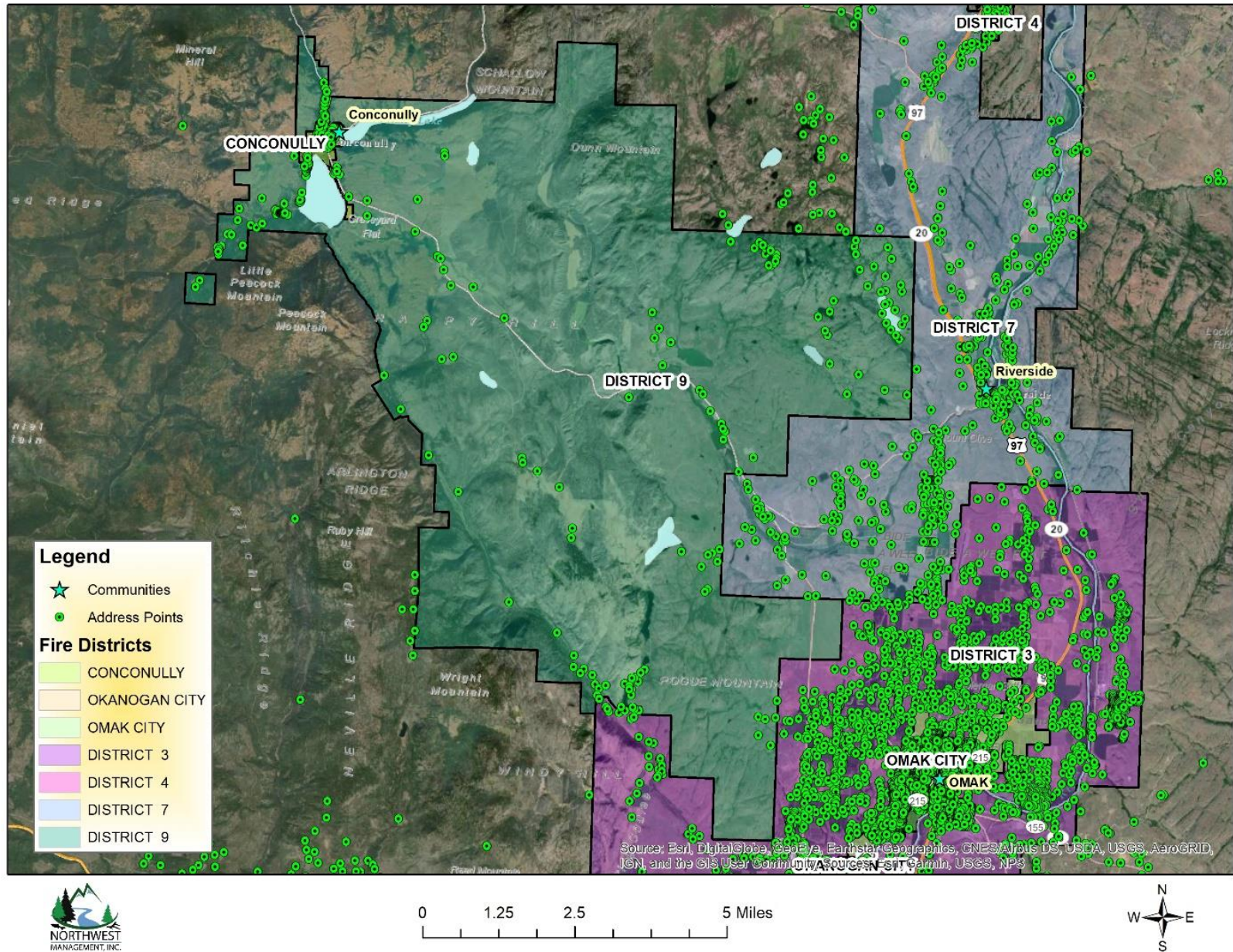


Figure 105) Distribution of address points in Fire District #9 and in surrounding areas in Okanogan County, WA.

OKANOGAN COUNTY FIRE DISTRICT #10

Okanogan County Fire District #10 is approximately 24 square miles and encompasses the unincorporated Town of Loomis. Fire District #10 operates out of a facility located off the Loomis-Oroville road in Loomis. Much of the risk posed by natural hazards to the district facility, assets, and jurisdiction has already been described for Okanogan County. Therefore, this section is supplemental to the more detailed analyses provided in the County annex.

PROBABILITY OF FUTURE OCCURRENCE

The probability that the Fire District #10 facility, assets, and jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 135 describes risk and impacts that are specific to the District’s facility and assets in Loomis; flood and landslide hazard areas around the fire station are depicted in Figure 106. Refer to the Okanogan County Annex for a geographically broader analysis of hazards that could affect the fire station. Potential impacts to the District’s jurisdiction are the same as what was described for the County; Refer to the Okanogan County Annex for maps and other information related to risk within and around the Fire District #10 jurisdiction.

Table 135) Summary of potential natural hazard impacts that could affect the Fire District #10 facility. This information is supplemental to the risk assessments in the Okanogan County annex.

District 10 Facility	Loomis
Address	Loomis-Oroville Rd
Flood	Flood risk is low as the station is not located in or near NFIP Flood Zones.
Landslide	There is a landslide hazard area directly to the north of the District fire facility; based on slope, landslide risk associated with this area is moderate to high.
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for Okanogan County. However, the impacts from these hazards, which are described in the County Annex, may affect the District’s ability to respond during a natural hazard event.
Severe Weather	
Wildland Fire	
Volcano	
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.
Pandemic	The District’s ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.

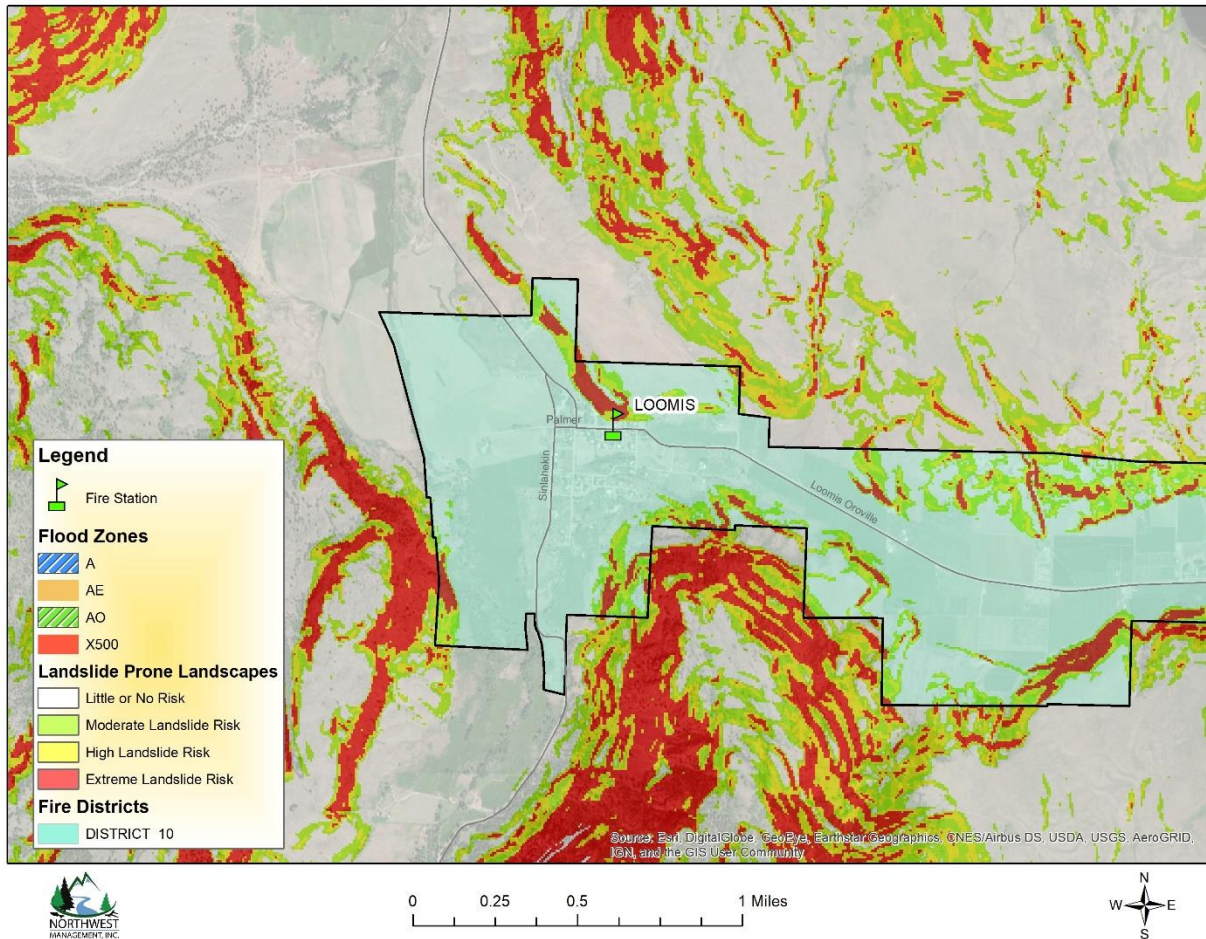


Figure 106) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Fire District #10 facility in Loomis, WA.

VALUE OF RESOURCES AT RISK

Even though the Fire District #10 facility, equipment, and other assets could be affected by any of the hazards described in this plan it is highly unlikely that any losses will result from a hazard event.

The at-risk assets/values in Fire District #10 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in Fire District #10, there are approximately 235 address points within the District (Figure 107). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

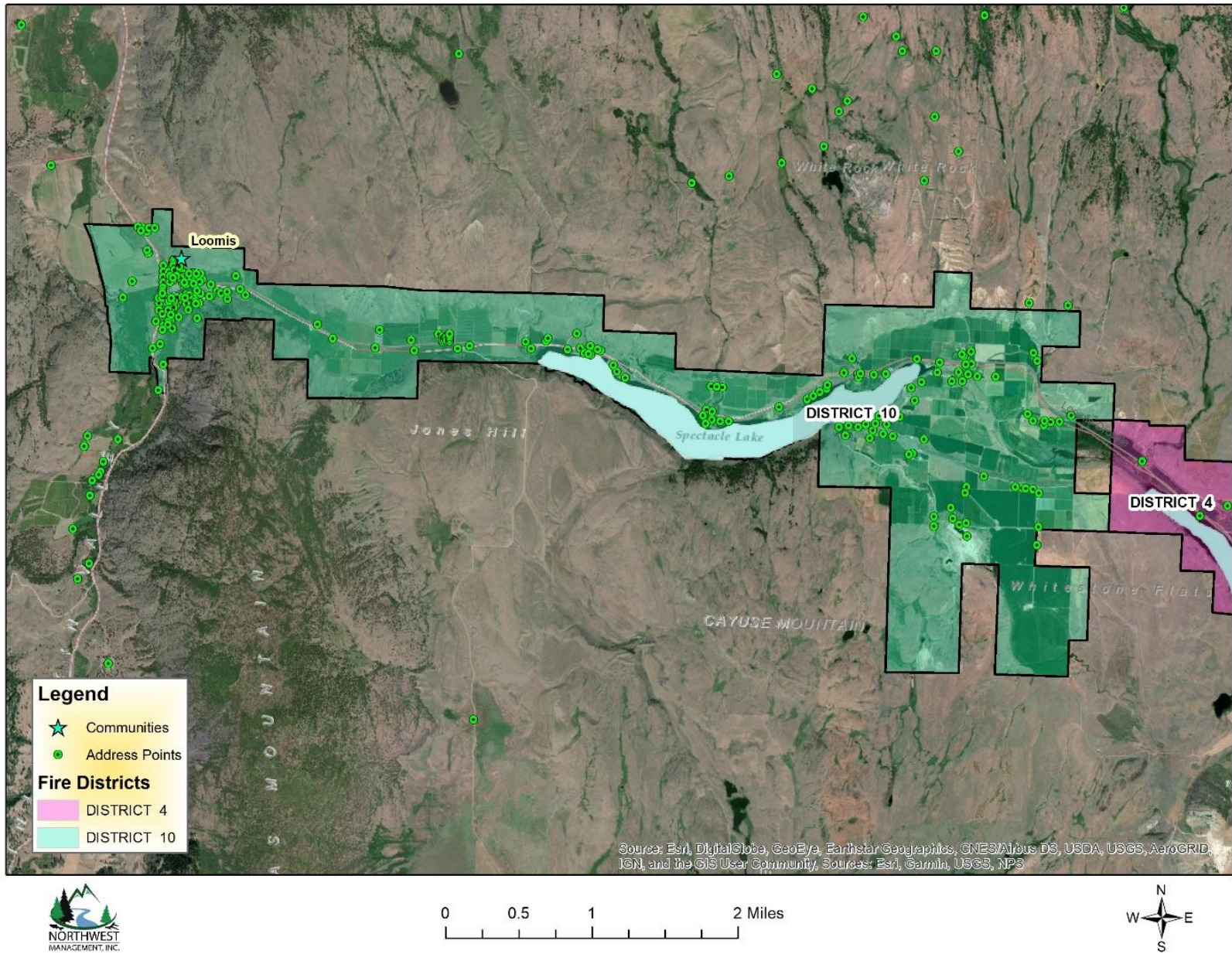


Figure 107) Distribution of address points in Fire District #10 and in surrounding areas in Okanogan County, WA.

OKANOGAN COUNTY FIRE DISTRICT #11

Okanogan County Fire District #11 covers approximately 111 square miles and includes the communities of Molson and Chesaw. Fire District #11 operates out of four different facilities that are located off Chesaw Road (x2), Molson Road, and Rawhide Road. Much of the risk posed by natural hazards to the District fire stations and the District jurisdiction has already been described for Okanogan County. Therefore, this section is supplemental to the more detailed analyses provided in the County annex.

PROBABILITY OF FUTURE OCCURRENCE

The probability that Fire District #11 fire facilities will be affected by natural hazards is the same as what was described for other communities in the eastern portion of Okanogan County (refer to the Okanogan County annex). The probability that the Fire District #11 jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 131 describes risk and impacts that are specific to Fire District #11 fire stations; flood and landslide hazard areas around the fire stations are depicted in Figure 108. Refer to Okanogan County annex for a geographically broader analysis of hazards that could affect each fire station. Potential impacts to the District's jurisdiction are the same as what was described for the County; Refer to the Okanogan County Annex for maps and other information related to risk within the Fire District #11 jurisdiction.

Table 136) Summary of potential natural hazard impacts that could affect the Fire District #11 fire stations. This information is supplemental to the risk assessments and risk mapping that concerns the eastern portion of the county.

District 11 Facility	Chesaw Road	Chesaw Road	Molson Road	Rawhide Road
Address	1607 Chesaw Rd	2050 Chesaw Rd	512B Molson Rd	15 Rawhide Rd
Flood	Risk is low to none; none of the fire stations are in NFIP flood zones.			
Landslide	Risk is low to none; although there are landslide hazard areas in proximity to the fire stations none of them are directly at risk.			
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for Okanogan County. However, the impacts from these hazards, which are described in the County Annex, may affect the District's ability to respond during a natural hazard event.			
Severe Weather				
Wildland Fire				
Volcano				
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.			
Pandemic	The District's ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.			

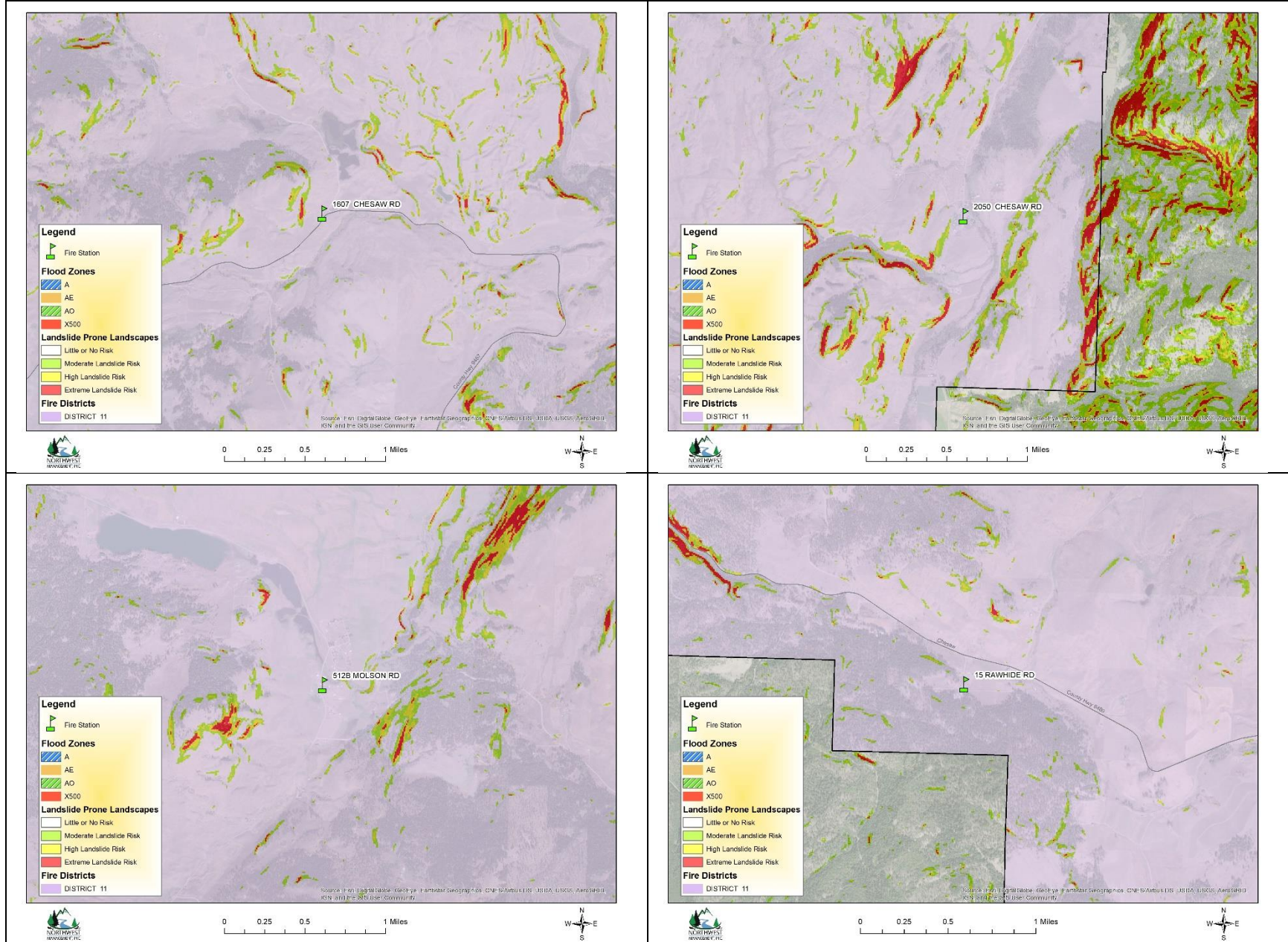


Figure 108) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Fire District #11 facilities in Okanogan County, WA.

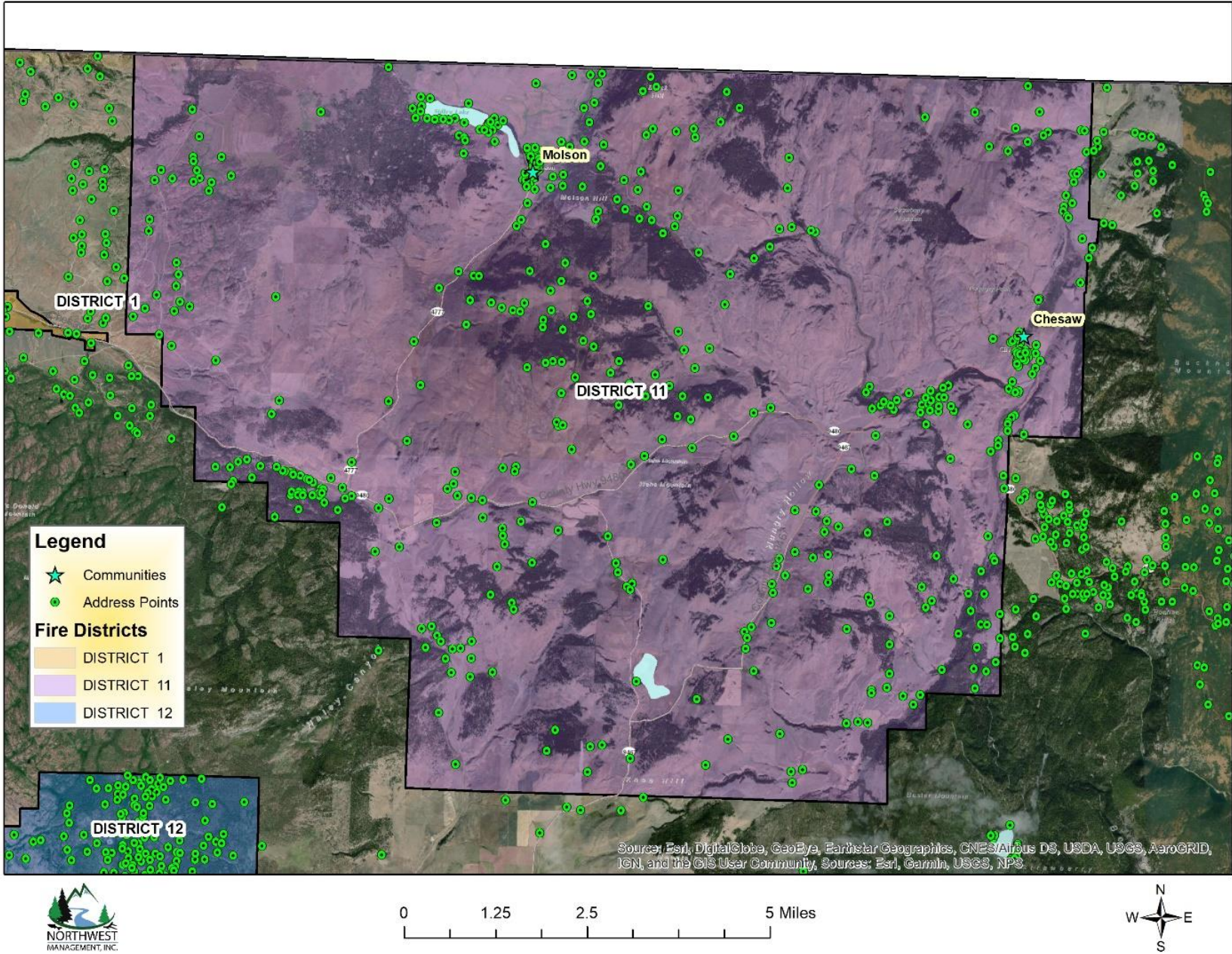


Figure 109) Distribution of address points in Fire District #11 and in surrounding areas in Okanogan County, WA.

VALUE OF RESOURCES AT RISK

Even though the Fire District #11 facilities, equipment, and other assets could be affected by any of the hazards described in this plan it is highly unlikely that any losses will result from a hazard event.

The at-risk assets/values in Fire District #11 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in Fire District #11, there are approximately 524 address points within the District (Figure 109, above). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

OKANOGAN COUNTY FIRE DISTRICT #12

Okanogan County Fire District #12 is almost 16 square miles; the District operates out of a facility located off Swanson Mill road. Much of the risk posed by natural hazards to the District fire station and the District jurisdiction has already been described for the eastern side of Okanogan County. Therefore, this section is supplemental to the more detailed analyses provided in the County annex.

PROBABILITY OF FUTURE OCCURRENCE

The probability that the Fire District #12 fire station will be affected by natural hazards is the same as what was described for other communities in the eastern portion of Okanogan County (refer to the Okanogan County annex). The probability that the Fire District #12 jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 137 describes risk and impacts that are specific to the District facility along Swanson Mill road; flood and landslide hazard areas around the fire station are depicted in Figure 110. Refer to the Okanogan County Annex for a geographically broader analysis of hazards that could affect the fire station. Potential impacts to the District’s jurisdiction are the same as what was described for the County; Refer to the Okanogan County Annex for maps and other information related to risk within and around the Fire District #12 jurisdiction.

Table 137) Summary of potential natural hazard impacts that could affect the Fire District #12 facility. This information is supplemental to the risk assessments in the Okanogan County annex.

District 12 Facility	Swanson Mill
Address	474 Swanson Mill Rd
Flood	Flood risk is low as the station is not located in or near NFIP Flood Zones.
Landslide	Risk is low to none; although there are landslide hazard areas in proximity to the fire stations none of them are directly at risk.
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for Okanogan County. However, the impacts from these hazards, which are described in the County Annex, may affect the District’s ability to respond during a natural hazard event.
Severe Weather	
Wildland Fire	
Volcano	
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.
Pandemic	The District’s ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.

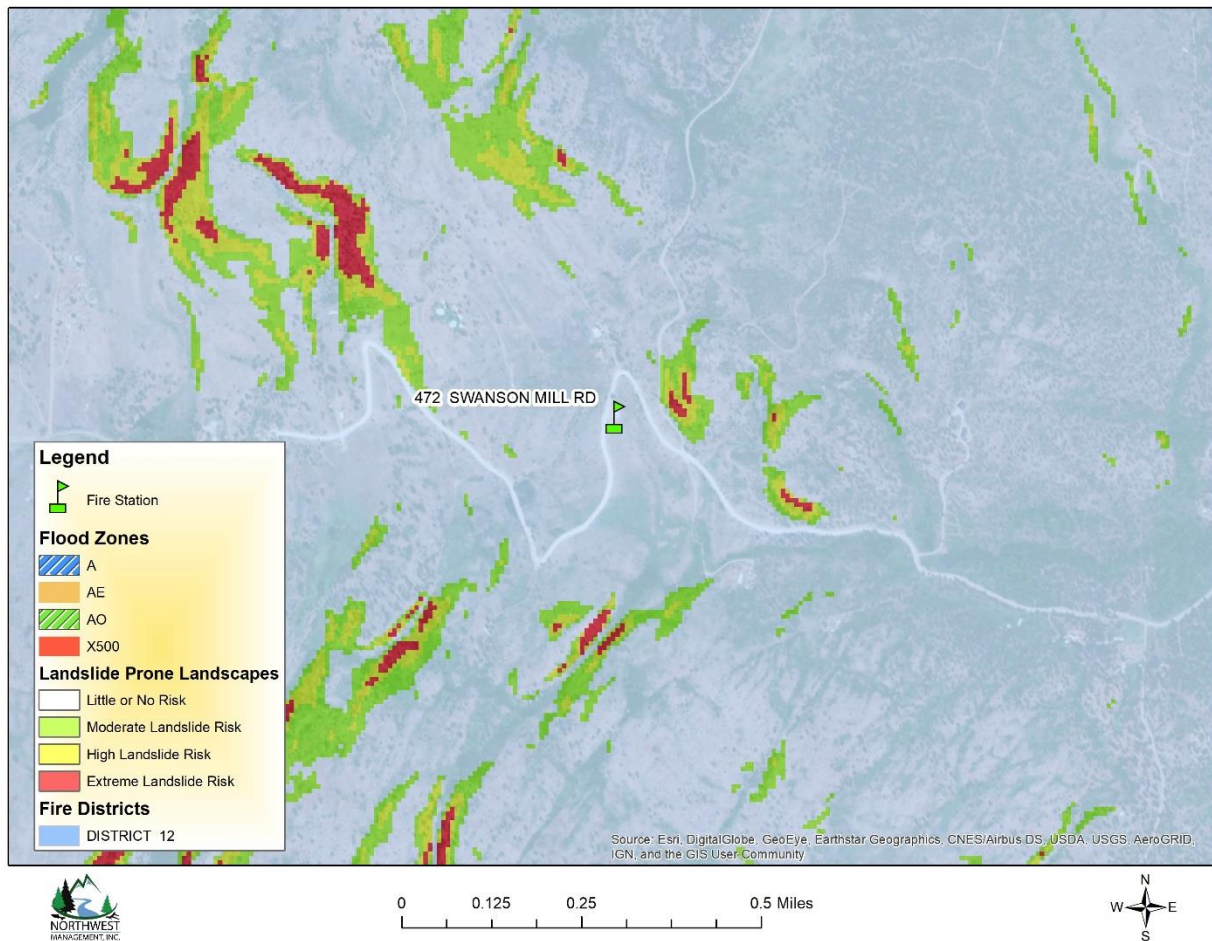


Figure 110) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Fire District #12 facility in Okanogan County, WA.

VALUE OF RESOURCES AT RISK

Even though the Fire District #12 facility, equipment, and other assets could be affected by any of the hazards described in this plan it is highly unlikely that any losses will result from a hazard event.

The at-risk assets/values in Fire District #12 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in Fire District #12, there are approximately 333 address points within the District (Figure 111). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

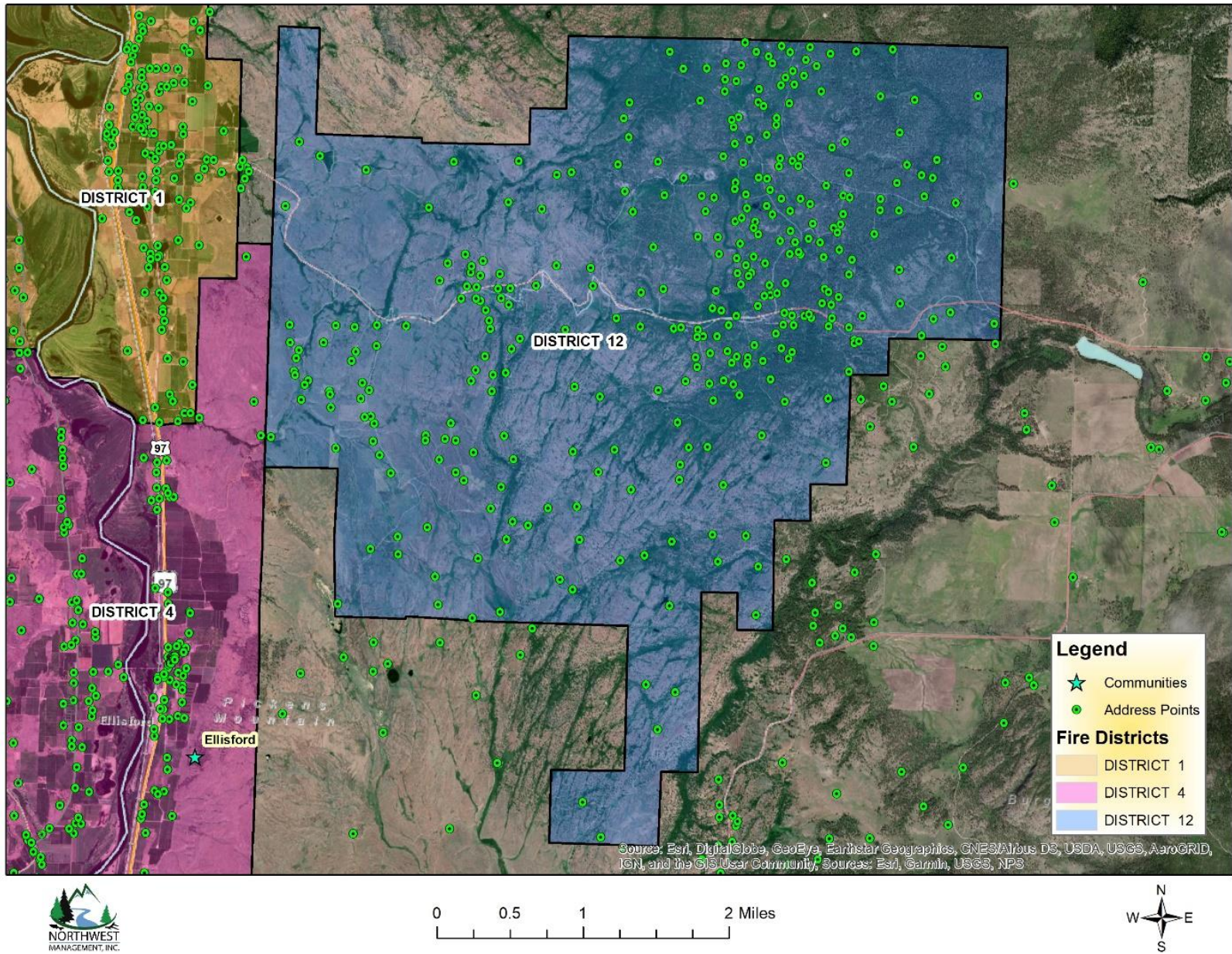


Figure 111) Distribution of address points in Fire District #12 and in surrounding areas in Okanogan County, WA.

OKANOGAN COUNTY FIRE DISTRICT #13

Fire District #13 covers about 3.5 square miles in Okanogan County; most of the District's jurisdiction and all District facilities are in Ferry County. Much of the risk posed by natural hazards to the portion of the district in Okanogan County has already been described in the Okanogan County annex. Therefore, this section is supplemental to the more detailed analyses provided in the County annex.

PROBABILITY OF FUTURE OCCURRENCE

The probability that the Fire District #13 jurisdiction (the portion in Okanogan County) will be affected by natural hazards is the same as what was described for Okanogan County (the District fire stations are in Ferry County; refer to the 2019 Ferry County Natural Hazard Mitigation Plan for more information about natural hazards that could affect the Fire District #13 fire stations and jurisdiction).

IMPACTS OF HAZARD EVENTS & VALUE OF RESOURCES AT RISK

The impacts to the portion of Fire District #13 that is in Okanogan County are the same as what was described in the County annex. The at-risk assets/values in Fire District #13 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures, there are approximately 27 address points within the Okanogan County portion of Fire District #13 (Figure 112, above). The number, type, and condition of structures present, land-use, and exposure to hazards is variable between address points.

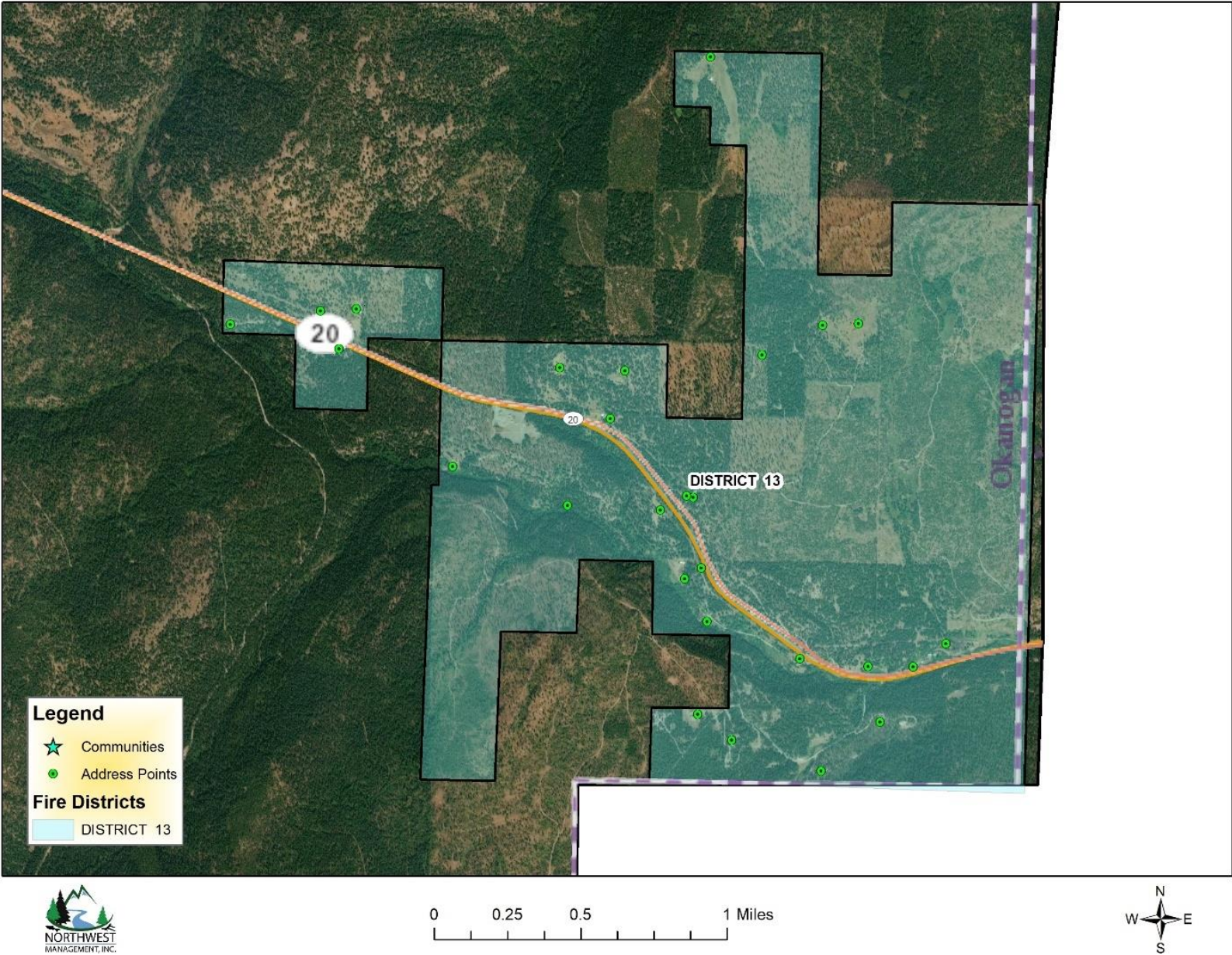


Figure 112) Distribution of address points in Fire District #13 and in surrounding areas in Okanogan County, WA. It should be noted that this map only includes the portion of the district that is in Okanogan County; most of the district jurisdiction and all fire stations are in Ferry County.

OKANOGAN COUNTY FIRE DISTRICT #14

Fire District #14 covers about 3.9 square miles in Okanogan County; most of the District's jurisdiction and all District facilities are in Ferry County. Much of the risk posed by natural hazards to the portion of the district in Okanogan County has already been described in the Okanogan County annex. Therefore, this section is supplemental to the more detailed analyses provided in the County annex.

PROBABILITY OF FUTURE OCCURRENCE

The probability that the Fire District #14 jurisdiction (the portion in Okanogan County) will be affected by natural hazards is the same as what was described for Okanogan County (the District fire stations are in Ferry County; refer to the 2019 Ferry County Natural Hazard Mitigation Plan for more information about natural hazards that could affect the Fire District #14 fire stations and jurisdiction).

IMPACTS OF HAZARD EVENTS & VALUE OF RESOURCES AT RISK

The impacts to the portion of Fire District #14 that is in Okanogan County are the same as what was described in the County annex. The at-risk assets/values in Fire District #14 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures, there are approximately 36 address points within the Okanogan County portion of District #14 (Figure 113, above). The number, type, and condition of structures present, land-use, and exposure to hazards is variable between address points.

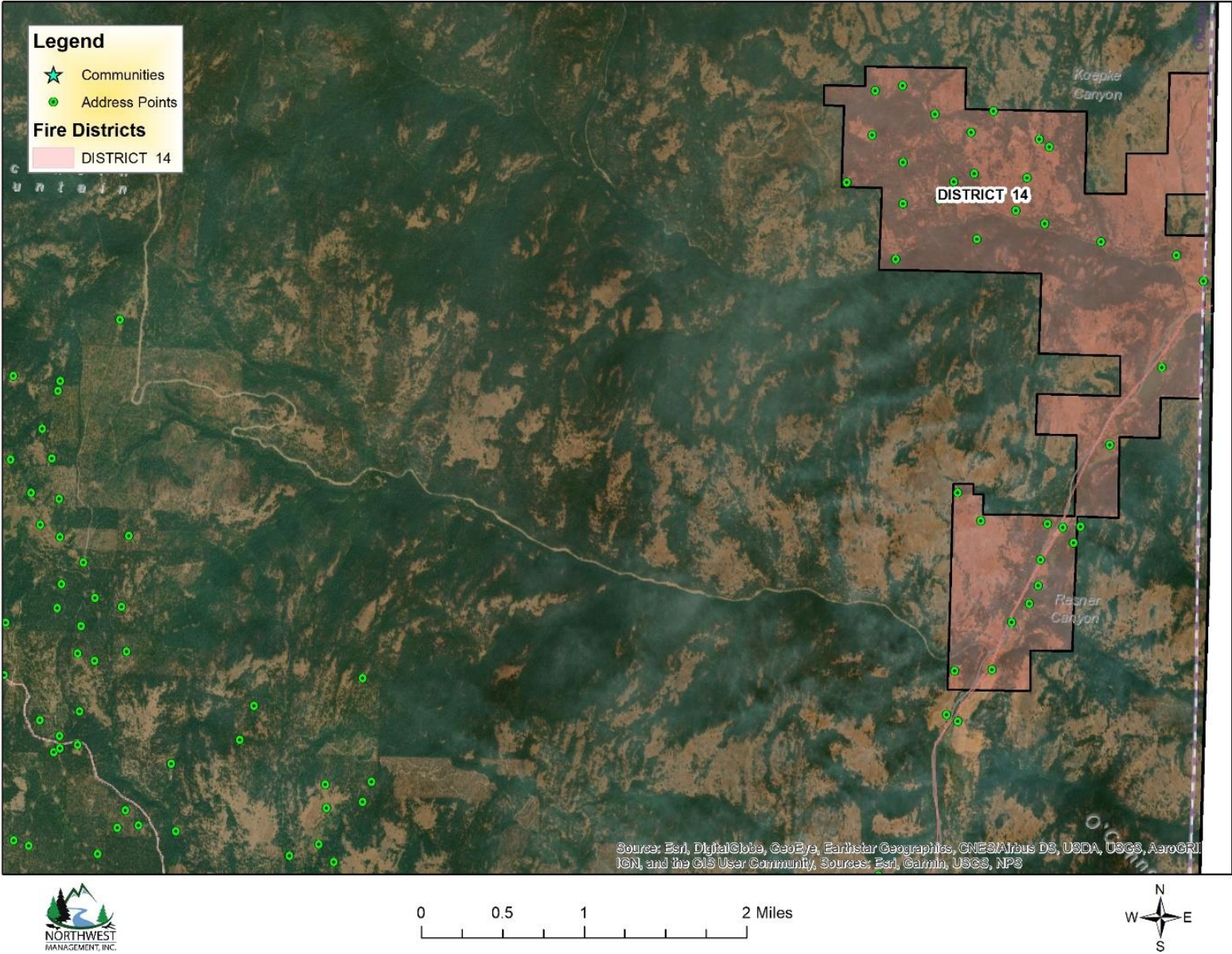


Figure 113) Distribution of address points in Fire District #14 and in surrounding areas in Okanogan County, WA. It should be noted that this map only includes the portion of the district that is in Okanogan County; most of the district jurisdiction and all fire stations are in Ferry County.

OKANOGAN COUNTY FIRE DISTRICT #15

Okanogan County Fire District #15 covers approximately 230 square miles and includes Brewster, Methow, and Pateros. Fire District #15 operates out of four different facilities, three are in Okanogan County (Brewster, Methow, and Pateros) and one is in Douglas County (Rocky Butte). Much of the risk posed by natural hazards to the District fire stations and the District jurisdiction has already been described for some of the cities (Brewster and Pateros) and Okanogan County, respectively. Therefore, this section is supplemental to the more detailed analyses provided in the City of Brewster, City of Pateros, and Okanogan County annexes.

PROBABILITY OF FUTURE OCCURRENCE

The probability that Fire District #15 fire facilities will be affected by natural hazards is the same as what was described for the City of Brewster and the City of Pateros. The probability that the Fire District #15 jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 138 describes risk and impacts that are specific to Fire District #15 fire stations; flood and landslide hazard areas around the fire stations are depicted in Figure 114 (see note, after Figure 115, about NFIP flood zones). Refer to the Brewster, Pateros, and County annexes for a geographically broader analysis of hazards that could affect each fire station. Potential impacts to the District's jurisdiction are the same as what was described for the County; Refer to the Okanogan County Annex for maps and other information related to risk within the Fire District #15 jurisdiction.

Table 138) Summary of potential natural hazard impacts that could affect the Fire District #15 fire stations. This information is supplemental to the risk assessments in the Brewster, Pateros, and County annexes.

District 15 Facilities	Brewster	Methow	Pateros
Address	412 W Indian Ave.	32 Main St.	191 Industrial Way
Flood	Risk is low to none; none of the fire stations are in NFIP flood zones.		
Landslide	Risk is low to none; none of the fire stations are adjacent to any landslide hazard areas.		
Earthquake	Risk presented to the fire stations by these hazards is the same as what was described for Okanogan County. However, the impacts from these hazards, which are described in the Brewster, Pateros, and County Annexes, may affect the District's ability to respond during a natural hazard event.		
Severe Weather			
Wildland Fire			
Volcano			
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.		
Pandemic	The District's ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.		

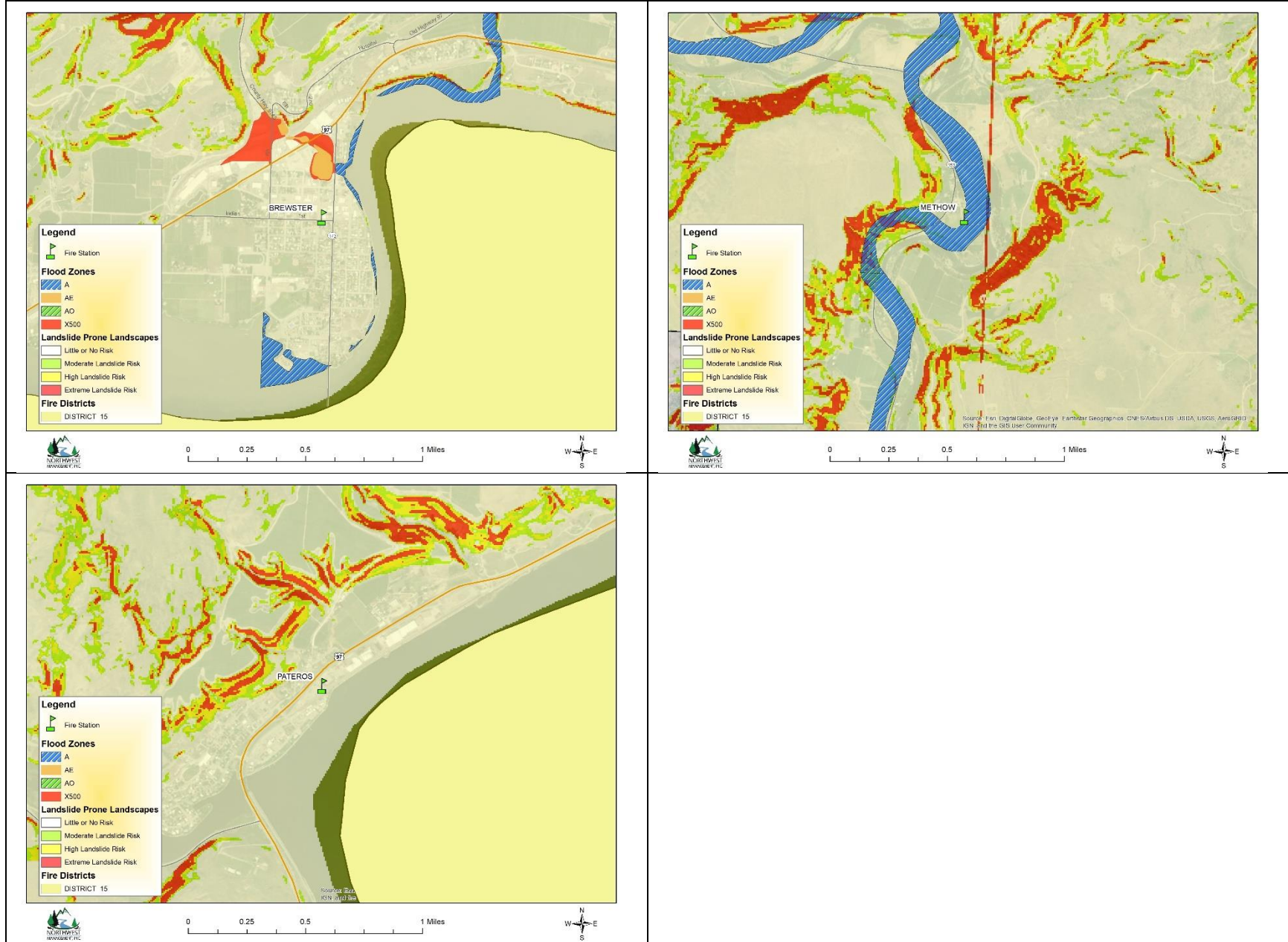


Figure 114) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Fire District #15 fire stations in Brewster (upper-left), Methow (upper-right), and Twisp (Pateros), WA. *SEE NOTE BELOW ABOUT FLOOD MAPS.

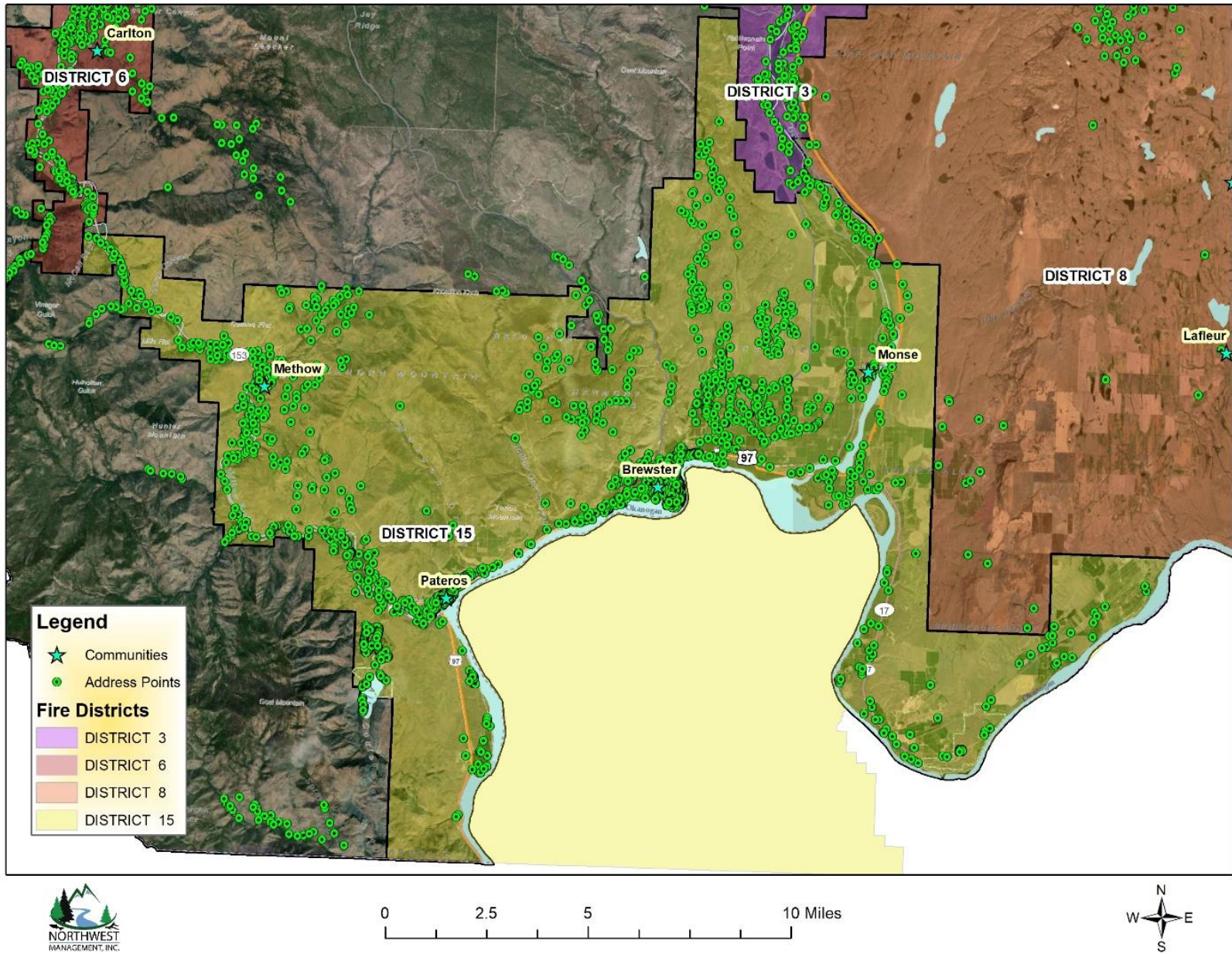


Figure 115) Distribution of address points in Fire District #15 and in surrounding areas in Okanogan County, WA.

It should be noted that the NFIP flood zones depicted in Figure 114, particularly in the Methow map, do not appear to line up with the baselayer map. Therefore, some of the maps may suggest that the fire stations and/or identifiable features in the basemap are closer to the flood zones than they actually are. For example, the fire station in Methow appears to be immediately adjacent to an NFIP flood zone when, in reality, it is probably outside of it. This inconsistency also appears on the web-based flood zone maps found on the Washington Department of Ecology website. This issue should be resolved once the county flood maps are updated (maps are expected to be completed by the winter of 2023/2024).

VALUE OF RESOURCES AT RISK

Even though the Fire District #15 facilities, equipment, and other assets could be affected by any of the hazards described in this plan it is highly unlikely that any losses will result from a hazard event.

The at-risk assets/values in Fire District #15 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will most likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in Fire District #15, there are approximately 2,590 address points within the District (Figure 115, above). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

OKANOGAN COUNTY FIRE DISTRICT #16

Okanogan County Fire District #16 is almost 51.5 square miles; the District operates out of a facility located off Bench Creek Road. Much of the risk posed by natural hazards to the District fire station and the District jurisdiction has already been described for the eastern side of Okanogan County. Therefore, this section is supplemental to the more detailed analyses provided in the County annex.

PROBABILITY OF FUTURE OCCURRENCE

The probability that the Fire District #16 fire station will be affected by natural hazards is the same as what was described for other communities in the eastern portion of Okanogan County (refer to the Okanogan County annex). The probability that the Fire District #16 jurisdiction will be affected by natural hazards is the same as what was described for Okanogan County.

IMPACTS OF HAZARD EVENTS

Table 139 describes risk and impacts that are specific to the District facility along Bench Creek Road; flood and landslide hazard areas around the fire station are depicted in Figure 116. Refer to the Okanogan County Annex for a geographically broader analysis of hazards that could affect the fire station. Potential impacts to the District’s jurisdiction are the same as what was described for the County; Refer to the Okanogan County Annex for maps and other information related to risk within and around the Fire District #16 jurisdiction.

Table 139) Summary of potential natural hazard impacts that could affect the Fire District #16 facility. This information is supplemental to the risk assessments in the Okanogan County annex.

District 16 Facility	Swanson Mill
Address	20 Bench Creek Rd.
Flood	Flood risk is low as the station is not located in or near NFIP Flood Zones.
Landslide	Risk is low to none; although there are landslide hazard areas in proximity to the fire facility it is not directly at risk.
Earthquake	Risk presented to the fire station by these hazards is the same as what was described for Okanogan County. However, the impacts from these hazards, which are described in the County Annex, may affect the District’s ability to respond during a natural hazard event.
Severe Weather	
Wildland Fire	
Volcano	
Hazardous Materials	Firefighters and other emergency personnel could be exposed to hazardous materials stored at the fire station, while working on a fire truck, when responding to a vehicle accident, when fighting a fire near a facility where hazardous materials are stored, etc. Firefighters are most often exposed to fuels (diesel and gasoline) and chemicals used for fire suppression such as foam.
Pandemic	The District’s ability to respond to emergencies could be limited due to the spread of illness amongst volunteers. Illness could potentially spread amongst firefighters while responding to an incident.

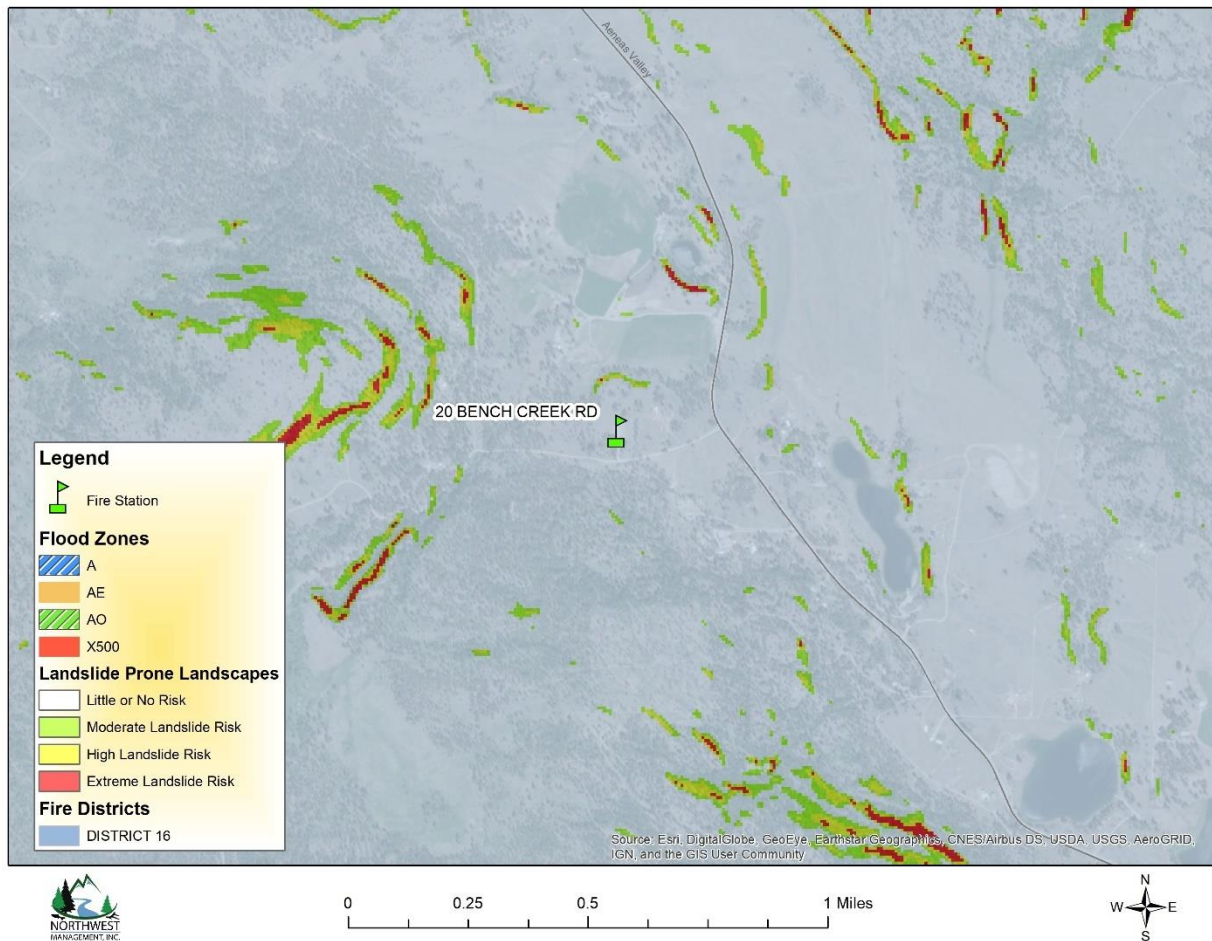


Figure 116) Flood hazard areas (NFIP flood zones) and landslide hazard areas (risk is based on slope) around the Fire District #16 facility in Okanogan County, WA.

VALUE OF RESOURCES AT RISK

Even though the Fire District #12 facility, equipment, and other assets could be affected by any of the hazards described in this plan it is highly unlikely that any losses will result from a hazard event.

The at-risk assets/values in Fire District #12 are not owned by the fire district; however, the District responds to wildfires and other incidents that threaten life and property. As the District is mostly concerned with wildfire, firefighters will mostly likely be tasked with protecting homes and other structures from fire hazards. Even though a dollar value cannot be provided for all structures in Fire District #12, there are approximately 672 address points within the District (Figure 117). The number, type, and condition of structures, land-use, and exposure to hazards varies significantly between address points.

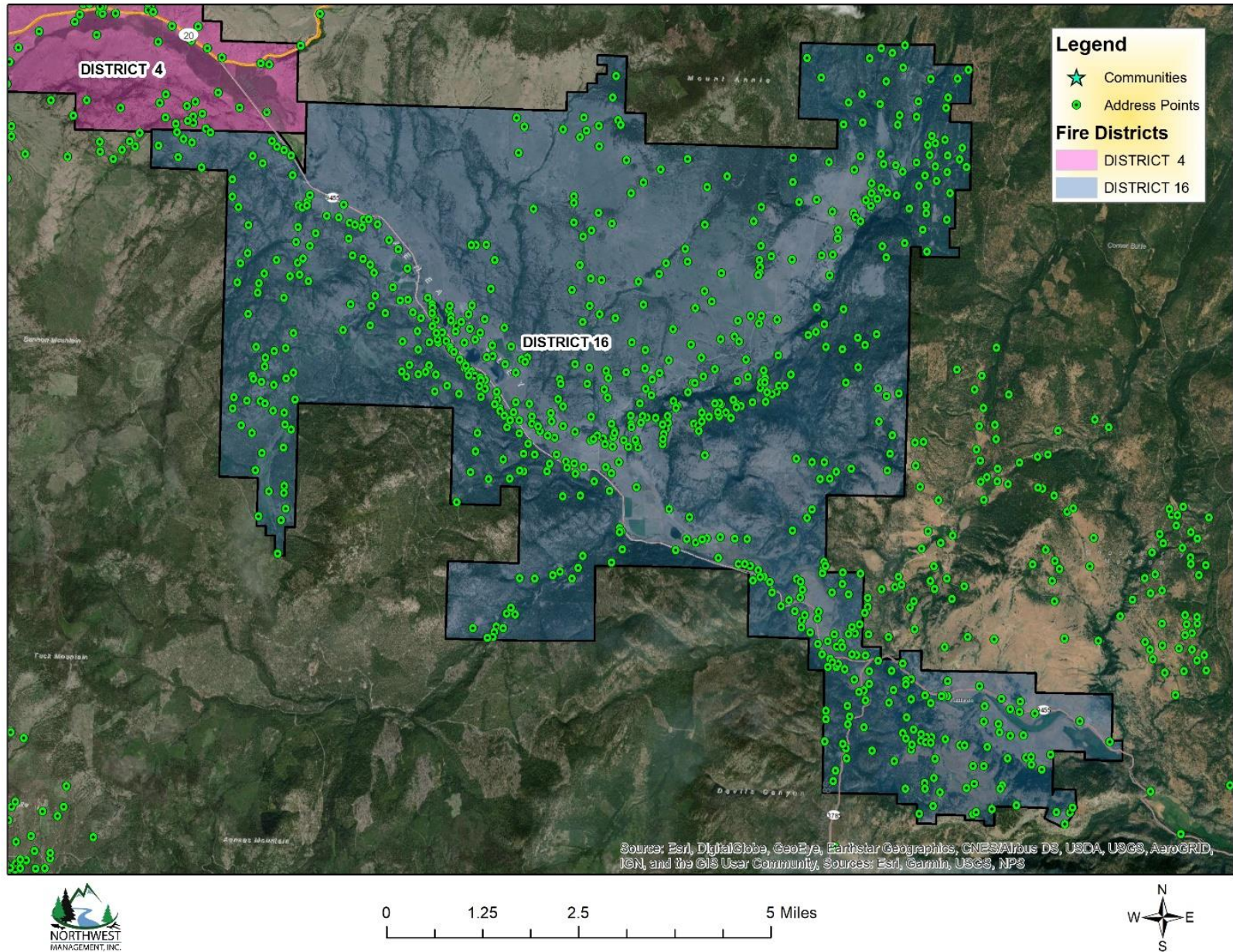


Figure 117) Distribution of address points in Fire District #16 and in surrounding areas in Okanogan County, WA.

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CHAPTER 6:

MITIGATION STRATEGY

IN THIS SECTION:

- Development of Mitigation Action Items
 - Action Item Criteria
 - Planning and Mitigation Goals
 - Funding Sources
 - Mechanisms to Incorporate Mitigation Strategies
- Mitigation Action Items
 - Okanogan County
 - Okanogan Conservation District
 - Adopting Towns and Cities
 - Fire Departments and Fire Districts

CHAPTER 6 – MITIGATION STRATEGY

Mitigation Action Items (MAIs) are central to the overall purpose of the Multi-Hazard Mitigation Plan (MHMP). As these MAIs are developed, implemented, and reviewed, Okanogan County will build disaster resistance into everyday operations and become more protected from potential losses. For the purposes of this document, mitigation action items are defined as activities designed to reduce or eliminate losses resulting from natural hazards. Losses can include life, physical property, and monetary value.

DEVELOPMENT OF MITIGATION ACTION ITEMS

The Mitigation Actions Items (MAIs) included in this section are a mix of new projects and projects from the previous plan that have been updated and clarified. Adopting jurisdictions included action items in the plan for each hazard that received a rating of “medium” or “high”; many of these hazards are included in Multi-Hazard action items (These are actions that address similar impacts from a variety of different hazards. For example, information on sheltering-in-place would likely help residents prepare for multiple hazards that could disrupt emergency services). The inclusion of action items for hazards that received a “low” rating was optional.

It should be noted that the Okanogan Conservation District does not have a project for each hazard that received a rating other than “low”. The ratings provided by the Conservation District reflect the organization’s perspective of hazards in Okanogan County, based on the work they perform, and not a specific need that would serve the interests of the District. The District is limited by the actions it could implement because of the way that it operates in the County. Therefore, it is most likely that the District would support other entities in the County as those entities identify and address natural hazards within their jurisdictions.

The MAIs were reviewed and prepared by representatives from each adopting jurisdiction with the objective of reducing impacts from the natural hazards addressed in this plan. Projects were categorized as either flood, wildland fire, drought, severe weather, earthquake, landslide, volcano, or multi-hazard mitigation actions items. Each member of the planning team served as a representative for their jurisdiction (or entity/department if their action items fall under the county annex) and was responsible for collecting the information required for a complete action item. Each project was entered into a separate table so as much information could be added to the project description as was necessary to make the intent of the project clear and understandable. A unique ID was then assigned to each action item to simplify future communication between entities within the county.

In addition to a statement that describes the project and problem being addressed, the template required additional information regarding the timeline on which the project will be implemented, how the project was prioritized, potential funding source(s) that could be used to finance the project, approximate cost, the agency responsible for the project, and any supporting agencies or entities.

ACTION ITEM CRITERIA

This section provides a brief overview of how the different fields in the MAI table were populated and the criteria used to assign ratings and values.

DESCRIPTION OF THE PROBLEM

This part of each MAI provides information about what the current issue is, who is affected and why? What is causing the problem or creating concern? If it hasn't become a problem yet, why is it an issue and why does it need to be addressed?

MITIGATION PROJECT SUMMARY

An overview of a proposed solution to the problem is included under this heading. Now that we know what the problem is, what initiative can be taken to solve the problem or, at the very least, reduce risk associated with that problem?

PRIORITY

As part of the preparation process, all action items were prioritized by representatives from the different adopting jurisdictions who were directly involved with the development of the action item; most departments selected items based on jurisdictional goals, project feasibility, cost, and urgency of implementation.

To help assign a rating/value to each project, the STAPLEE method was used to score each action item based on **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic, and **E**nvironmental considerations (Refer to Appendix 5 for more information about the STAPLEE method). The scoring method used for the 2022 Okanogan County MHMP Mitigation Action Items is an adaptation of the Feasibility Review Worksheet in Appendix A of the *Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects* handbook¹⁵². To complete the exercise for an action item, the scoring entity assigned one of the following ratings to each criterion:

- **Plus (+):** This is a favorable aspect of the project. For example, replacing a one-lane bridge with a two-lane bridge in the county would likely be favorable as it relates to community acceptance.
- **Minus (-):** This is an unfavorable aspect of the project. For example, creating a fuel break on a forested parcel of state land may be unfavorable as it relates to community acceptance and public support because of the impact the project will have on aesthetics.
- **Zero (0):** This is a neutral aspect of the project. For example, many projects may affect the natural environment, but the changes are neither good nor bad; this could include projects with temporary environmental impacts (such as an excavation project).

¹⁵² FEMA. *Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects*. Available online at: https://www.fema.gov/media-library-data/20130726-1635-20490-7447/how_to_9_aug08.pdf

- **Not Applicable (N/A):** This indicates that an aspect or component of a project does not apply. For example, "contributes to economic goals" may not apply to the bridge modification example that was described in the first bullet point.

To calculate a score, the pluses and minuses were changed to either +1 or -1 and then all values were added together. The total was then divided by the number of applicable categories (all categories that received a +, -, or 0 ranking) and multiplied by 100. The idea behind the calculation is that the added score did not account for the total number of positive and negative aspects to a project. For example:

- Project 1: A project with one positive aspect (and the remaining aspects are non-applicable) would have a score of 1.
- Project 2: A project with 12 positive aspects and 11 negative aspects (there are 23 total criteria by which a project is either scored a +1, -1, 0, or NA using the STAPLEE method) also has a total score of 1.
- The argument can be made that, even though both projects have a total score of 1, the first project is a greater priority because it doesn't have any negative aspects (all but one are N/A) while the second project has 11 negative aspects (even though it has 12 positive aspects).
- Therefore, when the scores are divided by the total number of applicable categories (ranging from one to 23) and multiplied by 100, the number of negative aspects is accounted for. So, project 1 has a final score of 100 (A score of 1 divided by 1 applicable category, multiplied by 100) while project 2 has a final score of 4.3 (A score of 1 divided by 23 applicable categories, multiplied by 100).

For the purpose of keeping the rating process simple and to help reduce bias, each mitigation action item was ranked relative to the other projects included in that annex; ***the mitigation action items were not ranked across adopting jurisdictions.*** Because it was not uncommon for projects to generate the same STAPLEE score, it was possible for multiple projects to "tie" and have the same STAPLEE score and intra-annex ranking. Excel was then used to rank a jurisdiction's MAIs relative to one another based on the scores calculated using the STAPLEE method.

LEAD AGENCY

The agencies listed in the table may not have developed the action item, but they are responsible for the implementation, status update, and close-out of the respective action item.

TIMELINE

This is the anticipated amount of time required to complete a mitigation project once it is started. An estimation was made for either the date of completion or the number of years required to fully implement and complete each project. For those projects that report the anticipated number of years until a project is completed, the number of years reflects the amount of time a project will require to complete once it is started (project start dates are unknown as they are dependent on the availability of funding and other resources).

FUNDING SOURCES

This is a short list of grants, agencies, local entities, etc. that could potentially fund the respective mitigation action item. Although not exhaustive, these sources are the most likely to provide funding.

COST

The value in the cost field in each table is an estimate of what each project will cost. Some estimates are rough and are, therefore, reported as a range while other costs are much more accurate. For projects with much more variable cost projections, a LOW, MEDIUM, HIGH rating was assigned:

- Low: \$0 to \$25,000
- Medium: \$25,000 to \$100,000
- High: \$100,000 to \$500,000
- Very High: \$500,000 or more

PLANNING AND MITIGATION GOALS

Mitigation goals are defined as general guidelines that explain what a community wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing community-wide visions.

The following are the Okanogan County planning and mitigation goals that were listed at the beginning of this plan in Chapter 1. They are included here for reference as the mitigation action items were developed for the purpose of addressing or achieving each goal. The following goals are representative of all adopting jurisdictions:

Planning Goals:

1. This planning process will involve planning for the hazards of Flood, Earthquake, Landslides, Severe Weather, Wildland Fire, Terrorism & Civil Unrest, Dam Failure, Hazardous Materials, and Volcano.
2. Prioritize the protection of people, structures, infrastructure, and unique ecosystems that contribute to our way of life and the sustainability of the local and regional economy in all current and future planning efforts.
3. Additional hazards will be added to this plan as pre-mitigation planning is completed in the future.
4. Establish mitigation priorities and develop mitigation strategies in Okanogan County.
5. Develop and implement planning mechanisms and strategies that include considerations for the protection of animals (including pets, livestock, and other animals) in order to prepare businesses, residents, and other people to care for their animals during disaster events.
6. Meet or exceed the requirements of a FEMA All Hazard Mitigation Plan while creating a plan that is usable and workable for future planning and mitigation purposes.

Mitigation Goals:

7. Educate communities and organizations/agencies about the unique challenges of natural hazard preparedness in the county and encourage and support people to take actions toward readiness and hazard mitigation.
8. Strategically locate and plan infrastructure projects that take into consideration the impacts of natural hazards.
9. Identify and implement an integrated schedule of treatments targeted at reducing losses of all kinds that may be sustained by Okanogan County and the region.

FUNDING SOURCES

All the action items listed in the tables in the following require some kind of funding, whether it be the donation of a person's time or an expensive improvement project. Different types of projects will apply for funding from a variety of sources that cater specifically to accomplishing the goals of the action item. For example, a culvert replacement project may be eligible for funding from the Natural Resource Conservation Service and the Washington Department of Ecology.

Okanogan County, WA Natural Hazard Mitigation Plan 2022

Natural Hazard Mitigation Project Fund-Source Matrix

Common Eligible Projects / Mitigation Programs	Points of Contact Federal / State	Fuels Reduction	Defensible Space	Property Acquisition or Demolition	Property Elevation	Utility Undergrounding	Critical Facility Generator	Vertical Evacuation Structure	Structural Retrofit	Non-Structural Retrofit	Other Infrastructure Retrofit ¹	Water Source Protection or Aquifer Recharge	Slope or Bank Stabilization	Feasibility Study, Mapping, and Design	Planning (Hazard Mitigation or Other)	Flood Risk Reduction Project	Other
BUILD Grants <i>Description:</i> Grants support investments in surface transportation infrastructure and are to be awarded on a competitive basis for projects that will have a significant local/regional impact.	U.S. Department of Transportation (USDOT)								✓		✓					✓	Stormwater Reduction
Building Blocks for Sustainable Communities <i>Description:</i> This EPA program provides targeted, technical assistance to communities to develop resilience plans, development plans, sustainability strategies, etc.	U.S. Environmental Protection Agency (EPA)													✓	✓		
Community Development Block Grants <i>Description:</i> CDBG funds comprehensive plans, limited infrastructure planning/construction, feasibility studies, community action plans. Income and population restrictions apply.	U.S. HUD / WA Department of Commerce								✓		✓			✓	✓		Low-Income Housing
Community Economic Revitalization Board <i>Description:</i> CERB provides loan funding to local jurisdictions for public infrastructure to support private business growth and expansion.	WA Department of Commerce								✓		✓						Public-Private Partnerships
Cooperating Technical Partnership Program <i>Description:</i> The program creates partnerships between FEMA and qualified local and state partners to create, maintain, and publicize up-to-date flood and other hazard maps and data.	Federal Emergency Management Agency (FEMA)													✓	✓		Outreach Data Collection and Analysis
Drinking Water State Revolving Fund <i>Description:</i> The Drinking Water State Revolving Fund (DWSRF) provides loans to drinking water systems to pay for infrastructure improvements. In some cases, partial loan forgiveness is offered.	WA Department of Health / WA Department of Commerce										✓	✓		✓			Drinking Water System Improvements
Emergency Watershed Protection Program <i>Description:</i> Emergency recovery measures for runoff retardation and erosion prevention to relieve imminent hazards created by a natural disaster.	Natural Resource Conservation Service (NRCS)										✓	✓	✓			✓	Erosion Prevention and Restoration
Estuary and Salmon Restoration Program <i>Description:</i> ESRP provides funding restoration and protection efforts in Puget Sound, including projects such as flood storage, erosion control, and climate resilience measures.	Department of Fish and Wildlife (WA DFW)			✓									✓			✓	Salmon Recovery Ecosystem Restoration
Firewise Fuel Mitigation Grant Program <i>Description:</i> The Fuel Mitigation Grant provides a cost share for communities engaged in defensible space and fuels reduction projects.	WA Department of Natural Resources	✓	✓														
Floodplains by Design <i>Description:</i> Floodplains by Design is the primary grant program for projects that reduce flood hazards while restoring the natural functions that Washington rivers and floodplains provide.	WA Department of Ecology			✓							✓	✓	✓	✓	✓	✓	

¹Other Infrastructure Retrofit includes many projects, such as water system seismic upgrades, bridge retrofits, and roadway retrofits.
Washington State Emergency Management – Hazard Mitigation Section – Updated: June 1, 2018

Okanogan County, WA Natural Hazard Mitigation Plan 2022

Natural Hazard Mitigation Project Fund-Source Matrix

Flood Mitigation Assistance Grant Program <i>Description:</i> FMA provides funding to local jurisdictions and states for projects and planning that reduces or eliminates long-term risk of flood damage to structures insured under the NFIP.	FEMA / WA Emergency Management				✓	✓					✓	✓	✓		✓	Advanced Assistance Only	✓	✓	
Hazard Mitigation Grant Program <i>Description:</i> HMGP is authorized statewide after a disaster declaration and is the most flexible of FEMA's three mitigation programs. Jurisdictions must have an approved hazard mitigation plan and projects must be cost effective.	FEMA / WA Emergency Management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	5% Initiative Only	✓	✓	✓	✓			Miscellaneous
Combined Water Quality Funding Program <i>Description:</i> Fund sources for projects associated with publicly-owned wastewater and stormwater facilities. The integrated program also funds nonpoint source pollution control activities.	U.S. EPA / WA Department of Ecology										✓	✓		✓				Drinking Water and Wastewater System Improvements	
Pre-Disaster Mitigation Grant Program <i>Description:</i> Annual program for cost-effective mitigation projects and plans. Jurisdiction must have a current mitigation plan to be eligible.	FEMA / WA Emergency Management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	Miscellaneous
Public Works Board <i>Description:</i> Low-interest loans for pre-construction or new construction for replacement/repair of infrastructure for stormwater, solid waste, road, or bridge projects. Emergency loans are available for public projects made necessary by a disaster or imminent threat to public health and safety.	WA Department of Commerce					✓					✓	✓	✓		✓				
Rural Community Assistance Corporation <i>Description:</i> Water, wastewater, stormwater, and solid waste planning; environmental work; to assist in developing an application for infrastructure improvements for small, rural communities.	Rural Community Assistance Corporation														✓	✓			
Rural Water Revolving Loan Fund <i>Description:</i> The RWLF provides low-cost loans for short-term repair costs, small capital projects, or pre-development costs associated with larger projects to small, rural communities.	National Rural Water Association										✓	✓						Drinking Water and Wastewater System Improvements	
USDA Rural Development Grants <i>Description:</i> Pre-construction planning, design, construction associated with building, repairing, or improving drinking water, solid waste facilities and wastewater facilities in rural communities.	U.S. Department of Agriculture										✓	✓		✓					
Source Water Protection Grant Program <i>Description:</i> Projects and studies to identify solutions to source water protection problems, implement protection plans, or update data that directly benefits source water protection.	WA Department of Health / WA Department of Commerce										✓	✓		✓					
Washington Transportation Improvement Board <i>Description:</i> TIB makes and manages street construction and maintenance grants to 320 cities and urban counties.	Transportation Improvement Board										✓							✓	
Urban and Community Forest Program <i>Description:</i> Program provides technical, financial, research and educational services to local jurisdictions and organizations for the preservation, protection, and restoration of forestlands.	U.S. Department of Agriculture / WA Department of Natural Resources															✓			Natural Resource Protection Public Information and Education

Washington State Emergency Management – Hazard Mitigation Section – Updated: June 1, 2018

MECHANISMS TO INCORPORATE MITIGATION STRATEGIES

The adopting jurisdictions can potentially incorporate mitigation action items into other planning mechanisms; refer to the Planning Mechanisms and Capabilities section in Chapter 1 and to Appendix 4 (Capability Assessments) for more information about other planning mechanisms that could be used to address mitigation concerns. Additional resources that are available to the county are also described in the Funding Sources box in each mitigation action item table.

Okanogan County promotes disaster awareness and preparedness in communities and actively builds resiliency in everyday operations. One strategy that Okanogan County and other adopting jurisdictions will consider, and initiate where possible, is the implementation of plan activities through existing programs and resources. By using existing resources, the cost of mitigation should be reduced, and the likelihood of project initiation and completion should also be greater since more people and resources required to complete the action are already in place.

Through their resolution of adoption as well as their participation in the planning process, each jurisdiction is aware of and committed to incorporating the risk assessments and mitigation strategies contained herein. It is anticipated that the research, local knowledge, and documentation of hazard conditions coalesced in this document will serve as a tool for decision-makers as new policies, plans, and projects are evaluated.

The risk assessment information in this document will be valuable to other planning processes and planning mechanisms in the County. Risk assessment information will either be used to guide other planning processes, or it will be directly integrated into other planning mechanisms. The information in this document will, at the very least, be reviewed as capital improvement plans, infrastructure enhancement projects, training projects, prevention campaigns, and land use and development plans are developed or updated. Although not inclusive, the following is a list of mechanisms available to each jurisdiction for incorporating the mitigation requirements:

Okanogan Conservation District

The Okanogan Conservation District will incorporate this plan into their annual work plan and five-year plan. Funding for mitigation projects may be possible through capital improvements project funding and fees charged to private landowners for services and various types of work.

Cities and Towns

The cities and towns have various plans into which the HMP will be incorporated and through which mitigation projects will be identified. Mutual aid agreements between the cities and resources through the county can be used to implement mitigation strategies and expand response capabilities. The cities and towns can fund portions of mitigation projects internally, but most funding would need to come from the various grants listed in the Funding Sources sections.

Fire Districts and Fire Departments

Okanogan County Fire Districts and Fire Departments can accomplish projects, particularly fuels mitigation projects, through the Community Wildfire Protection Plan (anticipated completion date is end of 2022). Other projects and department or district needs may also be completed or obtained through city, state, or federal departments or programs.

Okanogan County

The county will incorporate information from the HMP into various plans, prevention programs, training programs, and mutual aid agreements. Mitigation projects will be identified through the capabilities listed previously and incorporated into the HMP during the annual reviews and 5-year update.

The Okanogan County Emergency Manager is responsible for informing the Board of Commissioners and other County departments as well as city planners on the contents and incorporation requirements of the Multi-Hazard Mitigation Plan. County Emergency Management and other Planning Team partners should be aware of the risk assessments and mitigation strategies respective to their jurisdictions and include them in the planning processes and discussions for other types of projects as they come up. Okanogan County Emergency Management is responsible for ensuring that each participating jurisdiction as well as other partners has a copy of the Multi-Hazard Mitigation Plan readily available for reference purposes. Furthermore, as previously mentioned, Emergency Management is responsible for annual and 5-year evaluations of the Multi-Hazard Mitigation Plan. The annual meetings will serve a dual purpose of updating the document and reviewing the contents and mitigation requirements of Multi-Hazard Mitigation Plan with the adopting jurisdictions. Members of the Planning Team are also responsible for educating decision-makers in their own jurisdictions on the use and incorporation of mitigation requirements of this document into other planning mechanisms such as those listed above.

MITIGATION ACTION ITEMS

OKANOGAN COUNTY MITIGATION ACTION ITEMS

MULTI-HAZARD

Project ID: OKC-MH-1.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 87.5	\$180,000	This project is new for the 2022 update. Complete by the end of 2023.
Description of the Problem: A loss of electrical power to the EOC will leave County officials unable to manage an incident and communicate to the public.			
Description of the Project: Install external self-standing generator and transfer switch.			
Lead Agency	Okanogan County		
Funding Sources	Local funding, FEMA pre-disaster mitigation grants, hazard mitigation grant program		

Project ID: OKC-MH-2.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 75.0	\$1.3 Million	This project is new for the 2022 update. Complete by the end of the planning cycle.
Description of the Problem: Currently, Okanogan County officials do not have the ability to notify members of the public in outlying areas of the County during emergencies.			
Description of the Project: Install Alert FM as an added Emergency Alert System.			
Lead Agency	Okanogan County		
Funding Sources	FEMA pre-disaster mitigation grants, hazard mitigation grant program, Washington State Legislature Capital Projects appropriation		

Project ID: OKC-MH-3.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 85.7	\$100,000	This project is new for the 2022 update. Complete by the end of 2023.
Description of the Problem: Currently, there is a lack of redundancy with communications for local hospitals, EMS, and County dispatch. As a result, county officials are unable to communicate with hospitals and dispatch during emergencies.			

Description of the Project: Install a Radio system to link hospitals, EMS, and dispatch.	
Lead Agency	Okanogan County
Funding Sources	Local funding, FEMA pre-disaster mitigation grants, hazard mitigation grant program, Washington State Legislature Capital Projects appropriation

Project ID: OKC-MH-4.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	Medium Score: 87.5	\$200,000	This project is new for the 2022 update. Complete by the end of the planning cycle.
Description of the Problem: Emergency Management does not currently have a Command Post vehicle; such a vehicle would allow County officials to communicate and coordinate more effectively on-site at an incident, this is particularly important for the safety of the personnel responding to the incident.			
Description of the Project: Purchase a vehicle that would serve as an on-site command post and allow County officials to support responders during an incident and foster a safe working environment.			
Lead Agency	Okanogan County		
Funding Sources	Local funding, pre-disaster mitigation grants, hazard mitigation grant program		

Project ID: OKC-MH-5.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard: FL, EQ, LS, SW, WF, VO	High Score: 85.7	Low to Medium	This project is new for the 2022 update. It will be evaluated, modified (if necessary), and implemented annually.
Description of the Problem: Natural hazards can disrupt services within and to Okanogan County at any time. Although many hazards can be forecasted, they can occur rapidly and have impacts that range from mild to severe and be localized or regional. As such, it is important that residents be prepared to shelter in place for up to two weeks in the case that a hazard disrupts services and delays emergency responders.			
Description of the Project: Conduct public outreach efforts that focus on emergency scenarios and sheltering in place. A severe hazard event could delay emergency response so residents should have enough supplies in their homes to shelter in place for up to two weeks.			
Lead Agency	Okanogan County		
Funding Sources	Local funding, pre-disaster mitigation grants, hazard mitigation grant program		

Completed Projects:

6.1.h. Complete risk assessments for additional hazards identified in Phase I Profile (completed with 2022 plan update).

6.1.o. Incorporate this All Hazard Mitigation Plan into the Public Utility District's Emergency and Operating Plans.

6.1.q. Assess and hardwire necessary government buildings, emergency facilities, and community shelters for use with a portable generator.

6.1.z. Obtain portable generators for use during power outages and other emergency situations.

6.1.aa. Enhance radio availability in the County, link into existing dispatch, improve range within the region, and conversion to consistent standard of radio types or obtain necessary components to link between existing radio types.

Revised Projects:

6.1.g. Rural signage (road signs and house numbers) improvements across the County (now listed as a CWPP/wildfire project).

6.1.y. Improve primary and secondary emergency routes to address access issues including response, evacuation, and linkages outside the County (now listed as a CWPP/wildfire project).

Deleted Projects:

6.1.a. Continue to develop and implement public education programs (too generic; this effort is reflected in other projects).

6.1.i. Incorporate the Okanogan County All Hazard Mitigation Plan into the Okanogan County Comprehensive Plan, where applicable (insufficient funding and staffing).

6.1.k. Incorporate this All Hazard Mitigation Plan as an element of the Okanogan County Public Health District's Facilities Master Plan (insufficient funding and staffing).

6.1.v. Obtain FEMA "Emergency Evacuation Route" signs to be posted on primary and secondary access routes during an emergency (too much liability -evacuation routes are established as needed and as the circumstances dictate).

FLOOD

Project ID: OKC-FL-1.21			
Hazard	Priority	Cost	Timeline
Flood	High Score: 100.0	Low	This is a continuous effort that will be updated with new milestones as needed.
<p>Description of the Problem: National Flood Insurance Program participation, implementation, and outreach is a priority for Okanogan County. To maximize the effectiveness of the NFIP within the County, measures taken to address flood concerns through the NFIP need to be continuously evaluated.</p>			
<p>Description of the Project: This project table will serve as a placeholder where all needs related to the NFIP will be recorded and updated. The following is the current list of NFIP priorities for the County:</p> <ul style="list-style-type: none"> • Continue participation in National Flood Insurance Program. • Encourage residents to participate in the National Flood Insurance Program. • Continue to work with FEMA to update the Okanogan County Flood Insurance Rate Maps. • Update flood hazard chapter following the adoption of new FEMA Flood Insurance Rate Maps. 			
Lead Agency	Okanogan County Emergency Management		
Funding Sources	Local funding, flood mitigation assistance grant program, cooperating technical partnership program		

Project ID: OKC-FL-2.21			
Hazard	Priority	Cost	Timeline
Flood (Dam Failure)	High Score: 100.0	Low	This project is new for the 2022 update. Hold first meeting by the end of 2022 (Subsequent meetings will be annual?)
<p>Description of the Problem: Communications with officials and other individuals who are knowledgeable of dam safety could be improved. County, city, and town representatives often have questions related to dam operating procedures and dam safety; however, there is no formal group or committee that meets to discuss questions related to dam operations.</p>			
<p>Description of the Project: Establish a dam-hazards committee as a means of communicating with dam officials and identifying and evaluating potential hazards related to dams on the Columbia River.</p>			
Lead Agency	Okanogan County Emergency Management with support from U.S. Army Corps of Engineers and local leadership from any counties, cities, towns, or communities with an interest in dam safety.		
Potential Resources	Local funding, hazard mitigation grant program, block grants		

Completed Projects:

6.1.u. Prepare and maintain a prioritized list of existing undersized culverts that are in need of replacing.

Revised Projects:

6.1.b. Participation in National Flood Insurance Program.

6.1.c. Encourage residents to participate in the National Flood Insurance Program.

6.1.d. Work with FEMA to update the Okanogan County Flood Insurance Rate Maps.

6.1.p. Update flood hazard chapter following the adoption of new FEMA Flood Insurance Rate Maps.

Deleted Projects:

6.1.e. Obtain resources to provide National Flood Insurance Program training to County staff and elected officials (Insufficient funding and staffing).

6.1.f. Obtain resources and materials to develop a National Flood Insurance Program outreach program for local residents (Insufficient funding and staffing).

6.1.i. Develop reach-based mitigation plans for residences already in the floodplain and channel migration zones (Insufficient funding and staffing).

6.1.m. Develop channel migration studies for all rivers in Okanogan County (Insufficient funding and staffing).

6.1.n. Develop a Countywide policy supporting recommendations derived from channel migration studies (Insufficient funding and staffing).

6.1.t. Review all road profiles which are within flood zones to determine degree of road profile rise needed to elevate it above the flood zone (Insufficient funding and staffing).

6.1.w. Develop a Countywide prioritized list of watersheds that require stream bank and channel stabilization and/or restoration (Insufficient funding and staffing).

EARTHQUAKE

Project ID: OKC-EQ-1.21			
Hazard	Priority	Cost	Timeline
Earthquake	Medium Score: 87.5	Low to Medium	This project is new for the 2022 update. Phase 1: Complete project scoping by 2024 Phase 2: Initiate plan development by 2026
Description of the Problem: Should the Cascadia earthquake take place, a significant portion of the population on the west side of the state will be displaced. Those people will head east to look for shelter and resources. How should Okanogan County respond to that situation?			

<p>Description of the Project: Develop a response plan to the Cascadia earthquake that addresses local impacts as well as the potential for a significant influx of people coming from the west side of the state. The Eastern Oregon earthquake evacuation plans may provide some guidance.</p> <ul style="list-style-type: none"> Phase 1: Scoping the project -determine what type of information should be included and if the eastern Oregon plan, or any other existing plan, can serve as a template. Phase 2: Based on finding from phase 1, initiate plan development 	
Lead Agency	Okanogan County Emergency Management with support from State of Washington officials, officials who developed eastern Oregon plan, local emergency response personnel
Funding Sources	Local funding, pre-disaster mitigation grant program, hazard mitigation grant program, building blocks for sustainable communities, community development block grants

Project ID: OKC-EQ-2.21			
Hazard	Priority	Cost	Timeline
Earthquake	Medium Score: 100.0	Low	This project is new for the 2022 update. Participate in trainings that are offered during this planning cycle (2022-2027)
<p>Description of the Problem: The Cascadia earthquake will be a major event that impacts the entire Pacific Northwest (either directly or indirectly). The scope of impacts is so broad and complex that it would be beneficial for Okanogan County to begin participating in Washington State training exercises.</p>			
<p>Description of the Project: Participate in Region 7/Cascadia exercises hosted by the state. These exercises will provide some insight on what the county could expect to happen after the Cascadia earthquake.</p>			
Lead Agency	Okanogan County Emergency Management		
Funding Sources	Funding or cost-share from Washington State		

Deleted Project:

6.1.r. Inspect buildings, particularly un-reinforced masonry, for hazard stability (project is no longer needed at this time).

LANDSLIDE

Project ID: OKC-LS-1.21			
Hazard	Priority	Cost	Timeline
Landslide	Low Score: 88.9	Low to High	This project is new for the 2022 update. Phase 1: Complete by the end of 2022 Phase 2: Begin to plan possible mitigation measures by the end of the planning cycle (2016)
<p>Description of the Problem: There are some stretches of highway in the county that are affected by landslides or rockslides at a greater frequency. Slope failures that occur above the highway often results in the deposition of debris on the road surface while slope failures below the highway can result in major damage to the road.</p>			
<p>Description of the Project: Identify areas in the county where landslides/rockslides are recurring issues; this is of particular concern along highways.</p> <ul style="list-style-type: none"> • Phase 1: Determine if the highway district already has a working inventory and, if not, begin to lay out steps for the creation of an inventory. • Phase 2: Identify any meaningful actions that can be taken to reduce landslide risk or reduce the impacts that landslides have in problem areas. 			
Lead Agency	Okanogan County Highway District with support from Okanogan County Emergency Management, Washington State Department of Transportation		
Funding Sources	Local funding, Washington transportation improvement board, pre-disaster mitigation grant program, hazard mitigation grant program		

Project ID: OKC-LS-2.21			
Hazard	Priority	Cost	Timeline
Landslide	Low Score: 81.8	Low to Medium	New for the 2022 update. Complete by the end of 2022
<p>Description of the Problem: Much of Okanogan County is characterized by steep, rugged terrain which creates safety concerns regarding new develop; new develop and residences within wildland areas of the county has increased significantly in recent years. Current guidelines for building in these areas may be inadequate and should be reviewed and/or revised.</p>			
<p>Description of the Project: Review/revise current guidelines or create guidelines for development in landslide hazard areas. Work with Planning and Zoning to determine what the current guidelines and develop new guidelines if the current set is inadequate.</p>			
Lead Agency	Okanogan County Emergency Management with support from Okanogan County Planning and Zoning		
Funding Sources	Local funding, pre-disaster mitigation grant program, hazard mitigation grant program		

SEVERE WEATHER

Refer to the Multi-Hazard project section (above) for projects that address issues related to severe weather hazards. The following table is a placeholder for any future projects related to severe weather.

Project ID: OKC-SW-1.21			
Hazard	Priority	Cost	Timeline
Severe Weather	Score:		
Description of the Problem:			
Description of the Project:			
Lead Agency			
Potential Resources			

Deleted Projects:

6.1.s. Inspect schools and other public buildings for snow-load resistance and retrofit as necessary (Insufficient funding and staffing).

WILDLAND FIRE**CATEGORY A: PLANNING AND POLICY**

Project ID: OKC-WF-1.21A				
Wildland-Urban Interface Practices & Standards				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 90.0	Low to Medium	1,2,4	Revised for the 2022 update; this project is being continued from the previous planning cycle.
Description of the Problem: Currently, the County and municipalities have no regulations requiring fire resistant construction and retrofitting of built structures and planned developments. The WA State Legislature has mandated adoption of minimum requirements for buildings in mapped Wildland Urban Interface areas and all jurisdictions will soon be required to comply. Additional requirements should be considered for community safety and resilience of life, property and economic health of individuals, businesses, and governments.				
Description of the Project: Adopt and enforce requirements for, but not limited to, the following: <ul style="list-style-type: none"> • State WUI requirements in high-risk WUI areas on existing structures and new construction • Adequate ingress/egress/access capability for residents and personnel & emergency equipment • Installation of underground power lines with new home and business construction 				

	<ul style="list-style-type: none"> • Maintenance of defensible space in Home Ignition Zones 1-3 • Use & maintenance of fire-resistant landscaping & plants
Lead Agency	County Commissioners, County and Municipal Planning and Building departments with support from Fire Districts/Departments (education); OCPUD, OCEC, NVEC
Funding Sources	Local funding, pre-disaster mitigation grants, Firewise fuel mitigation grant, Washington DNR, community development block grants

Project ID: OKC-WF-2.21A				
County Burn Ban Policy				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 100.0	Low	1,2,4	New action item for 2022; to be completed by the end of 2022
Description of the Problem: Jurisdictional burn ban decisions and information access are inconsistent and confusing to the public across the County.				
Description of the Project: Work toward consistency and easy access to information about burn bans across the county by: <ul style="list-style-type: none"> • Developing a consistent burn ordinance to enforce burning permits and fire restrictions throughout the County through a meeting in 2021. • Implementing a coordinated burn restriction system to allow residents and visitors to quickly find related information. 				
Lead Agency	Okanogan County EMD & DNR with support from USFS, BLM, WDFW, City and County Planning Departments, Okanogan County Sheriff's Department, Fire Districts and Departments, County Commissioners			
Funding Sources	Local funding, pre-disaster mitigation grants, Washington DNR			

Project ID: OKC-WF-3.21A				
Interagency Cooperation & Information Sharing				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 100.0	Low	1,2,3,4, 5,6	Revised action item for 2022; this project is ongoing so the next phase will be completed by the end of 2022
Description of the Problem: Wildfire-related problems & solutions are complex and multi-jurisdictional. Sharing knowledge & resources can improve efficiency & effectiveness of needs assessment, planning and solution implementation.				
Description of the Project: Continue or initiate participation in the following collaboratives: <ul style="list-style-type: none"> • the Washington Prescribed Fire Council, • Washington Fire Adapted Communities Learning Network, 				

	<ul style="list-style-type: none"> local fire adapted community development organizations, and Okanogan River Airshed Partnership.
Lead Agency	Washington RC & D, Colville Tribes, community organizations with support from County Commissioner's Office, Okanogan County Fire Districts, WDFW, USFS, DNR, & BLM, Okanogan CD, municipalities
Funding Sources	Local funding, Washington DNR, and other participating agencies

Project ID: OKC-WF-4.21A				
Incorporation of CWPP Into Other Planning Mechanisms				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 100.0	Low	1,2,7	Revised action item for 2022; plans will be integrated as they are reviewed or updated. This should be completed by the end of the planning cycle (2027).
<p>Description of the Problem: In the interest of aligning the wildfire mitigation objectives of the different CWPP planning partners and stakeholders, the CWPP should be incorporated into or referenced in appropriate planning partner and stakeholder planning mechanisms. <i>THIS IS CRITICAL AND HAS NOT BEEN DONE, TO-DATE.</i></p>				
<p>Description of the Project: The CWPP will be incorporated into the following documents the next time they are updated or revised:</p> <ol style="list-style-type: none"> Okanogan County Comprehensive Plan The "Emergency Preparedness and Contingency Plans" belonging to all utility companies. Fire District annual operating or strategic plans Okanogan Conservation District annual work plan and 5-year plan Okanogan Long Term Recovery Group operating or strategic plans Methow Valley Long Term Recovery Group operating or strategic plans Municipality planning mechanisms (those that are relevant) Local Fire Adapted Community organization operating or strategic plans 				
Lead Agency	1) OCPUD, OCEC, NVEC; 2) Fire Districts; 3) OCD; 4) OCLTRG; 5) MVLTRG; 6) All municipalities; 7) Local FAC organizations with support from Okanogan County Department of Emergency Management			
Funding Sources	Local funding, pre-disaster mitigation grant, building blocks for sustainable communities, community development block grants			

Project ID: OKC-WF-5.21A				
Dissemination of Information & Emergency Notifications to the Public				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score: 100.0	Low	1,2,3,4, 5,6	This project is on-going so the next phase will be completed by the end of 2022
<p>Description of the Problem: Residents and visitors need pre-planning, situational awareness, timely guidance, and safe options during wildfires, when they may need to evacuate their home/location. Timely and accurate information alerts from the County's EMD are an essential baseline solution, and more forms of alert and guidance, as well as options for safe emergency shelter are needed.</p>				
<p>Description of the Project: Work with county & municipal planning departments, HOAs and community organizations to identify highest priority needs for improved availability and distribution of evacuation/sheltering information, personal planning assistance, and development of safe shelter options; and begin developing and implementing highest priority solutions.</p>				
Lead Agency	County Emergency Manager with support from Okanogan County Fire Districts, County & municipal Planning Depts, local community organizations, USFS, DNR, BIA, and BLM, OCD			
Funding Sources	Local funding, participating agencies			

Project ID: OKC-WF-6.21A				
Mapping of County Water Sources				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 100.0	Low	1,2,4	Revised for 2022; this project will be completed by the end of 2022
<p>Description of the Problem: County water sources that are used for firefighting have not been adequately compiled or mapped.</p>				
<p>Description of the Project: Map onsite water sources such as hydrants or underground storage tanks and drafting or dipping sites. Compiling this information using GIS will ease and simplify database maintenance procedures and provide a means through which the data can be accessed rapidly for firefighting purposes.</p>				
Lead Agency	Fire Districts with support from County GIS, DNR (water sources), Emergency Management			
Funding Sources	Local funding, pre-disaster mitigation grant, building blocks for sustainable communities, community development block grants			

Project ID: OKC-WF-7.21A				
Maintenance of GIS Systems & Data				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score: 100.0	Low	1,2,4	New for 2022. Project is on-going so the next phase will be completed by the end of 2022
<p>Description of the Problem: GIS datasets that are used for the purposes of evaluating wildfire threats and risk need to be continuously updated to ensure that the best information is available to Okanogan County officials. New datasets, models, and mapping techniques are released regularly; the county should be aware of these tools and evaluate their utility to addressing wildfire concerns.</p>				
<p>Description of the Project: Continue to update and verify GIS information is accurate throughout the County.</p>				
Lead Agency	County Planning with support from County Commissioners, Fire Districts			
Funding Sources	Local funding, pre-disaster mitigation grant, building blocks for sustainable communities, community development block grants			

Project ID: OKC-WF-8.21A				
Expansion of Fire Districts				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score: 55.6	Low to High	1,2,4	This project will continue in 2022 and be completed by the end of 2023.
<p>Description of the Problem: The number of homes and other structures in wildland areas in Okanogan County continues to increase every year. As more homes are built, the level of wildfire protection in the county will need to be increased.</p>				
<p>Description of the Project: Continue to expand the Fire Districts so they encompass both growing communities and new communities.</p>				
Lead Agency	County Planning with support from County Commissioners, Fire Districts			
Funding Sources	Local funding, participating agencies			

CATEGORY B: EDUCATION AND OUTREACH

Project ID: OKC-WF-1.21B				
Dissemination of Fire-Awareness Information to Residents & Property Owners				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score: 100.0	Low	1,2,3	On-going throughout the current planning cycle; maintain in 2022.
Description of the Problem: Many property owners, especially people new to living in our fire-prone ecosystem, have an inadequate understanding of what is required for themselves and neighbors to live here safely. More ways are needed to reach them with information.				
Description of the Project: Distribute information about wildfire preparedness and emergency actions and services with building permit requests.				
Lead Agency	County Building Department with support from Emergency Management, County Commissioners and incorporated cities of Oroville, Tonasket, Riverside, Omak, Okanogan, Conconully, Nespelem, Elmer City, Coulee Dam, Brewster, Pateros, Twisp, and Winthrop.			
Funding Sources	Local funding, Washington DNR, Firewise, pre-disaster mitigation grants			

Project ID: OKC-WF-2.21B				
Rural Signage Improvements				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score: 100.0	Low to High	1,2,4	On-going throughout the current planning cycle; maintain in 2022.
Description of the Problem: Missing, damaged, faded, or covered address signs make it difficult for emergency responders to locate homes and properties in emergency situations. This is particularly problematic in low-light and/or smokey conditions.				
Description of the Project: Continue rural signage (road signs & house numbers) improvements across the County.				
Lead Agency	County Planning Department with support from County Commissioners and Sheriff's Office, Okanogan County Long Term Recovery Group			
Funding Sources	Local funding, participating groups, pre-disaster mitigation grant program			

Project ID: OKC-WF-3.21B				
Programs and Assistance for Private Landowners				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 80.0	Low to High	1,2,3,	Revised for 2022; this project is on-going so the next phase will be completed in 2022
<p>Description of the Problem: Risk mitigation is essential on all lands in Okanogan County, including private properties, because wildfire does not respect boundaries. Private landowners need information and assistance re: fire behavior, risks they are responsible for as property owners, mitigation steps and mitigation resources. Particular attention is needed to equitable solutions for low-income, elderly and other vulnerable residents who are unable to conduct, pay for &/or manage mitigation projects on their properties.</p>				
<p>Description of the Project: Implement fire prevention, education and mitigation programs and projects including, but not limited to, the following:</p> <ul style="list-style-type: none"> • Wildfire information for communities and individuals including: fire behavior; building, landscaping & defensible space maintenance standards and requirements; emergency alerts and evacuation. Distribute information through avenues such as: realtors, developers, building designers, builders, visitor centers, insurance agencies. • Wildfire risk assessments for homes, private landscapes including forest, and for developments and neighborhoods. • Cost-share programs for mitigation treatments in Home Ignition Zones 1-3. • Chipping programs and periodic free green waste disposal periods for residential properties. • Equitable Mitigation Program(s) to provide mitigation services to residents without the means to conduct, pay for and/or manage treatments on their properties. • Mitigation assistance to HOAs & neighborhoods to attain & maintain Firewise USA® recognition. • Mitigation assistance to municipalities & other public & private entities with properties essential to community services. 				
Lead Agency	County Emergency Manager, Okanogan Conservation District, WA DNR, Fire Districts, local Fire Adapted Communities & equivalent organizations with support from USFS, BIA, BLM, school districts, municipalities, businesses & community organizations, County LCG(?) / County Commissioner's (Title 3), FEMA Mitigation; local and other philanthropy			
Funding Sources	Local funding, participating agencies and groups, Firewise fuel mitigation grant program			

CATEGORY C: CAPACITY BUILDING

Project ID: OKC-WF-1.21C			
Collaboration & Coordination Between Wildfire Stakeholder Organizations			
Hazard	Priority	Cost	Timeline
Wildfire	High Score: 100.0	Low	Ongoing; this project will be started by the end of 2022 and occur regularly.
<p>Description of the Problem: Wildfire adaptation requires an “all hands” effort between public and private entities across Okanogan County. Ongoing collaboration is required in order to build & maintain trusted relationships that are needed when disaster strikes. Broader & more consistently supported collaborative efforts will also increase the pace, scale, and effectiveness of local wildfire resiliency actions.</p>			
<p>Description of the Project: Conduct quarterly meetings of wildfire stakeholder organizations to bolster ongoing efforts to increase wildfire resiliency in Okanogan County. Establish a set agenda that encourages progress on planning, education, and mitigation projects. Meetings would likely include discussions about project design, funding, partnership, and implementation, along with information sharing. All efforts will be made to ensure that a wide range of perspectives are included at meetings, with the intention of equitable implementation of wildfire resiliency projects across the county.</p>			
Lead Agency	Okanogan Conservation District (?) with support from WA DNR -if they are funding a “County FAC Coordinator” as specified in DNR’s Wildland Fire Protection 10 Yr Strategic Plan, because if there is a County FAC Coordinator (e.g. within OCD), that person would be the logical person to lead the required quarterly meetings		
Support Organizations	Fire Districts, local fire adapted community organizations, long term recovery organizations, coordinators of fire adapted neighborhoods, USFS, WA DNR, WDFW / funders??		
Funding Resources	Local funding, participating agencies and groups, Firewise fuel mitigation grant program		

Project ID: OKC-WF-2.21C			
Youth Job Corps Development			
Hazard	Priority	Cost	Timeline
Wildfire	H/M/L? Score: 77.8	Medium to High	New project for 2022 update. Phase 1 to be implemented by the end of 2022
<p>Description of the Problem: Local youth need more job training opportunities, and more skilled wildfire mitigation personnel are needed throughout the County.</p>			
<p>Description of the Project: Develop mechanisms for engaging local youth at multiple age levels in opportunities for learning about fire, mitigation, and general work skills. Develop a job corps for the pre-professional level of training and field work.</p> <ul style="list-style-type: none"> • Phase I: Research existing models of youth job corps-type programs; evaluate local applicability; identify recommendations & next steps for local development. 			

Lead Agency	Western WA University faculty & students, Fire Adapted Methow Valley, Room One, Methow Ready, Methow at Home, Independent Learning Center with support from WWU Sustainability Planning Studio class project - Summer 2022
Funding Sources	Local funding, participating agencies and groups

Project ID: OKC-WF-3.21C				
Firefighter Retention Program				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 75.0	Low to High	1,2,3	Revised for 2022; this project will be completed by the end of 2022
<p>Description of the Problem: It is difficult to retain firefighters long-term. Substantial investments are made in training and equipping firefighters, yet the “turnaround” on recruits, particularly volunteers, is high. Retaining trained, knowledgeable, and experienced firefighters would be extremely valuable to firefighting efforts in Okanogan County.</p>				
<p>Description of the Project: Develop a firefighter retention plan for Okanogan County. The following points may be considered during the development of the plan:</p> <ul style="list-style-type: none"> • Identify common reasons for firefighter departure as well as the average length of service before departure (consecutive seasons worked as a firefighter). • Explore options for addressing common factors that contribute to high rates of firefighter turnover. Consider surveying firefighters about the effectiveness of these options. • Develop and implement firefighter retention program and continue to monitor firefighter turnover for improvements in retention. 				
Lead Agency	Fire Districts with support from County GIS, DNR (water sources), Emergency Management			
Funding Sources	Local funding, participating agencies and groups			

Project ID: OKC-WF-4.21C				
Expansion of Firefighter Training				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 100.0	Low	1,2,4	Revised for 2022; this project will be completed by the end of 2022
<p>Description of the Problem: Current training practices for firefighters in the county is adequate, but it could be improved. Other training methods, techniques, and opportunities need to be explored and pursued.</p>				

<p>Description of the Project: Find other opportunities for firefighting training and identify other skills and capabilities that need to be emphasized during training exercises. The following are general steps that will be taken for improving and expanding training opportunities:</p> <ol style="list-style-type: none"> 1. Evaluate current firefighter training practices and identify skills and capabilities that need to be further promoted and developed. Develop a set of firefighter training goals. 2. Identify interested individuals who would benefit from such training. 3. Look for training events that would help achieve the identified training goals. 	
Lead Agency	Fire Districts with support from County Commissioners
Funding Sources	Local funding, participating agencies and groups

Project ID: OKC-WF-5.21C				
Evaluation & Expansion of Radio Capabilities				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 54.5	Medium to High	1,2,4	This project is continuously being evaluated. Opportunities will be discussed and explored at annual updates.
<p>Description of the Problem: Radio capabilities in the county can always be improved through the expansion of communications infrastructure or by upgrading communications equipment.</p>				
<p>Description of the Project: Enhance radio availability in each district, link into existing dispatch, improve range within the region, and conversion to consistent standard of radio types.</p> <p><u>Work Completed as of 2013:</u> Installed a repeater in the northern portion of the county – allows fire departments to use fire tactical response frequencies and not mobile-to-mobile.</p> <p>Enhanced delivery of information to the first responders – delivers detailed description of the event to cell phone or email.</p> <p>Preparing and installing preidentified response plans into the dispatch communications system – allows dispatchers to dispatch specific sets of responders to specific incidents or locations – 2nd half 2013.</p> <p>Completed narrowbanding for the entire county.</p>				
Lead Agency	Mike Warden, Okanogan County Dispatch with support from Dispatch Advisory Board, Communications Center			
Funding Sources	FEMA pre-disaster mitigation grants, Washington State Legislature Capital Projects appropriation			

Project ID: OKC-WF-6.21C				
Okanogon County Fire Training Facility				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 50.0	High to Very High	1,2,4	Revised for 2022; this project will be completed by the end of 2022
<p>Description of the Problem: Currently, the county does not have the ability to offer certain types of advanced training to firefighters. The county does not own a facility with the equipment required to offer such training.</p>				
<p>Description of the Project: Construct a centralized Okanogon County fire training center. The training center would include large, modern classroom(s) and a training burn tower for more advanced, hands-on training in operations and tactics.</p>				
Lead Agency	Fire Districts with support from County Commissioners			
Funding Sources	Local funding, FEMA pre-disaster mitigation grants, Washington DNR			

Project ID: OKC-WF-7.21C				
Okanogon County Fire Marshal				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 77.8	Medium	1,2,4	This project is on-going as it is funding dependent; to be evaluated again in 2022
<p>Description of the Problem: Okanogon County would benefit from having a fire marshal employed full time. <i>The Fire Marshal's Office would provide safe livable environments through inspections, investigations, and education*</i>.</p> <p>*Modified language from the Snohomish County Website (https://snohomishcountywa.gov/1113/Fire-Marshal)</p>				
<p>Description of the Project: Hire a County Fire Marshal. <i>The Okanogon County Fire Marshal would be responsible for assuring fire and life safety, and for reducing the risk of fire loss to the lives and property of the citizens of Okanogon County. The Fire Marshal would represent a vital communication link between the fire districts, county, and state government*</i>.</p> <p><i>The Okanogon County Fire Marshal's Office would conduct annual fire and life safety inspections, conduct fire and arson investigations, provide plan review for land use and commercial construction, and issue permits for firework displays, fireworks stands, and special events*</i>.</p> <p>*Modified language from the Snohomish County Website (https://snohomishcountywa.gov/1113/Fire-Marshal)</p>				
Lead Agency	County Commissioners with support from Fire Districts			
Funding Sources	Local Funding			

Project ID: OKC-WF-8.21C				
Creation of Tunk Valley Fire District				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 77.8	Low to High	1,2,4	This project is on-going so the next phase will be completed by the end of 2022
<p>Description of the Problem: As communities expand and populations increase in Okanogan County, demand for fire protection has also increased. Fire district resources may be spread too thin if populations and development expand beyond current capacities.</p>				
<p>Description of the Project: Create a new Okanogan County Fire District in Tunk Valley. The new district will require a facility, business plan, MOUs, and basic firefighting equipment.</p> <p><u>Work completed as of 2013:</u> Developed informal fire brigade and water system</p>				
Lead Agency	Fire Districts with support from County Commissioners			
Funding Sources	Local funding, FEMA pre-disaster mitigation grants, Washington DNR			

Project ID: OKC-WF-9.21C				
Inventory & Replace Firefighting Equipment				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 100.0	Low to High	1,2,4	This project is on-going so the next phase will be completed by the end of 2022
<p>Description of the Problem: Firefighting equipment receives a significant amount of wear from year to year. As equipment becomes worn, outdated, or expires it should be replaced and/or upgraded.</p>				
<p>Description of the Project: Inventory the safety equipment and personal protective equipment for all Fire Districts in Okanogan County and replace or upgrade equipment where necessary.</p>				
Lead Agency	Fire Districts with support from County Commissioners			
Funding Sources	Local funding, Washington DNR, FEMA pre-disaster mitigation grants			

Project ID: OKC-WF-10.21C				
Participation in State & Federal Firefighting Programs				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 100.0	Low	1,2,4	This project is on-going; the next opportunities to participate in such programs will be identified by the end of 2022.

Description of the Problem: There are many funding opportunities related to firefighting through State and Federal government programs. Funding opportunities may be missed if Okanogan County is not fully involved with these programs.	
Description of the Project: Support the maintenance and/or enhancement of State and Federal firefighting programs and resources in Okanogan County	
Lead Agency	Fire Districts with support from County Commissioners
Funding Sources	Local funding, Washington DNR, FEMA pre-disaster mitigation grants

CATEGORY D: MITIGATION

Project ID: OKC-WF-1.21D				
Treatment of Vegetation Around Critical Infrastructure				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 70.0	Low to High	1,2,4,5,6	This project is a continuous effort so additional treatment areas will be identified and addressed each year.
Description of the Problem: Vegetation encroaching on critical infrastructure needs to be periodically treated in order to maintain appropriate spacing. Critical infrastructure could become impassable, damaged, or destroyed and services may be disrupted because of wildfire if vegetation is not treated.				
Description of the Project: Create and maintain defensible space around critical infrastructure: <ol style="list-style-type: none"> 1) Identify critical infrastructure in need of fuels treatments 2) Thin vegetation and widen PUD and Okanogan Electric Co-op transmission lines in high-risk areas 3) Conduct outreach and provide assistance for mitigation of hazards on private properties immediately surrounding critical infrastructure. 				
Lead Agency	1) County Emergency Management; 2) Okanogan County Public Utilities District, Okanogan County Electric Co-op, NVEC with support from County Commissioners, incorporated cities, Okanogan County Public Utilities District, adjacent landowners			
Funding Sources	Local funding, Washington DNR, Firewise Fuel Mitigation Grant Program			

Project ID: OKC-WF-2.21D			
Purchase Woodchippers			
Hazard	Priority	Cost	Timeline
Wildfire	Medium Score: 77.8	High	New project for 2022 update. Complete by 2022-2023

Description of the Problem: Chipping is a necessary part of many fuel reduction projects. Additional publicly owned chippers are needed to support mitigation treatments on residential and municipal properties.	
Description of the Project: Obtain chippers to be housed & shared throughout the county, and subsidize community training, operation & maintenance.	
Lead Agency	County Public Works Department with support from Municipal Public Works Departments / WA Dept of Ecology, DNR?
Funding Sources	Local funding, Washington DNR, Firewise Fuel Mitigation Grant Program

Project ID: OKC-WF-3.21D				
Treatment of Vegetation Along Primary & Secondary Roads				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 88.9	Low to Medium	1,2,4,5, 6	Revised for 2022; this project will be completed by the end of 2022
Description of the Problem: Vegetation encroaching on primary and secondary roads needs to be periodically treated in order to maintain appropriate spacing. Roads need to be able to accommodate two-way traffic and larger emergency response vehicles; vehicles need to be able to pass safely during wildfires or other emergency situations.				
Description of the Project: Eliminate or thin, as needed, fuels along the primary and secondary access routes in the County to ensure these routes can be accessed in the case of an emergency				
Lead Agency	County Public Works and Washington Department of Transportation with support from County Commissioner's Office, USFS, DNR, BIA			
Funding Sources	Local funding, Washington DNR, Firewise Fuel Mitigation Grant Program			

Project ID: OKC-WF-4.21D				
Alternate Escape Routes & Dead-End Roads				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score: 54.5	Medium to High	1,2	Revised for 2022; this project will be completed by the end of 2022
Description of the Problem: There are many rural communities located across the rugged terrain in Okanogan County. Because of terrain limitations, these communities are often connected to limited road systems that may feature numerous dead-end roads and few options for escape routes.				
Description of the Project: Identify and maintain alternate escape routes in rural communities and support the connection of dead-end roads, where feasible.				

Lead Agency	Okanogan County Commissioners with support from County Public Works, County Planning Department, USFS, BLM, DNR, BIA
Funding Sources	Local funding, Washington DNR, pre-disaster mitigation grants, Firewise

Project ID: OKC-WF-5.21D				
Evaluate Roads for Emergency Vehicle Access				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 100.0	Low to High	1,2	Revised for 2022; this project will be completed by the end of 2024
<p>Description of the Problem: Road and road-feature designs, specifications, and conditions can also restrict access of large emergency response vehicles and resident/visitor evacuation. This could be a major issue during an emergency response situation. These issues may concern both public and private roads.</p>				
<p>Description of the Project: Identify and prioritize existing problems and improve access for fire response, including bridges, cattle guards, culverts, and limiting road surfaces/designs.</p> <ul style="list-style-type: none"> Phase 1: Identify roads or road infrastructure that need improvements for the purposes of emergency vehicle access and/or evacuation egress. Phase 2: Explore viable options for resolving road-issues (e.g. implementing codes or standards for road construction) and identify any limitations to implementing road improvement projects (e.g. issues or concerns with private roads). Phase 3: Implement improvements to resolve ingress/egress issues. 				
Lead Agency	County Public Works with support from County Commissioners, State of Washington (Lands and Transportation), USFS, DNR, BIA, OCOG			
Funding Sources	Local funding, Washington DNR, pre-disaster mitigation grants, Firewise			

Completed Projects:

6.1.i: Incorporate the Okanogan County Community Wildfire Protection Plan into the Okanogan County Comprehensive Plan, where applicable.

OKC 6.4k (CWPP): Obtain an urban interface apparatus for the Methow station, a rescue apparatus for the Pateros station, and update aging brush trucks on Okanogan County Fire District #15.

OKC 6.4o (CWPP): Obtain newer structural engine and thermal imager for Okanogan County Fire District #4.

OKC 6.4aa (CWPP): Obtain a newer pumper truck and extrication vehicle and equipment for the Town of Winthrop Volunteer Fire Department.

Chapter 6: Mitigation Strategy

OKC 6.4ab (CWPP): Begin locating sites for future development of at least three all weather water storage facilities in the Tunk Valley.

OKC 6.4ac (CWPP): Facility, land, and basic equipment for a new fire hall for the Town of Winthrop Volunteer Fire Department.

Revised Projects:

6.1.a. Adopt State WUI requirements in high-risk WUI areas on existing structures and new construction.

6.1.b: Distribute wildfire and emergency services awareness info with building permit requests.

6.1.c: Continue rural signage (road signs & house numbers) improvements across the County.

6.1.d: Develop policy to require new home and business construction to install underground power lines.

6.1.e: Work towards developing a consistent burn ordinance to enforce burning permits and fire restrictions throughout the County through a meeting in 2021.

6.1.g: Continue support of the Washington Prescribed Fire Council, Washington Fire Adapted Communities Network, Okanogan River Airshed Partnership.

6.1.h: Incorporate this Community Wildfire Protection Plan into all Utility Companies' "Emergency Preparedness and Contingency Plans".

6.1.j: Adopt stringent regulations to ensure fire-safe development of rural subdivisions (see FIREWISE or similar programs for specific recommendations).

6.1.x. Continue the vegetation management program that includes, but is not limited to thinning and clearing brush and other vegetation from under and adjacent to transmission and distribution lines.

6.2.a: Implement Community and Individual Wildfire Educational Programs

6.2.b: Wildfire risk assessments of homes in identified neighborhoods Conduct on-site wildfire risk assessments of homes countywide.

6.2.c: Provide and support cost share programs for home ignition zone treatments

6.2.g: Develop community evacuation plans and alternate safety zones/ shelter-in-place.

6.2.h: Coordinated burn restriction system to allow residents to quickly find related information.

6.2.i: Encourage and assist communities to attain Firewise USA® recognition.

6.3.b: Thin vegetation and widen PUD and Okanogan Electric Co-op transmission lines in high-risk areas.

6.3.c: Create and maintain defensible space around critical infrastructure.

6.3.d: Maintain alternate escape routes and support connection of dead end roads, where feasible.

6.3.e: Identify and improve access for fire response, including bridges, cattle guards, culverts, and limiting road surfaces/designs.

6.3.f: Mitigation fuels along the primary and secondary access routes in the County to ensure these routes can be accessed in the case of an emergency.

6.4.a: Enhance radio availability in each district, link into existing dispatch, improve range within the region, and conversion to consistent standard of radio types.

6.4.b: Work to retain volunteer firefighters and share how they are doing it with other fire departments

6.4.c: Map onsite water sources such as hydrants or underground storage tanks and drafting or dipping sites.

6.4.d: Increase training and capabilities of firefighters.

6.4.f: Centralized Okanogan County fire training center to include large, modern classroom and training burn tower for more advanced, hands on training in operations and tactics.

6.4.q: Facility, business plan, MOUs, and basic equipment for a new Okanogan County Fire District in Tunk Valley.

6.4.s: Hire a County Fire Marshal

6.4.t: Improve safety equipment and personal protective equipment for all Fire Districts in Okanogan County.

6.4.af: Support the maintenance and/or enhancement of State and Federal firefighting programs and resources in Okanogan County.

6.4.an: Continue to update and verify GIS information is accurate throughout the County.

6.4.ao: Continue to expand the Fire Districts to encompass more communities.

Deleted Projects:

6.1.f: Develop policy on adoption of WUI Code.

6.2.d: Initiate an incentive based promotional program for community defensible zone treatments in rural subdivisions or housing clusters.

6.2.e: Maintenance of home site defensible space treatments

6.2.f: Re-entry of home site defensible space treatments

6.3.a: Post "Emergency Evacuation Route" signs along the identified primary and secondary access routes.

6.3.g: Install a municipal water system in the Town of Conconully.

VOLCANO

Refer to the Multi-Hazard project section (above) for projects that address issues related to volcanic hazards. The following table is a placeholder for any future projects related to volcanic activity.

Project ID: OKC-VO-1.21			
Hazard	Priority	Cost	Timeline
Volcano	Score:		
Description of the Problem:			
Description of the Project:			
Lead Agency			
Potential Resources			

HAZARDOUS MATERIALS

Project ID: OKC-HM-1.20			
Hazard	Priority	Cost	Timeline
HAZMAT	Medium Score: 100.0	Low to Medium (TBD-staff, backfill, location, facilitators)	This project is new for the 2022 update. Ok OEM and stakeholders prepare and submit training needs (training and exercise forecast worksheet) to the WA EMD Training Program prior to the State Training and Exercise Planning Workshop, Spring 2022
Description of the Problem: HAZMAT accidents pose risks to first responders and public. Propane storage and distribution and fuel trucks are the most likely to be encountered HAZMAT risk in the Methow Valley. Agricultural chemicals are also present.			
Description of the Project: Request scenario-based training in the form of a workshop, drill, functional exercise or tabletop be added to the State of Washington Training and Exercise Plan with the purpose of practicing Hazmat Awareness and Hazmat Operations level skills, as well as practicing interagency communications specific to the Methow Valley. Treatment and triage of patients during a Hazmat incident and garnering the participation of Fire, EMS and Law Enforcement entities would foster greater interoperability between agencies and resources. Facilitation of this training can be requested by application to the State Exercise Program.			
Lead Agency	Okanogan County Fire District 6 / Okanogan County Office of Emergency Management with support from Aero Methow Rescue Service, Twisp PD, OK Sheriff's Office, Winthrop Marshal, State Patrol, Ok OEM, MidValley Hospital, Three Rivers Hospital, Lifeline, D-O Fire Dist. 15, Airlift Northwest, OK Fire District 3, WA State Patrol.		

Funding Sources	Local funding, participating agencies, Washington State, FEMA Pre-Disaster Mitigation Grant
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PANDEMIC

Project ID: OKC-PA-1.20			
Hazard	Priority	Cost	Timeline
Pandemic	High Score: 100	Low	This project is new for the 2022 update. Assemble group and conduct first meeting by the end of 2022.
Description of the Problem: COVID-19 presented significant health risks to the residents of Okanogan County and major challenges for health care workers and emergency responders. Because of the severity of the COVID-19 pandemic, there may be questions about the adequacy of current response guidelines and whether or not they should be updated.			
Description of the Project: Recruit County health officials and professionals to participate in an “after action review” type of meeting aimed at evaluating the response to the COVID-19 pandemic. (Kim Jacobs is going to conduct outreach efforts for this project).			
Lead Agency	Okanogan County Public Health with support from Okanogan County Emergency Management, the hospitals, interested cities and towns, emergency responders		
Funding Sources	Local funding, participating agencies		

OKANOGAN CONSERVATION DISTRICT

It should be noted that the Okanogan Conservation District does not have a project for each hazard that received a rating other than “low”. The ratings provided by the Conservation District (CD) reflect the organization’s perspective of hazards in Okanogan County, based on the work they perform, and not a specific need that would serve the interests of the district. The CD is limited by the actions it could implement because of the way that it operates in the County. Therefore, it is most likely that the CD would support other entities in the county as those entities identify and address natural hazards within their jurisdictions.

WILDLAND FIRE

Project ID: OCD-WF-1.21A				
Evaluate Roads for Emergency Vehicle Access				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score: 77.8	Low	1,2	New action item for 2022; to be completed by the end of 2023
<p>Description of the Problem: Emergency personnel close roads around wildfires for the safety of people and to prevent them from impeding fire suppression efforts. When fire threatens large ranching operations, ranchers need to move their livestock out of harm's way and make sure they have feed and water. To help rural communities prepare for wildfire, it would be helpful for farmers and ranchers to have a plan in place to coordinate with first responders.</p>				
<p>Description of the Project: Using the best practices outlined in Publication 8685 (December 2020) by University of California Agriculture and Natural Resources, develop a county-based “Ag Pass” program to identify owner-operators of commercial farms and ranches, along with their employees, to firefighting personnel, law enforcement, and other emergency personnel. Possession of an Ag Pass during a wildfire or similar disaster allows the agriculturalist access to areas that may otherwise be restricted to the public so that the agriculturalist can 1) protect or care for agricultural assets (such as by irrigating crops or feeding, watering, and transporting livestock) or 2) provide auxiliary support to emergency personnel (such as identification of access roads and water points).</p>				
Lead Agency	Okanogan Conservation District with support from EMD, Sheriff, WSU Extension, NRCS/FSA, Okanogan County Cattlemen’s Assoc., other agricultural associations and cooperatives.			
Funding Sources	Local funding, participating agencies			

CITY OF OMAK

MULTI-HAZARD

Project ID: OMA-MH-1.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be on-going; the projects in the HMP/CWPP will be reviewed and updated annually, at minimum, by the assembled committee.
<p>Description of the Problem: Severe natural hazard events that impact Omak could result in financial losses and property damage. Mitigation project exploration and implementation strategies are needed to identify the changing needs of the town for mitigation work.</p>			
<p>Description of the Project: Once a dedicated team has been established, this project will be a continuous effort that addresses evolving natural hazard risk within the town and through which mitigation projects will be developed and implemented. This project captures the commitment of Omak to reviewing, updating, and pursuing the mitigation projects that are included in the hazard mitigation plan (HMP) and community wildfire protection plan (CWPP):</p> <ul style="list-style-type: none"> • Step 1: Identify a committed group of individuals who will meet annually, or as often as is needed, to review the Omak content in the HMP/CWPP (for example, a local LEPC group may handle this task by committing to reviewing the HMP/CWPP at the first meeting of each calendar year). • Step 2: Once a committee is assembled and a meeting schedule has been determined, those individuals will discuss recent hazard events that have affected the town as well as vulnerabilities in the town to those hazards. From that information, the mitigation projects in the HMP/CWPP will be reviewed, revised, and supplemented with new projects as needed. • Step 3: Assign mitigation projects to individuals who will look for and pursue funding opportunities. This person may serve as the lead on the project, but the committee will support their efforts. • Step 4: Update the list of projects or update project status in the HMP/CWPP at the next annual review (for example, the first LEPC meeting of the following calendar year). Wildfire projects should be included in OMA-WF-1.21 (below). <p>These steps will be followed each year to ensure that the City of Omak is actively engaged in identifying hazard areas and performing mitigation work in the town.</p>			
Lead Agency	Mayor, City Council, City Department with support from First Responders, Okanogan County Emergency Management, USFS, WA DNR, Okanogan Conservation District		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program		

Project ID: OMA-MH-2.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard: FL, SW, WF, PA	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be an on-going effort that will occur at least annually.
<p>Description of the Problem: Public education campaigns to promote natural hazard awareness need to be regularly evaluated, updated, and modified based on changing conditions at multiple scales; from the Omak city limits to the greater Pacific Northwest region.</p>			
<p>Description of the Project: A group of individuals will be selected to lead the review, update, and modification of public education and awareness materials related to natural hazards. This group will meet annually, or as often as is needed, to review the City's public outreach and awareness programs and decide if any changes need to be made. Priority items may include the distribution of information related to:</p> <ul style="list-style-type: none"> • Encourage homeowners to participate in the NFIP and provide information about flood mitigation activities (e.g. filling and placing sandbags). • Storm hazards and mitigation measures that can be taken to reduce home damage resulting from severe storms or storm winds. • Encourage residents to have supplies (blankets, flashlights, batteries, food, water, etc.) and plans for sheltering in place. This is particularly important for severe weather events which happen regularly in the county. • Wildland fire hazards and actions that can be taken to reduce fire risk around individual homes and awareness of evacuation notifications and procedures. • Updates related to COVID-19, or pandemics in general, and preparedness/prevention measures that can be taken. 			
Lead Agency	Mayor, City Council, City Department with support from First Responders, USFS, WA DNR, Okanogan Conservation District, Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Firewise Fuel Mitigation Grant Program		

Project ID: OMA-MH-3.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	Moderate Score:	Very High	By the end of the planning cycle (2027)
<p>Description of the Problem: The Central Street Bridge “is a transportation bottleneck -too narrow for today's safety standards. It is an accident risk for vehicles and pedestrians. A recent Rural Transportation study sited lack of pedestrian access to the bridge, is too narrow for large trucks, motor homes, school buses, and emergency vehicles; and adds to downtown congestion.” (https://slideplayer.com/slide/3823659/)</p>			
<p>Description of the Project: Replace Central Street Bridge crossing Okanogan River to standards that meeting the weight rating for emergency response vehicles.</p>			

Lead Agency	Mayor, City Council with support from WSDOT
Funding Sources	BUILD Grants, Pre-Disaster Mitigation Grant Program, Public Works Board, Washington Transportation Improvement Board

Revised Projects:

6.2.a. Increase public awareness of the risks associated with hazards/disasters and emergency preparedness.

6.2.b. Conduct community-wide multi-hazard risk assessment and prioritize hazards for planning and mitigation projects.

6.2.c. Replace Central Street Bridge crossing Okanogan River to standards that meeting the weight rating for emergency response vehicles.

6.2.d. Encourage homeowners in flood prone areas to participate in the National Flood Insurance Program (was a flood project, now incorporated into the multi-hazard public outreach project).

EARTHQUAKE

Project ID: OMA-EQ-1.21			
Hazard	Priority	Cost	Timeline
Earthquake	Medium Score: 50	High	Complete any URM structure retrofit projects as they are identified by the end of the planning cycle (2027).
Description of the Problem: Unreinforced masonry structures are some of the most vulnerable to earthquakes. There are unreinforced masonry structures within the city that could fail as a result of seismic activity.			
Description of the Project: Continue to identify and evaluate any remaining unreinforced masonry structures within the City of Omak. Structures may either be approved, reinforced, or replaced.			
Lead Agency	Building Department		
Funding Sources	Local funding, Pre-Disaster Mitigation Grant Program		

WILDLAND FIRE

Project ID: OMA-WF-1.21			
Hazard	Priority	Cost	Timeline
Wildfire	Medium Score: 77.8	Low to High	This project is on-going; new projects will be identified and added to this table at each annual

			update (as needed). The bulleted projects will be completed by the end of the planning cycle.
<p>Description of the Problem: Addressing wildland fire hazards is a continuous effort as conditions in the fire environment and the hazards they present to life and property are constantly changing. To address wildland fire hazards as effectively as possible, all stakeholders in the town need to identify any plans, mitigation projects, education and outreach programs, or capacity-building needs that make Omak a more wildfire resistant and resilient community. The objective of this project is to, through communication and coordination of different stakeholders, maintain a list of current wildland fire mitigation action items or participate in or adopt County wildland fire mitigation action items that will improve wildfire awareness, preparation, and response in the town. In addition to all entities concerned with fire, stakeholders should also include soil and conservation districts, parks and recreation, highway and roads, private residents, and other non-traditional wildland fire planning partners.</p>			
<p>Description of the Project: The following wildfire project(s) is/are the current priority of the City of Omak; this list will be updated as needed:</p> <ul style="list-style-type: none"> • Review wildland fire projects in the Okanogan County annex and determine if the Town of Omak would benefit from any of those projects and should, therefore, actively participate in the implementation of those projects. • Participate in CWPP update and identify areas outside of Omak that present a fire risk to the town. Those project areas can be delineated in the CWPP and identified as areas that need fuels reduction projects. • Evaluate the current fire department equipment and resource needs and include those items in the CWPP (Items could include vehicles, tools, water supply improvements, etc.). 			
Lead Agency	Mayor, City Council, & First Responders with support from the CWPP Steering Committee		
Funding Sources	Washington DNR, FEAM Pre-Disaster Mitigation Grants, Firewise Fuel Mitigation Grant Program, Urban and Community Forest Program		

Revised Projects:

6.2.e. Continue to work on actions items and proposed projects in the OC CWPP

CITY OF TONASKET

MULTI-HAZARD

Project ID: TON-MH-1.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be on-going; the projects in the HMP/CWPP will be reviewed and updated annually, at minimum, by the assembled committee.
<p>Description of the Problem: Severe natural hazard events that impact Tonasket could result in financial losses and property damage. Mitigation project exploration and implementation strategies are needed to identify the changing needs of the town for mitigation work.</p>			
<p>Description of the Project: Once a dedicated team has been established, this project will be a continuous effort that addresses evolving natural hazard risk within the city and through which mitigation projects will be developed and implemented. This project captures the commitment of Tonasket to reviewing, updating, and pursuing the mitigation projects that are included in the hazard mitigation plan (HMP) and community wildfire protection plan (CWPP):</p> <ul style="list-style-type: none"> • Step 1: Identify a committed group of individuals who will meet annually, or as often as is needed, to review the Tonasket content in the HMP/CWPP (for example, a local LEPC group may handle this task by committing to reviewing the HMP/CWPP at the first meeting of each calendar year). • Step 2: Once a committee is assembled and a meeting schedule has been determined, those individuals will discuss recent hazard events that have affected the town as well as vulnerabilities in the town to those hazards. From that information, the mitigation projects in the HMP/CWPP will be reviewed, revised, and supplemented with new projects as needed. • Step 3: Assign mitigation projects to individuals who will look for and pursue funding opportunities. This person may serve as the lead on the project, but the committee will support their efforts. • Step 4: Update the list of projects or update project status in the HMP/CWPP at the next annual review (for example, the first LEPC meeting of the following calendar year). Wildfire projects should be included in TON-WF-1.21 (below). <p>These steps will be followed each year to ensure that the City of Tonasket is actively engaged in identifying hazard areas and performing mitigation work in the town.</p>			
Lead Agency	Mayor, City Council, City Department with support from First Responders, Okanogan County Emergency Management, USFS, WA DNR, Okanogan Conservation District		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program		

Project ID: TON-MH-2.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard: FL, SW, WF, PA	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be an on-going effort that will occur at least annually.
Description of the Problem: Public education campaigns to promote natural hazard awareness need to be regularly evaluated, updated, and modified based on changing conditions at multiple scales; from the Tonasket city limits to the greater Pacific Northwest region.			
Description of the Project: A group of individuals will be selected to lead the review, update, and modification of public education and awareness materials related to natural hazards. This group will meet annually, or as often as is needed, to review the City's public outreach and awareness programs and decide if any changes need to be made. Priority items may include the distribution of information related to: <ul style="list-style-type: none"> • Encourage homeowners to participate in the NFIP and provide information about flood mitigation activities (e.g. filling and placing sandbags). • Storm hazards and mitigation measures that can be taken to reduce home damage resulting from severe storms or storm winds. • Encourage residents to have supplies (blankets, flashlights, batteries, food, water, etc.) and plans for sheltering in place. This is particularly important for severe weather events which happen regularly in the county. • Wildland fire hazards and actions that can be taken to reduce fire risk around individual homes and awareness of evacuation notifications and procedures. • Updates related to COVID-19, or pandemics in general, and preparedness/prevention measures that can be taken. 			
Lead Agency	Mayor, City Council, City Department with support from First Responders, USFS, WA DNR, Okanogan Conservation District, Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Firewise Fuel Mitigation Grant Program		

Revised Projects:

6.6.a. Educate residents about the potential risks of hazards and appropriate preparedness.

6.6.b. Conduct community-wide multi-hazard risk assessment and prioritize hazards for planning and mitigation projects.

6.6.c. Encourage homeowners in flood prone areas to participate in the National Flood Insurance Program (was listed as a flood project, now included in one multi-hazard project that will address all public outreach efforts).

WILDLAND FIRE

Project ID: TON-WF-1.21			
Hazard	Priority	Cost	Timeline
Wildfire	Medium Score: 77.8	Low to High	This project is on-going; new projects will be identified and added to this table at each annual update (as needed). The bulleted projects will be completed by the end of the planning cycle.
<p>Description of the Problem: Addressing wildland fire hazards is a continuous effort as conditions in the fire environment and the hazards they present to life and property are constantly changing. To address wildland fire hazards as effectively as possible, all stakeholders in the town need to identify any plans, mitigation projects, education and outreach programs, or capacity-building needs that make Tonasket a more wildfire resistant and resilient community. The objective of this project is to, through communication and coordination of different stakeholders, maintain a list of current wildland fire mitigation action items or participate in or adopt County wildland fire mitigation action items that will improve wildfire awareness, preparation, and response in the city. In addition to all entities concerned with fire, stakeholders should also include soil and conservation districts, parks and recreation, highway and roads, private residents, and other non-traditional wildland fire planning partners.</p>			
<p>Description of the Project: The following wildfire project(s) is/are the current priority of the City of Tonasket; this list will be updated as needed:</p> <ul style="list-style-type: none"> • Review wildland fire projects in the Okanogan County annex and determine if the Town of Tonasket would benefit from any of those projects and should, therefore, actively participate in the implementation of those projects. • Participate in CWPP update and identify areas outside of Tonasket that present a fire risk to the town. Those project areas can be delineated in the CWPP and identified as areas that need fuels reduction projects. • Evaluate the current fire department equipment and resource needs and include those items in the CWPP (Items could include vehicles, tools, water supply improvements, etc.). 			
Lead Agency	Mayor, City Council, & First Responders with support from CWPP Steering Committee		
Funding Sources	Washington DNR, FEAM Pre-Disaster Mitigation Grants, Firewise Fuel Mitigation Grant Program, Urban and Community Forest Program		

Revised Projects

6.6.d. Continue to work on action items and proposed projects in the OC CWPP.

CITY OF OKANOGAN

MULTI-HAZARD

Project ID: OKA-MH-1.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 100.0	Low	This project will begin by the end of 2022, but it will be on-going; the projects in the HMP/CWPP will be reviewed and updated annually, at minimum, by the assembled committee.
<p>Description of the Problem: Severe natural hazard events that impact Okanogan often result in financial losses and property damage. Mitigation project exploration and implementation strategies are needed to identify the changing needs of the city for mitigation work.</p>			
<p>Description of the Project: Once a dedicated team has been established, this project will be a continuous effort that addresses evolving natural hazard risk within the city and through which mitigation projects will be developed and implemented. This project captures the commitment of Okanogan to reviewing, updating, and pursuing the mitigation projects that are included in the hazard mitigation plan (HMP) and community wildfire protection plan (CWPP):</p> <ul style="list-style-type: none"> • Step 1: Identify a committed group of individuals who will meet annually, or as often as is needed, to review the Okanogan content in the HMP/CWPP (for example, the Public Safety Committee may handle this task by committing to reviewing the HMP/CWPP at the first meeting of each calendar year). • Step 2: Once a committee is assembled and a meeting schedule has been determined, those individuals will discuss recent hazard events that have affected the city as well as vulnerabilities in the city to those hazards. From that information, the mitigation projects in the HMP/CWPP will be reviewed, revised, and supplemented with new projects as needed. • Step 3: Assign mitigation projects to individuals who will look for and pursue funding opportunities. This person may serve as the lead on the project, but the committee will support their efforts. • Step 4: Update the list of projects or update project status in the HMP/CWPP at the next annual review (for example, the first LEPC meeting of the following calendar year). <p>These steps will be followed each year to ensure that the City of Okanogan is actively engaged in identifying hazard areas and performing mitigation work in the city.</p>			
Lead Agency	Mayor, City Council, City Department with support from First Responders, Okanogan County Emergency Management, USFS, WA DNR, Okanogan Conservation District		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program		

Project ID: OKA-MH-2.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard: FL, SW, WF, PA	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be an on-going effort that will occur at least annually.
Description of the Problem: Public education campaigns to promote natural hazard awareness need to be regularly evaluated, updated, and modified based on changing conditions at multiple scales; from the Riverside town limits to the greater Pacific Northwest region.			
Description of the Project: A group of individuals will be selected to lead the review, update, and modification of public education and awareness materials related to natural hazards. This group will meet annually, or as often as is needed, to review the Town's public outreach and awareness programs and decide if any changes need to be made. Priority items may include the distribution of information related to: <ul style="list-style-type: none"> • Encourage homeowners to participate in the NFIP and provide information about flood mitigation activities (e.g. filling and placing sandbags). • Storm hazards and mitigation measures that can be taken to reduce home damage resulting from severe storms or storm winds. • Encourage residents to have supplies (blankets, flashlights, batteries, food, water, etc.) and plans for sheltering in place. This is particularly important for severe weather events which happen regularly in the county. • Wildland fire hazards and actions that can be taken to reduce fire risk around individual homes and awareness of evacuation notifications and procedures. • Updates related to COVID-19, or pandemics in general, and preparedness/prevention measures that can be taken. 			
Lead Agency	Mayor, City Council, City Department with support from First Responders, USFS, WA DNR, Okanogan Conservation District, Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Firewise Fuel Mitigation Grant Program		

Revised Projects:

6.14.a. Reduce the impact of hazard events and potential losses incurred by both public and private residents and entities.

6.14.b. Conduct community-wide multi-hazard risk assessment and prioritize hazards for planning and mitigation projects.

6.14.d. Encourage homeowners in flood prone areas to participate in the National Flood Insurance Program (was listed as a flood project, now included in one multi-hazard project that will address all public outreach efforts).

FLOOD

Project ID: OKA-FL-1.21			
Hazard	Priority	Cost	Timeline
Flood	Medium Score: 77.8	Low	This project is on-going; new projects will be identified and added to this table at each annual update (as needed).
Description of the Problem: Given the number of homes and other structures located in the NFIP flood zones, the number of individuals and properties with flood insurance, or other means of flood protection, is inadequate.			
Description of the Project: This will be a multi-step project as there could be several different strategies for conducting public outreach and information campaigns: <ol style="list-style-type: none"> 1. Assemble committee to develop outreach strategy for property owners in the flood zones. This effort will largely focus on education and awareness. Complete by end of 2022. 2. Encourage homeowners and other property owners in flood prone areas to participate in the National Flood Insurance Program. Begin outreach effort by end of 2022. 3. Provide information to property owners about sand bagging and consider hosting an event to demonstrate proper sandbagging techniques and offer some supplies. Begin outreach effort by end of 2022. 			
Lead Agency	Mayor & City Council with support from Okanogan County Emergency Management, Colville Confederated Tribes		
Funding Sources	Flood Mitigation Assistance Grant Program, FEMA Pre-Disaster Mitigation Grant Program		

Project ID: OKA-FL-2.21			
Hazard	Priority	Cost	Timeline
Flood	Medium Score: 88.9	Low to High	This project is on-going; new projects will be identified and added to this table at each annual update (as needed).
Description of the Problem: As flood risk and flood areas evolve and our understanding of hazard areas improves, drainage infrastructure and other flood-protection systems will need to be evaluated for effectiveness.			
Description of the Project: This could be a multi-step project as there may be multiple areas in the city that need improvements to increase protection against flooding: <ol style="list-style-type: none"> 1. Evaluate drainage infrastructure in the city for vulnerabilities to flooding and identify areas that need improvements (for example, the maps that were recently produced by the STARR team may include structures or infrastructure that was not previously considered to be at-risk). Begin initial evaluations by the end of 2023. 			
Lead Agency	Mayor & City Council with support from Okanogan County Emergency Management, Colville Confederated Tribes		

Funding Sources	Local funding, Flood Mitigation Assistance Grant Program
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Completed Projects:

6.14.c. Develop an emergency dam failure warning system for citizens downstream of the Conconully Dam (Reservoir) and Salmon Lake Dam.

EARTHQUAKE

Project ID: OKA-EQ-1.21			
Hazard	Priority	Cost	Timeline
Earthquake	Medium Score: 50	High	Complete any URM structure retrofit projects as they are identified by the end of the planning cycle (2027).
Description of the Problem: Unreinforced masonry structures are some of the most vulnerable to earthquakes. There are unreinforced masonry structures within the city that could fail as a result of seismic activity.			
Description of the Project: Continue to identify and evaluate any remaining unreinforced masonry structures within the City of Okanogan. Structures may either be approved, reinforced, or replaced.			
Lead Agency	Building Department		
Funding Sources	Local Funding, Pre-Disaster Mitigation Grant Program		

WILDLAND FIRE

Project ID: OKA-WF-1.21			
Hazard	Priority	Cost	Timeline
Wildfire	Medium Score: 100.0	Low to High	This project is on-going; new projects will be identified and added to this table at each annual update (as needed). The bulleted projects will be completed by the end of the planning cycle.
Description of the Problem: Addressing wildland fire hazards is a continuous effort as conditions in the fire environment and the hazards they present to life and property are constantly changing. To address wildland fire hazards as effectively as possible, all stakeholders in the City need to identify any plans, mitigation projects, education and outreach programs, or capacity-building needs that make Okanogan a more wildfire resistant and resilient community. The objective of this project is to, through communication and coordination of different stakeholders, maintain a list of current wildland fire mitigation action items or participate in or adopt County wildland fire mitigation action items that will improve wildfire awareness, preparation, and response in the City. In addition to all entities concerned with fire, stakeholders should also include soil and conservation districts, parks and			

recreation, highway and roads, private residents, and other non-traditional wildland fire planning partners.	
<p>Description of the Project: The following wildfire project(s) are the current priority of the City of Okanogan; this list will be updated as needed:</p> <ol style="list-style-type: none"> 1. Continue to evaluate risk assessment and coordinate with Okanogan Conservation District, Washington State Dept. of Natural Resources, Okanogan County Emergency Management, and local Fire Districts, to inform the public of the Firewise Program pertaining to preparedness in the event of wildfire. Begin involvement with program by the end of 2022. 2. Additional funding to provide paid daytime staff for the City of Okanogan Fire Department (Fire District #3 has a similar project listed as FD3-WF-5.21C in the Fire District #3 Annex). 3. Facility, land, and basic equipment for a joint City of Okanogan/Fire District #3 fire station (<i>This project is repeated in the Fire District #3 Annex as FD3-WF-4.21C</i>). 	
Lead Agency	Mayor, City Council with support from First Responders, CWPP Steering Committee and Colville Confederated Tribes
Funding Sources	Washington DNR, FEAM Pre-Disaster Mitigation Grants, Firewise Fuel Mitigation Grant Program, Urban and Community Forest Program

Revised Projects:

6.4.e (CWPP): Facility, land, and basic equipment for a joint City of Okanogan/Fire District #3 fire station

6.4.g: Obtain a 100 foot ladder truck for City of Okanogan Fire Department.

6.4.l: Additional funding to provide paid daytime staff at primary stations in Okanogan County Fire District #3, City of Okanogan Fire Department.

6.14.e. Continue to work on actions items and proposed projects in the OC CWPP.

TOWN OF TWISP

MULTI-HAZARD

Project ID: TWI-MH-1.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard: FL, SW, WF	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be an on-going effort that will occur at least annually.
<p>Description of the Problem: Public education campaigns to promote natural hazard awareness need to be regularly evaluated, updated, and modified based on changing conditions at multiple scales; from the Twisp town limits to the greater Pacific Northwest region.</p>			
<p>Description of the Project: A group of individuals will be selected to lead the review, update, and modification of public education and awareness materials related to natural hazards. This group will meet annually, or as often as is needed, to review the Town's public outreach and awareness programs and decide if any changes need to be made. Priority items may include the distribution of information related to:</p> <ul style="list-style-type: none"> • Encourage homeowners to participate in the NFIP and provide information about flood mitigation activities (e.g. filling and placing sandbags). • Storm hazards and mitigation measures that can be taken to reduce home damage resulting from severe storms or storm winds. • Encourage residents to have supplies (blankets, flashlights, batteries, food, water, etc.) and plans for sheltering in place. This is particularly important for severe weather events which happen regularly in the county. • Wildland fire hazards and actions that can be taken to reduce fire risk around individual homes and awareness of evacuation notifications and procedures. 			
Lead Agency	Mayor, City Council, City Department with support from First Responders, USFS, WA DNR, Okanogan Conservation District, Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Firewise Fuel Mitigation Grant Program		

Project ID: TWI-MH-2.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	Medium Score: 100.0	Low	Complete the next review by the end of 2022
<p>Description of the Problem: Threats from natural hazards and hazard areas within and around Twisp are ever-changing. As such, it is important that these areas are continually assessed and documented.</p>			

Description of the Project: Continue to update and improve the MV Emergency Plan. (The MVEP is a community prepared plan that addresses specific hazards of the area, expected response actions, and identifies available resources).	
Lead Agency	Mayor, First Responders with support from Okanogan County Emergency Management and Citizens
Funding Sources	Local funding, Building Blocks for Sustainable Communities, Community Development Block Grants

Completed Projects

6.13.c. Purchase and install back-up generator to cover City Hall and Police Station.

Revised Projects:

6.13.a. Educate residents about the potential risks of hazards and appropriate preparedness.

6.13.b. Continue to update and improve the MV Emergency Plan. (The MVEP is a community prepared plan that addresses specific hazards of the area, expected response actions, and identifies available resources).

6.13.d. Encourage homeowners in flood prone areas to participate in the National Flood Insurance Program (was listed as a flood project, now included in one multi-hazard project as it could potentially address all hazards documented in this plan).

LANDSLIDE

Project ID: TWI-LS-1.21			
Hazard	Priority	Cost	Timeline
Landslide	High Score: 60	Low	New project for the 2022 update. Initiate by 2023 and complete by 2024.
Description of the Problem: There are multiple areas within and around the Town of Twisp that could produce small to moderate landslides. Landslide hazard areas could directly and indirectly affect the town, but the potential of these hazard areas to produce landslides is not fully understood.			
Description of the Project: Work with Okanogan County to determine if any action needs to be taken to address landslide hazard areas that are adjacent to the Town of Twisp.			
Lead Agency	Town of Twisp with support from Okanogan County		
Funding Sources	Local funding, FEMA Pre-Disaster Mitigation Grant Program		

WILDLAND FIRE

Project ID: TWI-WF-1.21			
Hazard	Priority	Cost	Timeline
Wildfire	Medium Score: 77.8	Low to High	This project is on-going; new projects will be identified and added to this table at each annual update (as needed). The bulleted projects will be completed by the end of the planning cycle.
<p>Description of the Problem: Addressing wildland fire hazards is a continuous effort as conditions in the fire environment and the hazards they present to life and property are constantly changing. To address wildland fire hazards as effectively as possible, all stakeholders in the town need to identify any plans, mitigation projects, education and outreach programs, or capacity-building needs that make Twisp a more wildfire resistant and resilient community. The objective of this project is to, through communication and coordination of different stakeholders, maintain a list of current wildland fire mitigation action items or participate in or adopt County wildland fire mitigation action items that will improve wildfire awareness, preparation, and response in the town. In addition to all entities concerned with fire, stakeholders should also include soil and conservation districts, parks and recreation, highway and roads, private residents, and other non-traditional wildland fire planning partners.</p>			
<p>Description of the Project: The following wildfire project(s) is/are the current priority of the Town of Twisp; this list will be updated as needed:</p> <ul style="list-style-type: none"> • Review wildland fire projects in the Okanogan County annex and determine if the Town of Twisp would benefit from any of those projects and should, therefore, actively participate in the implementation of those projects. • Participate in CWPP update and identify areas outside of Twisp that present a fire risk to the town. Those project areas can be delineated in the CWPP and identified as areas that need fuels reduction projects. • Evaluate the current fire department equipment and resource needs and include those items in the CWPP (Items could include vehicles, tools, water supply improvements, etc.). 			
Lead Agency	Mayor, City Council with support from First Responders, CWPP Steering Committee		
Funding Sources	Washington DNR, FEAM Pre-Disaster Mitigation Grants, Firewise Fuel Mitigation Grant Program, Urban and Community Forest Program		

Revised Projects:

6.13.e. Continue to work on actions items and proposed projects in the OC CWPP.

TOWN OF WINTHROP

MULTI-HAZARD

Project ID: WIN-MH-1.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard: FL, SW, WF	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be an on-going effort that will occur at least annually.
<p>Description of the Problem: Public education campaigns to promote natural hazard awareness need to be regularly evaluated, updated, and modified based on changing conditions at multiple scales; from the Winthrop town limits to the greater Pacific Northwest region.</p>			
<p>Description of the Project: A group of individuals will be selected to lead the review, update, and modification of public education and awareness materials related to natural hazards. This group will meet annually, or as often as is needed, to review the Town's public outreach and awareness programs and decide if any changes need to be made. Priority items may include the distribution of information related to:</p> <ul style="list-style-type: none"> • Encourage homeowners to participate in the NFIP and provide information about flood mitigation activities (e.g. filling and placing sandbags). • Storm hazards and mitigation measures that can be taken to reduce home damage resulting from severe storms or storm winds. • Encourage residents to have supplies (blankets, flashlights, batteries, food, water, etc.) and plans for sheltering in place. This is particularly important for severe weather events which happen regularly in the county. • Wildland fire hazards and actions that can be taken to reduce fire risk around individual homes and awareness of evacuation notifications and procedures. 			
Lead Agency	Mayor, City Council, City Department with support from First Responders, USFS, WA DNR, Okanogan Conservation District, Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Firewise Fuel Mitigation Grant Program		

Project ID: WIN-MH-2.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	Medium Score: 100.0	Low	Complete the next review by the end of 2022
<p>Description of the Problem: Threats from natural hazards and hazard areas within and around Winthrop are ever-changing. As such, it is important that these areas are continually assessed and documented.</p>			

Description of the Project: Continue to update and improve the MV Emergency Plan. (The MVEP is a community prepared plan that addresses specific hazards of the area, expected response actions, and identifies available resources).	
Lead Agency	Mayor, First Responders with support from Okanogan County Emergency Management and Citizens
Funding Sources	Local funding, Building Blocks for Sustainable Communities, Community Development Block Grants

Revised Projects:

6.12.a. Educate residents about the potential risks of hazards and appropriate preparedness.

6.12.b. Continue to update and improve the MV Emergency Plan. The MVEP is a community prepared plan that addresses specific hazards of the area, expected response actions, and identifies available resources (was listed as a flood project, now included in one multi-hazard project as it could potentially address all hazards documented in this plan).

6.12.d. Encourage homeowners in flood prone areas to participate in the National Flood Insurance Program.

FLOOD

There are no projects to include in the flood category at this time.

Completed Projects

6.12.c. Purchase and install a generator for water pump station.

EARTHQUAKE

Project ID: WIN-EQ-1.21			
Hazard	Priority	Cost	Timeline
Earthquake	Medium Score: 50	High	Complete any URM structure retrofit projects as they are identified by the end of the planning cycle (2027).
Description of the Problem: Unreinforced masonry structures are some of the most vulnerable to earthquakes. There are unreinforced masonry structures within the city that could fail as a result of seismic activity.			
Description of the Project: Continue to identify and evaluate any remaining unreinforced masonry structures within the Town of Winthrop. Structures may either be approved, reinforced, or replaced.			
Lead Agency	Building Department		
Funding Sources	Local funding, Pre-Disaster Mitigation Grant Program		

LANDSLIDE

Project ID: WIN-LS-1.21			
Hazard	Priority	Cost	Timeline
Landslide	High Score: 60	Low	New project for the 2022 update. Initiate by 2023 and complete by 2024.
Description of the Problem: There are multiple areas within and around the Town of Winthrop that could produce small to moderate landslides. Landslide hazard areas could directly and indirectly affect the town, but the potential of these hazard areas to produce landslides is not fully understood.			
Description of the Project: Work with Okanogan County to determine if any action needs to be taken to address landslide hazard areas that are adjacent to the Town of Winthrop.			
Lead Agency	Town of Winthrop with support from Okanogan County		
Funding Sources	Local funding, FEMA Pre-Disaster Mitigation Grant Program		

WILDLAND FIRE

Project ID: WIN-WF-1.21			
Hazard	Priority	Cost	Timeline
Wildfire	Medium Score: 77.8	Low to High	This project is on-going; new projects will be identified and added to this table at each annual update (as needed). The bulleted projects will be completed by the end of the planning cycle.
Description of the Problem: Addressing wildland fire hazards is a continuous effort as conditions in the fire environment and the hazards they present to life and property are constantly changing. To address wildland fire hazards as effectively as possible, all stakeholders in the town need to identify any plans, mitigation projects, education and outreach programs, or capacity-building needs that make Winthrop a more wildfire resistant and resilient community. The objective of this project is to, through communication and coordination of different stakeholders, maintain a list of current wildland fire mitigation action items or participate in or adopt County wildland fire mitigation action items that will improve wildfire awareness, preparation, and response in the town. In addition to all entities concerned with fire, stakeholders should also include soil and conservation districts, parks and recreation, highway and roads, private residents, and other non-traditional wildland fire planning partners.			
Description of the Project: The following wildfire project(s) is/are the current priority of the Town of Winthrop; this list will be updated as needed: <ul style="list-style-type: none"> Review wildland fire projects in the Okanogan County annex and determine if the Town of Winthrop would benefit from any of those projects and should, therefore, actively participate in the implementation of those projects. 			

	<ul style="list-style-type: none"> • Participate in CWPP update and identify areas outside of Winthrop that present a fire risk to the town. Those project areas can be delineated in the CWPP and identified as areas that need fuels reduction projects. • Evaluate the current fire department equipment and resource needs and include those items in the CWPP (Items could include vehicles, tools, water supply improvements, etc.).
Lead Agency	Mayor, City Council with support from First Responders and CWPP Steering Committee
Funding Sources	Washington DNR, FEMA Pre-Disaster Mitigation Grants, Firewise Fuel Mitigation Grant Program, Urban and Community Forest Program

Completed Projects:

6.4.aa: Obtain a newer pumper truck and extrication vehicle and equipment for the Town of Winthrop Volunteer Fire Department.

Revised Projects:

6.12.e. Continue to work on actions items and proposed projects in the OC CWPP.

TOWN OF RIVERSIDE

MULTI-HAZARD

Project ID: RIV-MH-1.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be on-going; the projects in the HMP/CWPP will be reviewed and updated annually, at minimum, by the assembled committee.
<p>Description of the Problem: Severe natural hazard events that impact Riverside could result in financial losses and property damage. Mitigation project exploration and implementation strategies are needed to identify the changing needs of the town for mitigation work.</p>			
<p>Description of the Project: Once a dedicated team has been established, this project will be a continuous effort that addresses evolving natural hazard risk within the town and through which mitigation projects will be developed and implemented. This project captures the commitment of Riverside to reviewing, updating, and pursuing the mitigation projects that are included in the hazard mitigation plan (HMP) and community wildfire protection plan (CWPP):</p> <ul style="list-style-type: none"> • Step 1: Identify a committed group of individuals who will meet annually, or as often as is needed, to review the Riverside content in the HMP/CWPP (for example, a local LEPC group may handle this task by committing to reviewing the HMP/CWPP at the first meeting of each calendar year). • Step 2: Once a committee is assembled and a meeting schedule has been determined, those individuals will discuss recent hazard events that have affected the town as well as vulnerabilities in the town to those hazards. From that information, the mitigation projects in the HMP/CWPP will be reviewed, revised, and supplemented with new projects as needed. • Step 3: Assign mitigation projects to individuals who will look for and pursue funding opportunities. This person may serve as the lead on the project, but the committee will support their efforts. • Step 4: Update the list of projects or update project status in the HMP/CWPP at the next annual review (for example, the first LEPC meeting of the following calendar year). Wildfire projects should be included in ELM-WF-1.21 (below). <p>These steps will be followed each year to ensure that the Town of Riverside is actively engaged in identifying hazard areas and performing mitigation work in the town.</p>			
Lead Agency	Mayor, City Council, City Department with support from First Responders, Okanogan County Emergency Management, USFS, WA DNR, Okanogan Conservation District		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program		

Project ID: RIV-MH-2.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard: FL, SW, WF, PA	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be an on-going effort that will occur at least annually.
<p>Description of the Problem: Public education campaigns to promote natural hazard awareness need to be regularly evaluated, updated, and modified based on changing conditions at multiple scales; from the Riverside town limits to the greater Pacific Northwest region.</p>			
<p>Description of the Project: A group of individuals will be selected to lead the review, update, and modification of public education and awareness materials related to natural hazards. This group will meet annually, or as often as is needed, to review the Town's public outreach and awareness programs and decide if any changes need to be made. Priority items may include the distribution of information related to:</p> <ul style="list-style-type: none"> • Encourage homeowners to participate in the NFIP and provide information about flood mitigation activities (e.g. filling and placing sandbags). • Storm hazards and mitigation measures that can be taken to reduce home damage resulting from severe storms or storm winds. • Encourage residents to have supplies (blankets, flashlights, batteries, food, water, etc.) and plans for sheltering in place. This is particularly important for severe weather events which happen regularly in the county. • Wildland fire hazards and actions that can be taken to reduce fire risk around individual homes and awareness of evacuation notifications and procedures. • Updates related to COVID-19, or pandemics in general, and preparedness/prevention measures that can be taken. 			
Lead Agency	Mayor, City Council, City Department with support from First Responders, USFS, WA DNR, Okanogan Conservation District, Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Firewise Fuel Mitigation Grant Program		

Project ID: RIV-MH-3.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 44.4	High	This project is new for the 2022 update. Unknown; Riverside has been pushing this project for years but has been unable to proceed because of discrepancies over the flood zone boundary.
<p>Description of the Problem: The Town of Riverside needs a new fire station as the current facility does not meet the current needs of the district. Riverside also needs a multi-purpose community center that would serve as an emergency shelter for residents.</p>			

Description of the Project: Construct a new facility that doubles as both a fire station and community center. This project has already been in the planning stages for multiple years. Refer to project documentation for more information about the status of the planned facility.	
Lead Agency	Town of Riverside, public works with support from Okanogan County Emergency Management, Washington DNR
Funding Sources	FEMA Pre-Disaster Mitigation Grant Program, Washington DNR, Firewise

Revised Projects:

6.11.a. Analyze community-wide-multi-hazard risk assessments and prioritize hazards for planning and mitigation projects.

6.11.b. Educate residents about the potential risks of hazards and appropriate preparedness.

6.11.c. Encourage homeowners in flood prone areas to participate in the National Flood Insurance Program (was listed as a flood project, now included in one multi-hazard project that will address all public outreach efforts).

LANDSLIDE

Project ID: CON-LS-1.21			
Hazard	Priority	Cost	Timeline
Landslide	High Score: 60	Low	New project for the 2022 update. Initiate by 2023 and complete by 2024.
Description of the Problem: There are multiple areas within and around the Town of Riverside that could produce landslides. Both sides of the river corridor feature steep slopes that could produce significant slides and, more recently, small, low angle slumps have occurred in areas that have been previously disturbed by construction projects or excavation. The water tower site is of particular concern as heavy rains and saturated soils have recently caused small slides near the tower.			
Description of the Project: Work with Okanogan County to determine if any action needs to be taken to address landslide hazard areas that are adjacent to the Town of Riverside.			
Lead Agency	Town of Riverside with support from Okanogan County		
Funding Sources	Local funding, FEMA Pre-Disaster Mitigation Grant Program		

WILDLAND FIRE

Project ID: RIV-WF-1.21			
Hazard	Priority	Cost	Timeline
Wildfire	Medium Score: 77.8	Low to High	This project is on-going; new projects will be identified and added to this table at each annual update (as needed). The bulleted projects will be completed by the end of the planning cycle.
<p>Description of the Problem: Addressing wildland fire hazards is a continuous effort as conditions in the fire environment and the hazards they present to life and property are constantly changing. To address wildland fire hazards as effectively as possible, all stakeholders in the town need to identify any plans, mitigation projects, education and outreach programs, or capacity-building needs that make Riverside a more wildfire resistant and resilient community. The objective of this project is to, through communication and coordination of different stakeholders, maintain a list of current wildland fire mitigation action items or participate in or adopt County wildland fire mitigation action items that will improve wildfire awareness, preparation, and response in the town. In addition to all entities concerned with fire, stakeholders should also include soil and conservation districts, parks and recreation, highway and roads, private residents, and other non-traditional wildland fire planning partners.</p>			
<p>Description of the Project: The following wildfire project(s) is/are the current priority of the Town of Riverside; this list will be updated as needed:</p> <ul style="list-style-type: none"> • Review wildland fire projects in the Okanogan County annex and determine if the Town of Riverside would benefit from any of those projects and should, therefore, actively participate in the implementation of those projects. • Participate in CWPP update and identify areas outside of Riverside that present a fire risk to the town. Those project areas can be delineated in the CWPP and identified as areas that need fuels reduction projects. • Evaluate the current fire department equipment and resource needs and include those items in the CWPP (Items could include vehicles, tools, water supply improvements, etc.). 			
Lead Agency	Mayor, City Council with support from First Responders and CWPP Steering Committee		
Funding Sources	Washington DNR, FEMA Pre-Disaster Mitigation Grants, Firewise Fuel Mitigation Grant Program, Urban and Community Forest Program		

Revised Projects:

6.11.d. Continue to work on actions items and proposed projects in the OC CWPP

TOWN OF CONCONULLY

MULTI-HAZARD

Project ID: CON-MH-1.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard: FL, LS, SW, WF	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be an on-going effort that will occur at least annually.
<p>Description of the Problem: Public education campaigns to promote natural hazard awareness need to be regularly evaluated, updated, and modified based on changing conditions at multiple scales; from the Conconully town limits to the greater Pacific Northwest region.</p>			
<p>Description of the Project: A group of individuals will be selected to lead the review, update, and modification of public education and awareness materials related to natural hazards. This group will meet annually, or as often as is needed, to review the Town's public outreach and awareness programs and decide if any changes need to be made. Priority items may include the distribution of information related to:</p> <ul style="list-style-type: none"> • Encourage homeowners to participate in the NFIP and provide information about flood mitigation activities (e.g. filling and placing sandbags). • Awareness of the potential for flash flooding and mudslides from the north (campers were recently trapped in that area by a mudslide). • Encourage residents to have supplies (blankets, flashlights, batteries, food, water, etc.) and plans for sheltering in place. This is particularly important for severe weather events which happen regularly in the county. • Wildland fire hazards and actions that can be taken to reduce fire risk around individual homes and awareness of evacuation notifications and procedures. • Create/Update Conconully Emergency Preparedness Plan using the 2022 HMP update and disseminate information to the public as needed. 			
Lead Agency	Mayor, City Council, City Department with support from First Responders, USFS, WA DNR, Okanogan Conservation District, Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Firewise Fuel Mitigation Grant Program		

Revised Projects:

6.10.a. Educate residents about the potential risks of hazards and appropriate preparedness.

6.10.b. Develop a Conconully Emergency Plan. (The plan will be a community prepared plan that addresses specific hazards of the area, expected response actions, and identifies available resources).

6.10.d Encourage homeowners in flood prone areas to participate in the National Flood Insurance Program (was listed as a flood project, now included in one multi-hazard project that will address all public outreach efforts).

FLOOD

Project ID: CON-FL-1.21			
Hazard	Priority	Cost	Timeline
Dam Failure	Medium Score: 100.0	Low	Ongoing; procedures will be evaluated by the end of the planning cycle.
Description of the Problem: Conconully is situated between two impoundments. Although there is a low probability of occurrence, the failure or partial failure of either dam will have significant implications for the town.			
Description of the Project: Continue to work with the county, Bureau of Reclamation to expand procedures for dam failure for both the Conconully Dam and the Salmon Lake Dam. Currently, there is no reason to believe that there are any issues with the Salmon Lake Dam, but the Conconully Dam may need updates or improvements.			
Lead Agency	Mayor, City Council with support from Okanogan County Emergency Management and Bureau of Reclamation		
Funding Sources	Local funding, Bureau of Reclamation, FEMA Pre-Disaster Mitigation Grant Program		

Revised Projects:

6.10.c. Continue to work with the county, Bureau of Reclamation to expand procedures for dam failure for both the Conconully Dam and the Salmon Lake Dam.

LANDSLIDE

Project ID: CON-LS-1.21			
Hazard	Priority	Cost	Timeline
Landslide	High Score: 60	Low	New project for the 2022 update. Initiate by 2023 and complete by 2024.
Description of the Problem: Log jams on the North Fork Salmon Creek present a flash flood and mudslide risk to the Town of Conconully. If they were to fail, they could release a significant volume of impounded water, mud, and other debris that could impact North Fork Salmon Creek Rd or the town itself.			
Description of the Project: Working with the appropriate landowner (probably USFS), the log jams should be broken up and removed.			
Lead Agency	Conconully Public Works with support from USFS		

Funding Sources	Local funding, United States Forest Service, FEMA Pre-Disaster Mitigation Grant Program, Floodplains by design
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WILDLAND FIRE

Project ID: CON-WF-1.21 (CWPP Projects)			
Hazard	Priority	Cost	Timeline
Wildfire	High Score: 100.0	Low to High	This project is on-going; new projects will be identified and added to this table at each annual update (as needed). The bulleted projects will be completed by the end of the planning cycle.
<p>Description of the Problem: Addressing wildland fire hazards is a continuous effort as conditions in the fire environment and the hazards they present to life and property are constantly changing. To address wildland fire hazards as effectively as possible, all stakeholders in the town need to identify any plans, mitigation projects, education and outreach programs, or capacity-building needs that make Conconully a more wildfire resistant and resilient community. The objective of this project is to, through communication and coordination of different stakeholders, maintain a list of current wildland fire mitigation action items or participate in or adopt County wildland fire mitigation action items that will improve wildfire awareness, preparation, and response in the town. In addition to all entities concerned with fire, stakeholders should also include soil and conservation districts, parks and recreation, highway and roads, private residents, and other non-traditional wildland fire planning partners.</p>			
<p>Description of the Project: The following wildfire project(s) is/are the current priority of the Town of Conconully; this list will be updated as needed:</p> <ul style="list-style-type: none"> • Review wildland fire projects in the Okanogan County annex and determine if the Town of Conconully would benefit from any of those projects and should, therefore, actively participate in the implementation of those projects. • Participate in CWPP update and identify areas outside of Conconully that present a fire risk to the town. Those project areas can be delineated in the CWPP and identified as areas that need fuels reduction projects. • Evaluate the current fire department equipment and resource needs and include those items in the CWPP (Items could include vehicles, tools, water supply improvements, etc.). • Obtain a 4x4 brush truck and funding for repairs to existing equipment for the Town of Conconully Fire Department. 			
Lead Agency	Mayor, City Council with support from First Responders and CWPP Steering Committee		
Funding Sources	Washington DNR, FEMA Pre-Disaster Mitigation Grants, Firewise Fuel Mitigation Grant Program, Urban and Community Forest Program		

Completed Projects:

6.4.z: Facility, land, and basic equipment for a new and larger fire hall for the Town of Conconully Fire Department.

Revised Projects:

6.10.e. Continue to work on actions items and proposed projects in the OC CWPP.

6.4.w: Obtain a 4x4 brush truck and funding for repairs to existing equipment for the Town of Conconully Fire Department.

CITY OF OROVILLE

MULTI-HAZARD

Project ID: ORO-MH-1.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be on-going; the projects in the HMP/CWPP will be reviewed and updated annually, at minimum, by the assembled committee.
<p>Description of the Problem: Severe natural hazard events that impact Oroville could result in financial losses and property damage. Mitigation project exploration and implementation strategies are needed to identify the changing needs of the city for mitigation work.</p>			
<p>Description of the Project: Once a dedicated team has been established, this project will be a continuous effort that addresses evolving natural hazard risk within the city and through which mitigation projects will be developed and implemented. This project captures the commitment of Oroville to reviewing, updating, and pursuing the mitigation projects that are included in the hazard mitigation plan (HMP) and community wildfire protection plan (CWPP):</p> <ul style="list-style-type: none"> • Step 1: Identify a committed group of individuals who will meet annually, or as often as is needed, to review the Oroville content in the HMP/CWPP (for example, a local LEPC group may handle this task by committing to reviewing the HMP/CWPP at the first meeting of each calendar year). • Step 2: Once a committee is assembled and a meeting schedule has been determined, those individuals will discuss recent hazard events that have affected the city as well as vulnerabilities in the city to those hazards. From that information, the mitigation projects in the HMP/CWPP will be reviewed, revised, and supplemented with new projects as needed. • Step 3: Assign mitigation projects to individuals who will look for and pursue funding opportunities. This person may serve as the lead on the project, but the committee will support their efforts. • Step 4: Update the list of projects or update project status in the HMP/CWPP at the next annual review (for example, the first LEPC meeting of the following calendar year). Wildfire projects should be included in ORO-WF-1.21 (below). <p>These steps will be followed each year to ensure that the City of Oroville is actively engaged in identifying hazard areas and performing mitigation work in the city.</p>			
Lead Agency	Mayor, City Council, City Department with support from First Responders, Okanogan County Emergency Management, USFS, WA DNR, Okanogan Conservation District		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program		

Project ID: ORO-MH-2.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be an on-going effort that will occur at least annually.
<p>Description of the Problem: Public education campaigns to promote natural hazard awareness need to be regularly evaluated, updated, and modified based on changing conditions at multiple scales; from the Oroville city limits to the greater Pacific Northwest region.</p>			
<p>Description of the Project: A group of individuals will be selected to lead the review, update, and modification of public education and awareness materials related to natural hazards. This group will meet annually, or as often as is needed, to review the City's public outreach and awareness programs and decide if any changes need to be made. Priority items may include the distribution of information related to:</p> <ul style="list-style-type: none"> • Encourage homeowners to participate in the NFIP and provide information about flood mitigation activities (e.g. filling and placing sandbags). • Storm hazards and mitigation measures that can be taken to reduce home damage resulting from severe storms or storm winds. • Encourage residents to have supplies (blankets, flashlights, batteries, food, water, etc.) and plans for sheltering in place. This is particularly important for severe weather events which happen regularly in the county. • Wildland fire hazards and actions that can be taken to reduce fire risk around individual homes and awareness of evacuation notifications and procedures. • Updates related to COVID-19, or pandemics in general, and preparedness/prevention measures that can be taken. 			
Lead Agency	Mayor, City Council, City Department with support from First Responders, USFS, WA DNR, Okanogan Conservation District, Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Firewise Fuel Mitigation Grant Program		

Project ID: ORO-MH-3.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	Moderate Score: 88.9	Medium to High	Project should be completed by the end of the planning cycle (2027)
<p>Description of the Problem: Many of the water systems in the city do not have a form of backup power. Services are often lost when there are power outages in the area.</p>			
<p>Description of the Project: Install back-up generators in sewer pump stations, for wastewater plant, and water wells and pump stations.</p>			
Lead Agency	Mayor and Council with support from PW Superintendent, and Community Development Council Director (CDD)		

Funding Sources	FEMA Pre-Disaster Mitigation Grant Program
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Project ID: ORO-MH-4.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	Moderate Score: 100.0	Low to Medium	Complete by the end of the planning cycle (2027)
Description of the Problem: Currently, some critical facilities are too accessible to the public which presents a security risk at those facilities.			
Description of the Project: Identify and implement increased security measures for the city hall, CDO, Police Department, and the fire station to reduce asset accessibility.			
Lead Agency	Community Development Council with support from Mayor, City Council, CDD, LE, & OCDEM		
Funding Sources	FEMA Pre-Disaster Mitigation Grant Program		

Project ID: ORO-MH-5.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 75.0	\$250,000	This project is new for the 2022 update. 1 year
Description of the Problem: Dorothy Scott Airport, Oroville, WA does not currently have an operational Jet A fuel system to fuel/refuel aircraft that are responding to emergency/wildfire situations. The existing aviation fuel system needs a Jet A storage tank and upgrades to the pump and dispensing system.			
Description of the Project: Purchase and install a Jet A fuel system at the airport. The addition of fuel will enable aircrafts from various agencies such as Life Flight, DNR and Forest Services to respond to a variety of hazards in the area including wildland fires.			
Lead Agency	City of Oroville with support from FAA, FEMA, WSDOT Aviation		
Funding Sources	FEMA Pre-Disaster Mitigation Grant Program, FAA, WSDOT Aviation, other grants		

Project ID: ORO-MH-6.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 75.0	\$2.5 Million	2-3 years

Description of the Problem: The runway at the Oroville airport is scheduled to be relocated and reconstructed in the coming years, 2023.	
Description of the Project: Reconstruct the municipal airport runway. A reconstructed runway will accommodate larger/heavier aircraft and a higher volume of traffic, both of which will facilitate emergency response during natural hazard situations.	
Lead Agency	City of Oroville with support from FAA, FEMA, WSDOT Aviation
Funding Sources	FEMA Pre-Disaster Mitigation Grant Program, FAA, WSDOT Aviation, EDA grants

Revised Projects:

6.5.a. Install back-up generators in sewer pump stations, wastewater plant, and water wells and pump stations.

6.5.b. Analyze community-wide-multi-hazard risk assessments and prioritize hazards for planning and mitigation projects.

6.5.c. Educate residents about the potential risks of hazards and appropriate preparedness.

6.5.d. Identify and implement increased security measures for the city hall, CDO, Police Department and the fire station in order to reduce asset accessibility.

FLOOD

Project ID: ORO-FL-1.21			
Hazard	Priority	Cost	Timeline
Flood	Moderate Score: 55.6	Low to High	Complete by the end of the planning cycle (2027)
Description of the Problem: Dyke maintenance and improvements are always a concern for the City of Oroville. New issues or concerns need to be rapidly identified and inventoried.			
Description of the Project: Complete the list of dike improvements/maintenance issues identified by the ACE.			
Lead Agency	Public Works Superintendent with support from Mayor, City Council		
Funding Sources	Army Corps of Engineers, FEMA Pre-Disaster Mitigation Grant Program		

Revised Projects:

6.5.g. Complete the list of dike improvements/maintenance issues identified by the ACE.

6.5.h. Encourage homeowners in flood prone areas to participate in the National Flood Insurance Program (was a flood project, now incorporated into the multi-hazard public outreach project).

EARTHQUAKE

Project ID: ORO-EQ-1.21			
Hazard	Priority	Cost	Timeline
Earthquake	Moderate Score: 75.0	Low	On-going: the next phase will be completed by the end of the planning cycle (2027)
Description of the Problem: Building and construction standards for the City of Oroville need to align with the most current predictions and assessments related to potential earthquake hazards.			
Description of the Project: Review and update Earthquake Hazard section of Critical Areas Ordinance.			
Lead Agency	Community Development Council Director with support from State of Washington, Washington DNR		
Funding Sources	FEMA Pre-Disaster Mitigation Grants, Building Blocks for Sustainable Communities, Community Development Block Grants		

Revised Projects:

6.5.e. Review and update Earthquake Hazard section of Critical Areas Ordinance.

SEVERE WEATHER

Project ID: ORO-SW-1.21			
Hazard	Priority	Cost	Timeline
Severe Weather	Moderate Score: 100.0	Low	Phase 1: Complete by the end of 2022 Phase 2: Begin by the end of the planning cycle
Description of the Problem: Heavy snow loads on the roofs of public facilities can potentially put building occupants at risk. The roofs of some facilities may not be in optimal condition for supporting heavy snow loads.			
Description of the Project: <ul style="list-style-type: none"> Phase 1: Inspect condition of roofs of public facilities and determine if their snow capacities are adequate for potential future conditions. Phase 2: Begin to plan updates to the structures that were identified in Phase 1 			
Lead Agency	Building Official with support from Schools, Building Departments, Public Works		
Funding Sources	FEMA Pre-Disaster Mitigation Grants		

Revised Projects:

6.5.f. Encourage schools and other public facilities to inspection building for snow load resistance.

WILDLAND FIRE

Project ID: ORO-WF-1.21			
Hazard	Priority	Cost	Timeline
Wildfire	High Score: 77.8	Low to High	This project is on-going; new projects will be identified and added to this table at each annual update (as needed). The bulleted projects will be completed by the end of the planning cycle.
<p>Description of the Problem: Addressing wildland fire hazards is a continuous effort as conditions in the fire environment and the hazards they present to life and property are constantly changing. To address wildland fire hazards as effectively as possible, all stakeholders in the city need to identify any plans, mitigation projects, education and outreach programs, or capacity-building needs that make Brewster a more wildfire resistant and resilient community. The objective of this project is to, through communication and coordination of different stakeholders, maintain a list of current wildland fire mitigation action items or participate in or adopt County wildland fire mitigation action items that will improve wildfire awareness, preparation, and response in the city. In addition to all entities concerned with fire, stakeholders should also include soil and conservation districts, parks and recreation, highway and roads, private residents, and other non-traditional wildland fire planning partners.</p>			
<p>Description of the Project: The following wildfire project(s) is/are the current priority of the City of Oroville; this list will be updated as needed:</p> <ul style="list-style-type: none"> • Review wildland fire projects in the Okanogan County annex and determine if the City of Oroville would benefit from any of those projects and should, therefore, actively participate in the implementation of those projects. • Participate in CWPP update and identify areas outside of Oroville that present a fire risk to the town. Those project areas can be delineated in the CWPP and identified as areas that need fuels reduction projects. • Evaluate the current fire department equipment and resource needs and include those items in the CWPP (Items could include vehicles, tools, water supply improvements, etc.). • Invoke fire flow standards within unincorporated water service area for new development. 			
Lead Agency	Mayor, City Council with support from First Responders and CWPP Steering Committee		
Funding Sources	Washington DNR, FEMA Pre-Disaster Mitigation Grants, Firewise Fuel Mitigation Grant Program, Urban and Community Forest Program		

Revised Projects:

6.5.i. Continue to work on actions items and proposed projects in the OC CWPP.

6.5.j. Invoke fire flow standards within unincorporated water service area for new development.

Chapter 6: Mitigation Strategy

CITY OF BREWSTER

MULTI-HAZARD

Project ID: BRE-MH-1.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be on-going; the projects in the HMP/CWPP will be reviewed and updated annually, at minimum, by the assembled committee.
<p>Description of the Problem: Severe natural hazard events that impact Brewster could result in financial losses and property damage. Mitigation project exploration and implementation strategies are needed to identify the changing needs of the city for mitigation work.</p>			
<p>Description of the Project: Once a dedicated team has been established, this project will be a continuous effort that addresses evolving natural hazard risk within the town and through which mitigation projects will be developed and implemented. This project captures the commitment of Brewster to reviewing, updating, and pursuing the mitigation projects that are included in the hazard mitigation plan (HMP) and community wildfire protection plan (CWPP):</p> <ul style="list-style-type: none"> • Step 1: Identify a committed group of individuals who will meet annually, or as often as is needed, to review the Brewster content in the HMP/CWPP (for example, a local LEPC group may handle this task by committing to reviewing the HMP/CWPP at the first meeting of each calendar year). • Step 2: Once a committee is assembled and a meeting schedule has been determined, those individuals will discuss recent hazard events that have affected the town as well as vulnerabilities in the town to those hazards. From that information, the mitigation projects in the HMP/CWPP will be reviewed, revised, and supplemented with new projects as needed. • Step 3: Assign mitigation projects to individuals who will look for and pursue funding opportunities. This person may serve as the lead on the project, but the committee will support their efforts. • Step 4: Update the list of projects or update project status in the HMP/CWPP at the next annual review (for example, the first LEPC meeting of the following calendar year). Wildfire projects should be included in BRE-WF-1.21 (below). <p>These steps will be followed each year to ensure that the City of Brewster is actively engaged in identifying hazard areas and performing mitigation work in the town.</p>			
Lead Agency	Mayor, City Council, City Department with support from First Responders, Okanogan County Emergency Management, USFS, WA DNR, Okanogan Conservation District		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program		

Project ID: BRE-MH-2.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard: FL, SW, WF, PA	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be an on-going effort that will occur at least annually.
Description of the Problem: Public education campaigns to promote natural hazard awareness need to be regularly evaluated, updated, and modified based on changing conditions at multiple scales; from the Brewster city limits to the greater Pacific Northwest region.			
Description of the Project: A group of individuals will be selected to lead the review, update, and modification of public education and awareness materials related to natural hazards. This group will meet annually, or as often as is needed, to review the city's public outreach and awareness programs and decide if any changes need to be made. Priority items may include the distribution of information related to: <ul style="list-style-type: none"> • Encourage homeowners to participate in the NFIP and provide information about flood mitigation activities (e.g. filling and placing sandbags). • Storm hazards and mitigation measures that can be taken to reduce home damage resulting from severe storms or storm winds. • Encourage residents to have supplies (blankets, flashlights, batteries, food, water, etc.) and plans for sheltering in place. This is particularly important for severe weather events which happen regularly in the county. • Wildland fire hazards and actions that can be taken to reduce fire risk around individual homes and awareness of evacuation notifications and procedures. • Updates related to COVID-19, or pandemics in general, and preparedness/prevention measures that can be taken. 			
Lead Agency	Mayor, City Council, City Department with support from First Responders, USFS, WA DNR, Okanogan Conservation District, Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Firewise Fuel Mitigation Grant Program		

Revised Projects:

6.4.a. Educate residents about the potential risks of hazards and appropriate preparedness.

6.4.b. Conduct community-wide multi-hazard risk assessment and prioritize hazards for planning and mitigation projects.

6.4.c. Encourage homeowners in flood prone areas to participate in the National Flood Insurance Program (was a flood project, now incorporated into the multi-hazard public outreach project).

EARTHQUAKE

Project ID: BRE-EQ-1.21			
Hazard	Priority	Cost	Timeline
Earthquake	Medium Score: 50	High	Complete any URM structure retrofit projects as they are identified by the end of the planning cycle (2027).
Description of the Problem: Unreinforced masonry structures are some of the most vulnerable to earthquakes. There are unreinforced masonry structures within the city that could fail as a result of seismic activity.			
Description of the Project: Continue to identify and evaluate any remaining unreinforced masonry structures within the City of Brewster. Structures may either be approved, reinforced, or replaced.			
Lead Agency	Building Department		
Funding Sources	Local funding, Pre-Disaster Mitigation Grant Program		

LANDSLIDE

Project ID: BRE-LS-1.21			
Hazard	Priority	Cost	Timeline
Landslide	High Score: 60	Low	New project for the 2022 update. Initiate by 2023 and complete by 2024.
Description of the Problem: There are multiple areas within and around the City of Brewster that could produce small to moderate landslides. Landslide hazard areas could directly and indirectly affect the town, but the potential of these hazard areas to produce landslides is not fully understood.			
Description of the Project: Work with Okanogan County to determine if any action needs to be taken to address landslide hazard areas that are adjacent to the City of Brewster.			
Lead Agency	City of Brewster with support from Okanogan County		
Funding Sources	Local funding, FEMA Pre-Disaster Mitigation Grant Program		

WILDLAND FIRE

Project ID: BRE-WF-1.21			
Hazard	Priority	Cost	Timeline
Wildfire	High Score: 77.8	Low to High	This project is on-going; new projects will be identified and added to this table at each annual update (as needed). The bulleted projects will be completed by the end of the planning cycle.
<p>Description of the Problem: Addressing wildland fire hazards is a continuous effort as conditions in the fire environment and the hazards they present to life and property are constantly changing. To address wildland fire hazards as effectively as possible, all stakeholders in the city need to identify any plans, mitigation projects, education and outreach programs, or capacity-building needs that make Brewster a more wildfire resistant and resilient community. The objective of this project is to, through communication and coordination of different stakeholders, maintain a list of current wildland fire mitigation action items or participate in or adopt County wildland fire mitigation action items that will improve wildfire awareness, preparation, and response in the city. In addition to all entities concerned with fire, stakeholders should also include soil and conservation districts, parks and recreation, highway and roads, private residents, and other non-traditional wildland fire planning partners.</p>			
<p>Description of the Project: The following wildfire project(s) is/are the current priority of the City of Brewster; this list will be updated as needed:</p> <ul style="list-style-type: none"> • Review wildland fire projects in the Okanogan County annex and determine if the City of Brewster would benefit from any of those projects and should, therefore, actively participate in the implementation of those projects. • Participate in CWPP update and identify areas outside of Brewster that present a fire risk to the town. Those project areas can be delineated in the CWPP and identified as areas that need fuels reduction projects. • Evaluate the current fire department equipment and resource needs and include those items in the CWPP (Items could include vehicles, tools, water supply improvements, etc.). 			
Lead Agency	Mayor, City Council with support from First Responders and CWPP Steering Committee		
Funding Sources	Washington DNR, FEMA Pre-Disaster Mitigation Grants, Firewise Fuel Mitigation Grant Program, Urban and Community Forest Program		

Revised Projects:

6.4.d. Continue to work on actions items and proposed projects in the OC CWPP.

CITY OF PATEROS**MULTI-HAZARD**

Project ID: PAT-MH-1.20			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 100	Medium	New project for 2022 update. Anticipated completion by 2022-2025.
Description of the Problem: There are multiple hazards with low frequency but potentially significant damage, including severe weather, landslides, and wildfire. The City needs to develop an Emergency Operation Plan.			
Description of the Project: The City relies heavily on Okanogan County Emergency Management for assistance in responding to emergency. As was learned during the Carlton Complex Fires of 2014, during large County-wide emergencies, resources of the County are stretched. The City needs an Operation Plan specific to local threats, infrastructure and resources.			
Lead Agency	City of Pateros with support from Okanogan County Emergency Management		
Funding Sources	Pre-Disaster Mitigation Grant Program, Building Blocks for Sustainable Communities, Community Development Block Grants This project would require an outside consultant with external funds.		

Project ID: PAT-MH-2.20			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 62.5	Medium	New project for 2022 update. Anticipated completion by 2022-2025.
Description of the Problem: South Okanogan County does not have an Emergency Coordination Center. There have been multiple occasions where Emergency Management Operation teams were needed in Pateros, or South County. The Pateros Fire Hall, Pateros City Hall, and Pateros Schools have been deemed inadequate spaces for this type of activity.			
Description of the Project: Conduct a study to determine the facility needs for an emergency coordination center in Pateros or South County.			
Lead Agency	City of Pateros with support from Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program This project would require an outside consultant with external funds.		

Project ID: PAT-MH-3.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard: FL, SW, WF, PA	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be an on-going effort that will occur at least annually.
<p>Description of the Problem: Public education campaigns to promote natural hazard awareness need to be regularly evaluated, updated, and modified based on changing conditions at multiple scales; from the Nespelem town limits to the greater Pacific Northwest region.</p>			
<p>Description of the Project: A group of individuals will be selected to lead the review, update, and modification of public education and awareness materials related to natural hazards. This group will meet annually, or as often as is needed, to review the Town's public outreach and awareness programs and decide if any changes need to be made. Priority items may include the distribution of information related to:</p> <ul style="list-style-type: none"> • Encourage homeowners to participate in the NFIP and provide information about flood mitigation activities (e.g. filling and placing sandbags). • Storm hazards and mitigation measures that can be taken to reduce home damage resulting from severe storms or storm winds. • Encourage residents to have supplies (blankets, flashlights, batteries, food, water, etc.) and plans for sheltering in place. This is particularly important for severe weather events which happen regularly in the county. • Wildland fire hazards and actions that can be taken to reduce fire risk around individual homes and awareness of evacuation notifications and procedures. • Updates related to COVID-19, or pandemics in general, and preparedness/prevention measures that can be taken. 			
Lead Agency	Mayor, City Council, City Department with support from First Responders, USFS, WA DNR, Okanogan Conservation District, Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Firewise Fuel Mitigation Grant Program		

Deleted Projects:

6.3.a. Educate residents about the potential risks of hazards and appropriate preparedness.

6.3.b. Conduct community-wide multi-hazard risk assessment and prioritize hazards for planning and mitigation projects.

FLOOD

Project ID: PAT-FL-1.20			
Hazard	Priority	Cost	Timeline
Flood	High Score: 100	1) Low 2) Low 3) Medium	New project for 2022 update: 1) 2023 2) 2023-2024

		4) Low 5) Low 6) Medium	3) 2024-2025 4) 2023-2025 5) By 2026 6) By 2026
<p>Description of the Problem: The City of Pateros has been a voluntary participant of the NFIP (Emergency Entrance) since 08 May 1975, had the Regular entry on 12 February 1976. According to the FEMA Community Status Book Report, the Current Effect Map Date is listed as NSFHA (No Special Flood Hazard Area – All Zone C, areas outside 500-year flood).</p> <p>FEMA started a flood risk review for Okanogan County in 2015. In early drafts, it appears that as many of 34 structures will lie within the 100-year flood plain. Final maps and a letter of determination are expected in summer of 2023. This will greatly change how the City views potential flooding hazards.</p>			
<p>Description of the Project: Conduct further analysis of flood hazards, including riverine flooding and dam failure, develop emergency response plans, update City codes, and educate the public. Through this process further identify mitigation projects.</p> <p>1) Track FEMA flood risk determination. 2) Inform public of potential risks and how to be prepared. 3) Develop a flood emergency plan for City. 4) Update City codes as needed. 5) Identify critical infrastructure that might be affected by flooding, such as Pump Station #4, and develop maintenance and mitigation plans. 6) Develop mitigation plans for flood risks.</p>			
Lead Agency	City of Pateros with support from Okanogan County Emergency Management, Douglas PUD, Army Corps of Engineers		
Funding Sources	FEMA Pre-Disaster Mitigation Grant, Flood Mitigation Assistance Grant Program, Army Corps of Engineers Most of the work would be performed in-house. There may be a need to bring on a private contractor/consultant with external funding to help further analyze specific risks, emergency response, and mitigation of risks specific to Pateros.		

Revised Projects:

6.3.d. Encourage homeowners in flood prone areas to participate in the National Flood Insurance Program.

EARTHQUAKE

Project ID: PAT-EQ-1.20			
Hazard	Priority	Cost	Timeline
Earthquake	High Score: 87.5	1) Medium 2) Low 3) Low 4) Medium	New project for 2022 update 1) 2024-2025 2) 2025 3) 2025 4) 2026
<p>Description of the Problem: Probability of an earthquake is low for Okanogan County and Pateros. Significant threats by earthquake are damage and collapse of unreinforced masonry structures and damage to critical infrastructure like bridges, public works and municipal facilities. Much of Pateros,</p>			

including the downtown business district, and municipal and public works buildings are built on 3-20' of fill and are likely susceptible to liquefaction.	
Description of the Project: Conduct further analysis of earthquake hazards, develop emergency response plans, update City codes, and educate the public. Through this process further identify mitigation projects.	
1) Conduct further analysis of earthquake hazards. 2) Develop emergency response plans. 3) Update City codes as necessary. 4) Identify critical infrastructure that might be affected by earthquake damage, collapse or liquefaction, such as the downtown businesses district, chemical and gas storage, and municipal and public work facilities.	
Lead Agency	City of Pateros with support from Okanogon County Emergency Management and Private consultants
Funding Sources	FEMA Pre-Disaster Mitigation Grant Program, Building Blocks for Sustainable Communities, Community Development Block Grants Some of the work may be performed in-house. There will be a need to bring on a private contractor/consultant with external funding to help further analyze specific risks, emergency response, and mitigation of risks specific to Pateros.

LANDSLIDE

Project ID: PAT-LS-1.21			
Hazard	Priority	Cost	Timeline
Landslide	High Score: 60	Low	New project for the 2022 update. Initiate by 2023 and complete by 2024.
Description of the Problem: There are multiple areas within and around the City of Pateros that could produce small to moderate landslides. Landslide hazard areas could directly and indirectly affect the town, but the potential of these hazard areas to produce landslides is not fully understood.			
Description of the Project: Work with Okanogon County to determine if any action needs to be taken to address landslide hazard areas that are adjacent to the City of Pateros.			
Lead Agency	Town of Pateros with support from Okanogon County		
Funding Sources	Local funding, FEMA Pre-Disaster Mitigation Grant Program		

SEVERE WEATHER

There are no severe weather specific projects to include at this time. Refer to the multi-hazard projects above.

Completed Projects:

6.3.c. Purchase and install generator City Hall and domestic drinking water system.

Chapter 6: Mitigation Strategy

WILDFIRE

There are no wildfire specific projects to include at this time. Refer to the multi-hazard projects above.

Completed Projects:

Projects that were completed after the 2014 Carlton Complex Fire (Projects were not included in the 2014 Okanogan County HMP):

- Water Tank Erosion Control Geotechnical Report – Consultants review of hazards to critical infrastructure of the city due to burned slopes. Report concluded slope stabilization was required
- Water Tank Erosion Control PS & E – Project design and engineering, preparation of bid and construction documents, procurement of easements and field surveys.
- Water Tank Erosion Control Construction – Hydro-seeding, installation of straw wattles, native shrubs, ecology blocks for retainage, gravel surfacing, and erosion control fabric
- Water Tank Permanent Repairs – Removal of soot from tanks and prep for artwork to be re-installed.
- Emergency Response/Protective Measures – Activities and coordination related to emergency measures taken to protect health and safety of the community. Reimbursements for staff wages related to emergency response; city equipment use and repairs; generator use and fuel; fire equipment use, repairs, and replacements; and capping of sewer connections.
- Debris Removal – Removal of debris from curb to landfill, including vegetative debris, metal, and ash and trash. Concrete grinding is still to be completed.
- Equipment Damages – Repair of fire engine #11
- FMAG – State reimbursement for use of city equipment during wildfire
- Insurance – Water tower mechanical room and equipment replacement; structural assessment report; repairs to equipment; replacement of freezer and fridge at fire hall; cleaning of smoke of city hall; replacement of reflective art on water reservoirs.
- Donated Materials – The value of donated materials is used as city match. Careful record keeping of volunteer labor and donated materials will more than cover the 12.5% required portion of FEMA grants.

Projects listed in 2015 (these are likely complete -need to confirm)

<p>WATER SYSTEM PLAN IMPROVEMENTS</p> <p><u>EXISTING Water Storage Deficiencies</u> Inadequate storage volume – 300,000 gal. System pressure below minimums Available fire flow below criteria Old and deteriorated reservoirs Peak demands exceed water rights Qi</p> <p><u>PROPOSED Water Storage Improvements</u> Construct new tank(s) of greater capacity and higher elevation – 500,000+ Gal</p>	<p><u>EXISTING Water Supply Deficiencies</u> Extremely high manganese Levels Supply capacity barely adequate to meet present demands Source capacity less than Department of Health requirement Limited well service life remaining</p> <p><u>PROPOSED Water Supply Improvements</u> Replace existing wells with new wells of greater total capacity and in a location with low manganese levels</p>	<p><u>EXISTING Fire Protection Coverage Deficiencies</u> Inadequate hydrant coverage</p> <p><u>PROPOSED Fire Protection Improvements</u> Evaluate and install additional hydrants</p>
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Deleted Projects:

6.3.e. Continue to work on actions items and proposed projects in the OC CWPP (too general; the city has worked on numerous wildfire projects since the last plan update).

TOWN OF NESPELEM

MULTI-HAZARD

Project ID: NES-MH-1.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be on-going; the projects in the HMP/CWPP will be reviewed and updated annually, at minimum, by the assembled committee.
<p>Description of the Problem: Severe natural hazard events that impact Nespelem could result in financial losses and property damage. Mitigation project exploration and implementation strategies are needed to identify the changing needs of the town for mitigation work.</p>			
<p>Description of the Project: Once a dedicated team has been established, this project will be a continuous effort that addresses evolving natural hazard risk within the town and through which mitigation projects will be developed and implemented. This project captures the commitment of Nespelem to reviewing, updating, and pursuing the mitigation projects that are included in the hazard mitigation plan (HMP) and community wildfire protection plan (CWPP):</p> <ul style="list-style-type: none"> • Step 1: Identify a committed group of individuals who will meet annually, or as often as is needed, to review the Nespelem content in the HMP/CWPP (for example, a local LEPC group may handle this task by committing to reviewing the HMP/CWPP at the first meeting of each calendar year). • Step 2: Once a committee is assembled and a meeting schedule has been determined, those individuals will discuss recent hazard events that have affected the town as well as vulnerabilities in the town to those hazards. From that information, the mitigation projects in the HMP/CWPP will be reviewed, revised, and supplemented with new projects as needed. • Step 3: Assign mitigation projects to individuals who will look for and pursue funding opportunities. This person may serve as the lead on the project, but the committee will support their efforts. • Step 4: Update the list of projects or update project status in the HMP/CWPP at the next annual review (for example, the first LEPC meeting of the following calendar year). Wildfire projects should be included in NES-WF-1.21 (below). <p>These steps will be followed each year to ensure that the Town of Nespelem is actively engaged in identifying hazard areas and performing mitigation work in the town.</p>			
Lead Agency	Mayor, City Council, City Department with support from First Responders, Okanogan County Emergency Management, USFS, WA DNR, Okanogan Conservation District		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program		

Project ID: NES-MH-2.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard: FL, SW, WF, PA	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be an on-going effort that will occur at least annually.
<p>Description of the Problem: Public education campaigns to promote natural hazard awareness need to be regularly evaluated, updated, and modified based on changing conditions at multiple scales; from the Nespelem town limits to the greater Pacific Northwest region.</p>			
<p>Description of the Project: A group of individuals will be selected to lead the review, update, and modification of public education and awareness materials related to natural hazards. This group will meet annually, or as often as is needed, to review the Town's public outreach and awareness programs and decide if any changes need to be made. Priority items may include the distribution of information related to:</p> <ul style="list-style-type: none"> • Encourage homeowners to participate in the NFIP and provide information about flood mitigation activities (e.g. filling and placing sandbags). • Storm hazards and mitigation measures that can be taken to reduce home damage resulting from severe storms or storm winds. • Encourage residents to have supplies (blankets, flashlights, batteries, food, water, etc.) and plans for sheltering in place. This is particularly important for severe weather events which happen regularly in the county. • Wildland fire hazards and actions that can be taken to reduce fire risk around individual homes and awareness of evacuation notifications and procedures. • Updates related to COVID-19, or pandemics in general, and preparedness/prevention measures that can be taken. 			
Lead Agency	Mayor, City Council, City Department with support from First Responders, USFS, WA DNR, Okanogan Conservation District, Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Firewise Fuel Mitigation Grant Program		

Revised Projects:

6.8.a. Educate citizens on how to minimize hazards on their property.

6.8.b. Conduct community-wide multi-hazard risk assessment and prioritize hazards for planning and mitigation projects.

WILDLAND FIRE

Project ID: NES-WF-1.21			
Hazard	Priority	Cost	Timeline
Wildfire	Medium Score: 77.8	Low to High	This project is on-going; new projects will be identified and added to this table at each annual update (as needed). The bulleted projects will be completed by the end of the planning cycle.
<p>Description of the Problem: Addressing wildland fire hazards is a continuous effort as conditions in the fire environment and the hazards they present to life and property are constantly changing. To address wildland fire hazards as effectively as possible, all stakeholders in the town need to identify any plans, mitigation projects, education and outreach programs, or capacity-building needs that make Nespelem a more wildfire resistant and resilient community. The objective of this project is to, through communication and coordination of different stakeholders, maintain a list of current wildland fire mitigation action items or participate in or adopt County wildland fire mitigation action items that will improve wildfire awareness, preparation, and response in the town. In addition to all entities concerned with fire, stakeholders should also include soil and conservation districts, parks and recreation, highway and roads, private residents, and other non-traditional wildland fire planning partners.</p>			
<p>Description of the Project: The following wildfire project(s) is/are the current priority of the Town of Nespelem; this list will be updated as needed:</p> <ul style="list-style-type: none"> Review wildland fire projects in the Okanogan County annex and determine if the Town of Nespelem would benefit from any of those projects and should, therefore, actively participate in the implementation of those projects. 			
Lead Agency	Mayor, City Council with support from First Responders and CWPP Steering Committee		
Funding Sources	Washington DNR, FEMA Pre-Disaster Mitigation Grants, Firewise Fuel Mitigation Grant Program, Urban and Community Forest Program		

Revised Projects:

6.8.c. Continue to work on actions items and proposed projects in the OC CWPP.

TOWN OF ELMER CITY

MULTI-HAZARD

Project ID: ELM-MH-1.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be on-going; the projects in the HMP/CWPP will be reviewed and updated annually, at minimum, by the assembled committee.
<p>Description of the Problem: Severe natural hazard events that impact Elmer City could result in financial losses and property damage. Mitigation project exploration and implementation strategies are needed to identify the changing needs of the town for mitigation work.</p>			
<p>Description of the Project: Once a dedicated team has been established, this project will be a continuous effort that addresses evolving natural hazard risk within the town and through which mitigation projects will be developed and implemented. This project captures the commitment of Elmer City to reviewing, updating, and pursuing the mitigation projects that are included in the hazard mitigation plan (HMP) and community wildfire protection plan (CWPP):</p> <ul style="list-style-type: none"> • Step 1: Identify a committed group of individuals who will meet annually, or as often as is needed, to review the Elmer City content in the HMP/CWPP (for example, a local LEPC group may handle this task by committing to reviewing the HMP/CWPP at the first meeting of each calendar year). • Step 2: Once a committee is assembled and a meeting schedule has been determined, those individuals will discuss recent hazard events that have affected the town as well as vulnerabilities in the town to those hazards. From that information, the mitigation projects in the HMP/CWPP will be reviewed, revised, and supplemented with new projects as needed. • Step 3: Assign mitigation projects to individuals who will look for and pursue funding opportunities. This person may serve as the lead on the project, but the committee will support their efforts. • Step 4: Update the list of projects or update project status in the HMP/CWPP at the next annual review (for example, the first LEPC meeting of the following calendar year). Wildfire projects should be included in ELM-WF-1.21 (below). <p>These steps will be followed each year to ensure that the Town of Elmer City is actively engaged in identifying hazard areas and performing mitigation work in the town.</p>			
Lead Agency	Mayor, City Council, City Department with support from First Responders, Okanogan County Emergency Management, USFS, WA DNR, Okanogan Conservation District		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program		

Project ID: ELM-MH-2.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard: SW, WF, PA	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be an on-going effort that will occur at least annually.
<p>Description of the Problem: Public education campaigns to promote natural hazard awareness need to be regularly evaluated, updated, and modified based on changing conditions at multiple scales; from the Elmer City limits to the greater Pacific Northwest region.</p>			
<p>Description of the Project: A group of individuals will be selected to lead the review, update, and modification of public education and awareness materials related to natural hazards. This group will meet annually, or as often as is needed, to review the Town's public outreach and awareness programs and decide if any changes need to be made. Priority items may include the distribution of information related to:</p> <ul style="list-style-type: none"> • Storm hazards and mitigation measures that can be taken to reduce home damage resulting from severe storms. • Encourage residents to have supplies (blankets, flashlights, batteries, food, water, etc.) and plans for sheltering in place. This is particularly important for severe weather events which happen regularly in the county. • Wildland fire hazards and actions that can be taken to reduce fire risk around individual homes and awareness of evacuation notifications and procedures. • Updates related to COVID-19, or pandemics in general, and preparedness/prevention measures that can be taken. 			
Lead Agency	Mayor, City Council, City Department with support from First Responders, USFS, WA DNR, Okanogan Conservation District, Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Firewise Fuel Mitigation Grant Program		

Revised Projects:

6.7.a. Educate citizens on how to minimize hazards on their property.

6.7.b. Conduct community-wide multi-hazard risk assessment and prioritize hazards for planning and mitigation projects.

FLOOD

Project ID: ELM-FL-1.21			
Hazard	Priority	Cost	Timeline
Flood	High Score: 77.8	Low to Moderate	New project for 2022. Initiate Phase 1 by the end of 2022. Initiate Phase 2 as quickly as possible after Phase 1 is completed.

Description of the Problem: There is a drainage that runs through the middle of town that presents a flash flood risk because of an undersized culvert. Heavy rains or runoff could inundate the culvert and cause localized flooding.	
Description of the Project: Replace the undersized culvert and make any other improvements to the drainage that are necessary for flood protection. <ul style="list-style-type: none"> • Phase 1: Determine all necessary drainage improvements through project scoping. • Phase 2: Project implementation. 	
Lead Agency	Town of Elmer City Public Works with support from Okanogan County Emergency Management
Funding Sources	FEMA Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Public Works Board, Rural Community Assistance Corporation, Washington Transportation Improvement Board

WILDLAND FIRE

Project ID: ELM-WF-1.21			
Hazard	Priority	Cost	Timeline
Wildfire	Medium Score: 77.8	Low to High	This project is on-going; new projects will be identified and added to this table at each annual update (as needed). The bulleted projects will be completed by the end of the planning cycle.
Description of the Problem: Addressing wildland fire hazards is a continuous effort as conditions in the fire environment and the hazards they present to life and property are constantly changing. To address wildland fire hazards as effectively as possible, all stakeholders in the City need to identify any plans, mitigation projects, education and outreach programs, or capacity-building needs that make Elmer City a more wildfire resistant and resilient community. The objective of this project is to, through communication and coordination of different stakeholders, maintain a list of current wildland fire mitigation action items or participate in or adopt County wildland fire mitigation action items that will improve wildfire awareness, preparation, and response in the town. In addition to all entities concerned with fire, stakeholders should also include soil and conservation districts, parks and recreation, highway and roads, private residents, and other non-traditional wildland fire planning partners.			
Description of the Project: The following wildfire project(s) is/are the current priority of the Town of Elmer City; this list will be updated as needed: <ul style="list-style-type: none"> • Review wildland fire projects in the Okanogan County annex and determine if the Town of Elmer City would benefit from any of those projects and should, therefore, actively participate in the implementation of those projects. • Participate in CWPP update and identify areas outside of Elmer City that present a fire risk to the town. Those project areas can be delineated in the CWPP and identified as areas that need fuels reduction projects. 			

<ul style="list-style-type: none"> Evaluate the current fire department equipment and resource needs and include those items in the CWPP (Items could include vehicles, tools, water supply improvements, etc.). 	
Lead Agency	Mayor, City Council with support from First Responders and CWPP Steering Committee
Funding Sources	Washington DNR, FEMA Pre-Disaster Mitigation Grants, Firewise Fuel Mitigation Grant Program, Urban and Community Forest Program

Revised Projects:

6.7.c. Continue to work on actions items and proposed projects in the OC CWPP.

TOWN OF COULEE DAM

MULTI-HAZARD

Project ID: COU-MH-1.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be on-going; the projects in the HMP/CWPP will be reviewed and updated annually, at minimum, by the assembled committee.
<p>Description of the Problem: Severe natural hazard events that impact Coulee Dam could result in financial losses and property damage. Mitigation project exploration and implementation strategies are needed to identify the changing needs of the town for mitigation work.</p>			
<p>Description of the Project: Once a dedicated team has been established, this project will be a continuous effort that addresses evolving natural hazard risk within the town and through which mitigation projects will be developed and implemented. This project captures the commitment of Coulee Dam to reviewing, updating, and pursuing the mitigation projects that are included in the hazard mitigation plan (HMP) and community wildfire protection plan (CWPP):</p> <ul style="list-style-type: none"> • Step 1: Identify a committed group of individuals who will meet annually, or as often as is needed, to review the Coulee Dam content in the HMP/CWPP (for example, a local LEPC group may handle this task by committing to reviewing the HMP/CWPP at the first meeting of each calendar year). • Step 2: Once a committee is assembled and a meeting schedule has been determined, those individuals will discuss recent hazard events that have affected the town as well as vulnerabilities in the town to those hazards. From that information, the mitigation projects in the HMP/CWPP will be reviewed, revised, and supplemented with new projects as needed. • Step 3: Assign mitigation projects to individuals who will look for and pursue funding opportunities. This person may serve as the lead on the project, but the committee will support their efforts. • Step 4: Update the list of projects or update project status in the HMP/CWPP at the next annual review (for example, the first LEPC meeting of the following calendar year). Wildfire projects should be included in NES-WF-1.21 (below). <p>These steps will be followed each year to ensure that the Town of Coulee Dam is actively engaged in identifying hazard areas and performing mitigation work in the town.</p>			
Lead Agency	Mayor, City Council, City Department with support from First Responders, Okanogan County Emergency Management, USFS, WA DNR, Okanogan Conservation District		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program		

Project ID: COU-MH-2.21			
Hazard	Priority	Cost	Timeline
Multi-Hazard: FL, SW, WF, PA	High Score: 75.0	Low	This project will begin by the end of 2022, but it will be an on-going effort that will occur at least annually.
<p>Description of the Problem: Public education campaigns to promote natural hazard awareness need to be regularly evaluated, updated, and modified based on changing conditions at multiple scales; from the Coulee Dam town limits to the greater Pacific Northwest region.</p>			
<p>Description of the Project: A group of individuals will be selected to lead the review, update, and modification of public education and awareness materials related to natural hazards. This group will meet annually, or as often as is needed, to review the Town's public outreach and awareness programs and decide if any changes need to be made. Priority items may include the distribution of information related to:</p> <ul style="list-style-type: none"> • Encourage homeowners to participate in the NFIP and provide information about flood mitigation activities (e.g. filling and placing sandbags). • Storm hazards and mitigation measures that can be taken to reduce home damage resulting from severe storms or storm winds. • Encourage residents to have supplies (blankets, flashlights, batteries, food, water, etc.) and plans for sheltering in place. This is particularly important for severe weather events which happen regularly in the county. • Wildland fire hazards and actions that can be taken to reduce fire risk around individual homes and awareness of evacuation notifications and procedures. • Updates related to COVID-19, or pandemics in general, and preparedness/prevention measures that can be taken. 			
Lead Agency	Mayor, City Council, City Department with support from First Responders, USFS, WA DNR, Okanogan Conservation District, Okanogan County Emergency Management		
Funding Sources	Local sources, participating agencies, Pre-Disaster Mitigation Grant Program, Flood Mitigation Assistance Grant Program, Firewise Fuel Mitigation Grant Program		

Revised Projects

6.8.a. Increase public education and work closely with and support all county and community partners to prepare for and recover from disasters.

6.8.b. Conduct community-wide multi-hazard risk assessment and prioritize hazards for planning and mitigation projects.

WILDLAND FIRE

Project ID: COU-WF-1.21			
Hazard	Priority	Cost	Timeline
Wildfire	Medium Score: 77.8	Low to High	This project is on-going; new projects will be identified and added to this table at each annual update (as needed). The bulleted projects will be completed by the end of the planning cycle.
<p>Description of the Problem: Addressing wildland fire hazards is a continuous effort as conditions in the fire environment and the hazards they present to life and property are constantly changing. To address wildland fire hazards as effectively as possible, all stakeholders in the town need to identify any plans, mitigation projects, education and outreach programs, or capacity-building needs that make Coulee Dam a more wildfire resistant and resilient community. The objective of this project is to, through communication and coordination of different stakeholders, maintain a list of current wildland fire mitigation action items or participate in or adopt County wildland fire mitigation action items that will improve wildfire awareness, preparation, and response in the town. In addition to all entities concerned with fire, stakeholders should also include soil and conservation districts, parks and recreation, highway and roads, private residents, and other non-traditional wildland fire planning partners.</p>			
<p>Description of the Project: The following wildfire project(s) is/are the current priority of the Town of Coulee Dam; this list will be updated as needed:</p> <ul style="list-style-type: none"> • Review wildland fire projects in the Okanogan County annex and determine if the Town of Coulee Dam would benefit from any of those projects and should, therefore, actively participate in the implementation of those projects. • Participate in CWPP update and identify areas outside of Coulee Dam that present a fire risk to the town. Those project areas can be delineated in the CWPP and identified as areas that need fuels reduction projects. • Evaluate the current fire department equipment and resource needs and include those items in the CWPP (Items could include vehicles, tools, water supply improvements, etc.). 			
Lead Agency	Mayor, City Council with support from First Responders and CWPP Steering Committee		
Funding Sources	Washington DNR, FEMA Pre-Disaster Mitigation Grants, Firewise Fuel Mitigation Grant Program, Urban and Community Forest Program		

Revised Projects:

6.8.c. Continue to work on actions items and proposed projects in the OC CWPP.

FIRE DEPARTMENTS AND FIRE DISTRICTS

OKANOGAN COUNTY FIRE DISTRICT #2

Project ID: FD2-WF-1.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score:	High	1,2,4	Complete project exploratory efforts by the end of the planning cycle (2026).
Description of the Problem: Currently, the existing Fire District #2 fire station does not fully support the needs of the district. The station is undersized and does not have adequate space for training and equipment.				
Description of the Project: Relocate the fire station to a new lot that can accommodate a new, larger fire station for Fire District #2. The station also needs to be supplied with enough new equipment so firefighters can safely and effectively fight wildfires within the district.				
Lead Agency	Fire Districts			
Support / Potential Resources	County Commissioners			

Revised Projects:

6.4.h: Facility, land, and basic equipment for a larger Okanogan County Fire District #2 fire station.

OKANOGAN COUNTY FIRE DISTRICT #3

Project ID: FD3-WF-1.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score:	High	1,2,4	Complete project exploratory efforts by the end of the planning cycle (2026).
Description of the Problem: Currently, the existing Fire District #3 fire station does not fully support the needs of the district. Additional facilities would increase the capacity of the district to respond to fires and provide better protection.				
Description of the Project: Obtain land and basic equipment for three small, one-engine stations on the outskirts of Okanogan County Fire District #3				
Lead Agency	Fire Districts			
Support / Potential Resources	County Commissioners			

Project ID: FD3-WF-2.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score:	High	1,2,4	Complete fleet assessment by the end of 2022 Obtain trucks by end of 2024
Description of the Problem: Some of the Fire District #3 fire engines will either need to be replaced or the current fleet of trucks will need to be supplemented with newer fire engines.				
Description of the Project: Evaluate district fire engines and obtain three Type 4 engines for Okanogan County Fire District #3				
Lead Agency	Fire Districts			
Support / Potential Resources	County Commissioners			

Project ID: FD3-WF-3.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score:	High	1,2,4	Complete project exploratory efforts by the end of the planning cycle (2026).
Description of the Problem: Currently, the existing Fire District #3 fire stations do not fully support the needs of the district. The stations are undersized and do not have adequate space for training and equipment.				
Description of the Project: Increase station capacity to house equipment at all three Okanogan County Fire District #3 stations				
Lead Agency	Fire Districts			
Support / Potential Resources	County Commissioners			

Project ID: FD3-WF-4.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score:	High	1,2,4	Revised for 2022; this project will be completed by the end of 2022
Description of the Problem: The City of Okanogan Fire Department and Fire District #3 often share space and resources and support one another while fulfilling firefighting responsibilities. As both entities already share space, it would be beneficial to have a fire station designed to support both entities under one roof.				
Description of the Project: Facility, land, and basic equipment for a joint City of Okanogan/Fire District #3 fire station. <i>(This project is repeated in the City of Okanogan Annex as OKA-WF-3.21C).</i>				

Lead Agency	Fire Districts
Support / Potential Resources	County Commissioners

Project ID: FD3-WF-5.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score:	Medium	1,2,4	Revised for 2022; this project will be completed by the end of 2022
Description of the Problem: The primary stations in Fire District #3 need additional daytime staffing to support operations.				
Description of the Project: Additional funding to provide paid daytime staff for primary stations in Fire District #3 (<i>The City of Okanogan Fire Department has a similar project listed as OKA-WF-2.21C in the City of Okanogan Annex</i>).				
Lead Agency	Fire Districts			
Support / Potential Resources	County Commissioners			

Revised Projects:

6.4.e (CWPP): Facility, land, and basic equipment for a joint City of Okanogan/Fire District #3 fire station

6.4.i (CWPP): Facility, land, and basic equipment for a three small one engine stations on outskirts of Okanogan County Fire District #3

6.4.p (CWPP): Obtain three Type 4 engines for Okanogan County Fire District #3.

6.4.r (CWPP): Increase station capacity to house equipment at all three Okanogan County Fire District #3 stations.

OKANOGAN COUNTY FIRE DISTRICT #4

Project ID: FD4-WF-1.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score:	High	1,2,4	Complete project exploratory efforts by the end of the planning cycle (2026).
Description of the Problem: Currently, the existing Fire District #4 fire station does not fully support the needs of the district. An additional facility near Crumbacher would increase the capacity of the district to respond to fires and provide better protection.				

Description of the Project: Obtain land and basic equipment for a satellite station near Crumbacher in Okanogan County Fire District #4	
Lead Agency	Fire Districts
Support / Potential Resources	County Commissioners

Completed Projects:

6.4.o: Obtain newer structural engine and thermal imager for Okanogan County Fire District #4.

Revised Projects:

6.4.n: Facility, land, and basic equipment for a satellite station near Crumbacher in Okanogan County Fire District #4.

OKANOGAN COUNTY FIRE DISTRICT #6

Project ID: FD6-WF-1.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score:	High	1,2,4	Revised for 2022; this project will be completed by the end of 2022
Description of the Problem: Currently, the existing Fire District #6 fire station does not fully support the needs of the district. The station is undersized and does not have adequate space for training and equipment.				
Description of the Project: Relocate the fire station to a new lot that can accommodate a new, larger fire station for Fire District #6. The station also needs to be supplied with enough new equipment so firefighters can safely and effectively fight wildfires within the district.				
Lead Agency	Fire Districts			
Support / Potential Resources	County Commissioners			

Revised Projects:

6.4.m: Facility, land, and basic equipment for a new Winthrop fire station in Okanogan County Fire District #6.

OKANOGAN COUNTY FIRE DISTRICT #7

Project ID: FD7-WF-1.21C				
Hazard	Priority	Cost	Goals	Timeline

Wildfire	Medium Score:		1,2,4	Complete project exploratory efforts by the end of the planning cycle (2026).
Description of the Problem: Currently, the existing Fire District #7 fire station does not fully support the needs of the district. The station is undersized and does not have adequate space for training and equipment.				
Description of the Project Relocate the fire station to a new lot that can accommodate a new, larger fire station for Fire District #7. The station also needs to be supplied with enough new equipment so firefighters can safely and effectively fight wildfires within the district.				
Lead Agency	Fire Districts			
Support / Potential Resources	County Commissioners			

Project ID: FD7-WF-2.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score:	High	1,2,4	Identify all equipment needs by the end of 2022; obtain new equipment by 2023
Description of the Problem: Some of Fire District #7's equipment is becoming worn or outdated and it needs to be replaced.				
Description of the Project: Obtain updated rolling stock (including a water tender), washer & dryer, a hose washer & dryer, and basic life support equipment for Okanogan County Fire District #7				
Lead Agency	Fire Districts			
Support / Potential Resources	County Commissioners			

Revised Projects:

6.4.ad: Facility, land, and basic equipment for a new fire hall for Okanogan County Fire District #7.

6.4.ae: Obtain updated rolling stock (including a water tender), washer & dryer, a hose washer & dryer, and basic life support equipment for Okanogan County Fire District #7.

OKANOGAN COUNTY FIRE DISTRICT #9

Project ID: FD9-WF-1.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score:		1,2,4	Complete project exploratory efforts by the end of the planning cycle (2026).

Description of the Problem: Currently, the existing Fire District #9 fire station does not fully support the needs of the district. The station is undersized and does not have adequate space for training and equipment.	
Description of the Project: Build a new, larger fire station on a new lot that can accommodate the needs of Fire District #9. The station also needs to be supplied with enough new equipment so firefighters can safely and effectively fight wildfires within the district.	
Lead Agency	Fire Districts
Support / Potential Resources	County Commissioners

Project ID: FD9-WF-2.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score:	High	1,2,4	Identify all equipment needs by the end of 2022; obtain new equipment by 2023
Description of the Problem: Fire District #9's equipment needs to be supplemented with additional vehicles and tools that will increase the district's capacity to respond to wildfires.				
Description of the Project: Obtain a water tender, two brush trucks, and draftable mobile pumps for Okanogan County Fire District #9				
Lead Agency	Fire Districts			
Support / Potential Resources	County Commissioners			

Revised Projects:

6.4.x: Facility, land, and basic equipment for a fire station in Okanogan County Fire District #9.

6.4.y: Obtain a water tender, two brush trucks, and draftable mobile pumps for Okanogan County Fire District #9.

OKANOGAN COUNTY FIRE DISTRICT #11

Project ID: FD11-WF-1.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score:	High	1,2,4	Complete project exploratory efforts by the end of the planning cycle (2026).
Description of the Problem: Currently, the existing Fire District #11 fire station does not fully support the needs of the district. Additional facilities would increase the capacity of the district to respond to fires and provide better protection.				

Description of the Project: Construct a new facility, develop a business plan, and obtain basic equipment for an Okanogan County Fire District #11 satellite station in the Havillah area.	
Lead Agency	Fire Districts
Support / Potential Resources	County Commissioners

Project ID: FD11-WF-2.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score:	Low to Medium	1,2,4	This project is on-going so the next phase will be completed by the end of 2022
Description of the Problem: To increase the district's capacity to respond to structure fires, Fire District #11 needs additional equipment and advanced training for firefighters.				
Description of the Project: Obtain structural equipment, air packs, and necessary training for Okanogan County Fire District #11				
Lead Agency	Fire Districts			
Support / Potential Resources	County Commissioners			

Project ID: FD11-WF-3.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score:	Low to Medium	1,2,4	This project is on-going so the next phase will be completed by the end of 2022
Description of the Problem: To increase the district's capacity to respond to wildfires, Fire District #11 needs new vehicles, additional equipment, and advanced training for firefighters.				
Description of the Project: Obtain updated rolling stock equipped with both fire and rescue gear for Okanogan County Fire District #11, and funding for advanced training.				
Lead Agency	Fire Districts			
Support / Potential Resources	County Commissioners			

Project ID: FD11-WF-4.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score:	Medium to High	1,2,4	2018 action item is partially completed; the next phase will be completed by end of 2022

Description of the Problem: Currently, the existing Fire District #11 fire stations do not fully support the needs of the district. The stations are undersized and do not have adequate space for training and equipment.	
Description of the Project: Expand storage and bay capacity of both the Molson and Chesaw Fire Stations in Okanogan County Fire District #11.	
Lead Agency	Fire Districts
Support / Potential Resources	County Commissioners

Project ID: FD11-WF-5.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score:	Low	1,2,4	This project is on-going so the next phase will be completed by the end of 2022
Description of the Problem: To increase the district's capacity to respond to wildfires, Fire District #11 needs updated equipment.				
Description of the Project: Updated turnouts and wildland firefighting personal gear for Okanogan County Fire District #11.				
Lead Agency	Fire Districts			
Support / Potential Resources	County Commissioners			

Revised Projects:

6.4.u: Facility, business plan, and basic equipment for an Okanogan County Fire District #11 satellite station in the Havillah area.

6.4.v: Obtain structural equipment, air packs, and necessary training for Okanogan County Fire District #11.

6.4.ak: Obtain updated rolling stock equipped with both fire and rescue gear for Okanogan County Fire District #11, and funding for advanced training.

6.4.al: Expand storage and bay capacity of both the Molson and Chesaw Fire Stations in Okanogan County Fire District #11.

6.4.am: Updated turnouts and wildland firefighting personal gear for Okanogan County Fire District #11.

OKANOGAN COUNTY FIRE DISTRICT #12

Project ID: FD12-WF-1.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score:	High	1,2,4	Equipment needs will be evaluated and summarized by the end of 2022. The District will pursue new equipment by end of 2022.
Description of the Problem: To increase the district's capacity to respond to wildfires, Fire District #12 needs updated equipment and vehicles.				
Description of the Project: Obtain updated rolling stock for Okanogan County Fire District #12				
Lead Agency		Fire Districts		
Support / Potential Resources		County Commissioners		

Project ID: FD12-WF-2.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score:	High	1,2,4	Complete project exploratory efforts by the end of the planning cycle (2026).
Description of the Problem: Currently, the existing Fire District #12 fire station does not fully support the needs of the district. A new facility would increase the capacity of the district to respond to fires and provide better protection.				
Description of the Project: Obtain funding for land and a new station at a better location in Okanogan County Fire District #12.				
Lead Agency		Fire Districts		
Support / Potential Resources		County Commissioners		

Revised Projects:

6.4.ah: Obtain updated rolling stock for Okanogan County Fire District #12.

6.4.ai: Obtain funding for land and a new station at a better location in Okanogan County Fire District #12.

OKANOGAN COUNTY FIRE DISTRICT #15

Project ID: FD15-WF-1.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	High Score:	High	1,2,4	Complete project exploratory efforts by the end of the planning cycle (2026).

Description of the Problem: Currently, the existing Fire District #15 fire station does not fully support the needs of the district. Additional facilities would increase the capacity of the district to respond to fires and provide better protection.	
Description of the Project: Obtain land and basic equipment for a new station in the Alta Lake area on Okanogan County Fire District #15.	
Lead Agency	Fire Districts
Support / Potential Resources	County Commissioners

Revised Projects:

6.4.j: Facility, land, and basic equipment for a new station in the Alta Lake area on Okanogan County Fire District #15

OKANOGAN COUNTY FIRE DISTRICT #16

Project ID: FD16-WF-1.21C				
Hazard	Priority	Cost	Goals	Timeline
Wildfire	Medium Score:	High	1,2,4	Need to confirm the status of this project. Has it been completed?
Description of the Problem: Currently, the existing Fire District #16 fire station does not fully support the needs of the district. A new facility/additional facilities would increase the capacity of the district to respond to fires and provide better protection.				
Description of the Project: Facility (including recruitment and training program) for the new Okanogan County Fire District #16				
Lead Agency	Fire Districts			
Support / Potential Resources	County Commissioners			

Revised Projects:

6.4.ag: Facility (including recruitment and training program) for the new Okanogan County Fire District #16.

6.4.aj: Obtain two Type 6 4x4 wildland trucks, one Type 4 4x4 wildland truck, two 2,500+ gallon tenders, one short wheel-base 4x4 structure truck for Okanogan County Fire District #16, and funding for advanced training.

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CHAPTER 7: APPENDICES

IN THIS SECTION:

- Appendix 1: Agendas and Sign-in Sheets
- Appendix 2: Understanding Mudflow and the NFIP
- Appendix 3: STAPLEE Scoring System
- Appendix 4: Capability Assessment
- Appendix 5: Lost of Figures & List of Tables

CHAPTER 7 – APPENDICES


APPENDIX 1 – AGENDAS AND SIGN-IN SHEETS

PLANNING GROUP MEETING DOCUMENTATION

OCTOBER 30, 2019

A G E N D A	Okanogan County Hazard Mitigation Plan Update Wednesday, October 30, 2019 1:30 p.m. – 3:30 p.m. Okanogan County Commissioners Hearing Room 123 5th Ave North, Okanogan, WA	
1:30 p.m.	LEPC Meeting	Okanogan County Emergency Management
1:50 p.m. 2:00 p.m.	Opening Introductions HMP Kickoff Meeting I. Overview of Hazard Mitigation Plan Update ✓ Presentation of the HMP process II. The Planning Team ✓ Adopting Jurisdictions i. Responsibilities/Expectations ii. Representation/Point of Contact ✓ Other Planning Partners i. Stakeholders ii. Contributors III. Planning Philosophy and Goals ✓ Okanogan County Planning Philosophy i. Mission Statement ii. Vision Statement ✓ Jurisdictional Planning and Mitigation Goals IV. Hazard Summary Worksheet Exercise ✓ Determine Overall Significance Ranking V. What's Next? ✓ Establish Communications ✓ Data and Information Request ✓ Next Meeting and Meeting Schedule ✓ Homework for Next Meeting	NMI/Group
3:15 p.m.	OPEN DISCUSSION	Group
3:30 p.m.	ADJOURNMENT	

FEBRUARY 20, 2020

		
OKANOGAN COUNTY MHMP/CWPP UPDATE Committee Meeting February 20, 2020 1:00 - 3:00 PM Commissioners Hearing Room		
Name: (PLEASE PRINT CLEARLY)	Agency	Phone #
Sheila Corson	Okanogan POD	422- 4822 ⁵⁴²²
Kirsten Cook	okanogan CD	
Kevin Bowling	Omak Fire	826-0760
Kathryn Joy Heilm	Fire Adapted withhrp pr	from 509 341 4113
Rusty Stamps	Okanogan fire Dist 6	509 879-0345
Brad Tucker	Northwest Mgmt.	208-245-1920
Eric Nelson	" "	208-883-4488
Adam Herrenbrack	" "	208-883-4488
Carlene Anders	City of Pateros ^{OCLTRG}	509-733-0318
Maggie Dungan	Aero Methow Rescue	970-765-4983
Zachett Kope (LAW)	Ok Okanogan EC	425-772-5256
Kim Jacobs	North Valley Hosp	509 486 3109
Ron Wouch	WA DNR	509-429-0167
Maurice Goodall	OK EM	429-2576
Kichie Gora	CCT EMS	634-2439
Robert Seyler	CCT EMS	509-634-2449
ROBERT.SEYLER.EMS@COLVILLETRIBES.COM		
KATHRYN HEILM	KATJOY@CENTURYLINK.NET	
Chris DeFap	Ok Co. Em. Mgmt	422-7206

JUNE 10, 2020

A G E N D A	Okanogan County Hazard Mitigation Plan Update Wednesday, June 10, 2020 2:00 p.m. – 4:00 p.m. Virtual Meeting	
2:00 p.m. 2:15 p.m.	I. Opening Introductions/Updates II. Comments on Chapters 1-3 ✓ Comments received to date have been incorporated ✓ Addition of community profiles ✓ Additional comments III. Hazard Profiles ✓ Comments on original hazards ✓ Introduce ‘new’ hazards IV. Maps ✓ Introduce maps V. Public Meeting Strategy ✓ Develop new strategy VI. Information request reminder ✓ Capability assessments ✓ Critical facilities checklist ✓ Projects VII. Next Meeting ✓ Discuss new hazards and maps ✓ When and where?	Maurice Goodall Northwest Management / Group
3:45 p.m.	Final Comments	CWPP Team
4:00 p.m.	ADJOURNMENT	

Contact Info:

Project Lead: Brad Tucker tucker@northwestmanagement.com Northwest Management Office: 208-883-4488	Eric Nelson nelson@northwestmanagement.com Adam Herrenbruck herrenbruck@northwestmanagement.com	Vaiden Bloch bloch@northwestmanagement.com
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JUNE 24, 2020

A G E N D A	Okanogan County Hazard Mitigation Plan Update Wednesday, June 24, 2020 2:00 p.m. – 4:00 p.m. Virtual Meeting	
2:00 p.m. 2:15 p.m.	I. Opening Introductions/Updates II. Comments on Chapters 1-4 ✓ Some comments still need to be incorporated ✓ Addition of other Community Profiles ✓ New hazard profiles still need to be added ✓ Additional comments III. Hazard Area/Risk Maps ✓ Present new maps ✓ Discuss impacts and impact areas IV. Finalize (?) Public Meeting Strategy ✓ Zoom meeting format V. Information request reminder ✓ Capability assessments ✓ Critical facilities checklist ✓ Projects VI. Next Meeting ✓ Discuss Mitigation Action Items ✓ Update old MAI's? Start over with new MAI's? ✓ Meeting time	Maurice Goodall Northwest Management / Group
3:45 p.m.	Final Comments	CWPP Team
4:00 p.m.	ADJOURNMENT	

Contact Info:

Project Lead: Brad Tucker tucker@northwestmanagement.com Northwest Management Office: 208-883-4488	Eric Nelson nelson@northwestmanagement.com Adam Herrenbruck herrenbruck@northwestmanagement.com	Vaiden Bloch bloch@northwestmanagement.com
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Meeting Notes – Meeting #4: June 24, 2020 2:00 p.m.

These are not “official” meeting minutes. All notes, especially comments made from planning team members, are paraphrased and not direct quotations.

Eric Nelson with Northwest Management, Inc. (NMI) led the meeting.

Comments on chapters 1-4:

- Some comments are still being incorporated and additional components are still in progress
- Are there any additional comments? none at this time

Risk Maps and Hazard Areas: Eric led the group through the maps that were posted.

1. FEMA flood zones
 - Overall flood map is zoomed way out to include the entire county but we can include more detailed inset maps about any community or area that the group thinks will be of value.
 - Our flood zone maps for each town/city include building footprints within the flood zone.
 - Please look at these flood zones and think about risk and impacts to your community.
 - We have a key to the legend so that abbreviations are understood.
 - Comment: these are helpful and can they be used for risk assessments in other planning mechanisms? – Yes please do.
2. Dams Map
 - Comment: “major dams” refers to what exactly? This needs clarification.
3. Earthquake Probability Map
 - The model used a fault line in the western part of the state and shows ground shaking intensity is higher in the west side of the county and grows weaker as it moves east.
 - Think about impacts to your community.
 - Comment: what fault line was used? Can we run a model using a scenario similar to a previous earthquake event such as Cascadia or Chelan quakes?
 - Comment: because most existent buildings in the county were likely not built to any earthquake standard or code, the damage could be more serious than “moderate” as is stated in plan.
4. Liquefaction Risk Map
 - This data was provided by the county; it shows the risk of soils behaving like a liquid due to intense ground shaking (seismic activity). Ground shaking disturbs soil particles causing them to rapidly rearrange and behave like a liquid; once ground shaking stops the soil settles and solidifies. Soil liquefaction can destabilize foundations and cause significant damage to buildings and other structures.

- Comment: lower parts of Pateros sit atop fill and are probably prone to liquefaction as sink holes have been observed. Excavation projects have also revealed a high-water table and saturated soils not far below the ground surface.
5. Landslide Risk Map
 - This model utilizes slope to predict landslide prone areas. Does anyone know of better data sources for Okanogan County?
 - The map also shows past slides and landslide prone soils.
 - What impact areas could be examined closer with a more detailed (zoomed in) map?
 - i. comment: Loup Loup Pass, Pateros, Conconully
 6. Fire Districts
 - Comment: add numbers to the polygon to help identify districts since colors are similar and hard to distinguish in the legend.
 7. Historic Fire Map
 - The map is a compilation of agency data (USFS, BLM, BIA) that shows the locations (individual points) of historic fires in the county along with the perimeters of multiple large historic fires.
 - Discussion: What else can be done with the map to make it more meaningful? The following changes were suggested:
 - i. Dataset date-range: the three agency datasets cover different date ranges; they should be the same date range (2020 should be excluded).
 - ii. Color-coding of data points: Instead of representing an agency, perhaps the colors should represent different decades? Point shape could indicate agency.
 - iii. Explore the addition of one or two maps that only display fire points and polygons from fires that occurred since the last plan update.
 - iv. Add names and years to the fire polygons.
 8. Wildfire Hazard Potential
 - This map was created using data from the wildfirerisk.org risk map tool put out by the USFS.
 - Brad Tucker: wildfire “potential” is relative to Okanogan County so it may be green in areas that do have fire potential but less potential than other parts of the county.
 - Multiple comments: What drives the model? What fuel models are used? More information will explain why some areas received green vs. red and will help the group determine if the map is accurately portraying fire potential.
 9. WUI – Wildland Urban Interface Map
 - This is what is present in the previous version of the plan and still needs updating based on development and input from the team but the map can also utilize new or different criteria or modelling.
 - Comment: what does the term “interface” refer to? Answer led to a discussion of the different classifications of WUI that are included in the map legend. Each term describes the distribution and spatial relationship between housing/development and vegetation/wildland fuels.

- Comment: The map seems to be on the right track but some of the degrees of shading are questionable and several members are not sure they are totally accurate.
- Brad Tucker: The levels of shading were developed to assist planners in deciding where to prioritize projects and resources. However, anything with a shade is part of the WUI and should be considered so.
- Comment: the differences in shading can and has in the past led to confusion among landowners. One big concern is that some homeowners will see they live within lighter colored shading and will not think they have any concerns but they in fact do live inside the WUI. Simpler is better.
- We can eliminate the various shades and use one color to represent the whole WUI. This is how the map will be presented after it is updated for development.
- Comment: how were the non-incorporated communities selected? Answer: a standard community layer was used and these were designated in that data.
- Comment: if there is a possibility to change the communities highlighted on the maps, there are several that could be included because they contain some concentration of homes.
- Another option to deciding what communities are highlighted on the maps is to only use incorporated cities and towns.

Public Meeting Strategy:

Nothing is ready to be decided at this time. Carlene met with Nancy to discuss a format and they had an idea to break the meetings into four categories. Carlene will meet with the Northwest team early next week (June 29-30) to work on a plan.

Next Planning Meeting:

Tentatively scheduled for Wednesday July 8, 2:00 – 4:00 p.m.

Meeting Attendance:

- Jord Wilson
- Kevin Bowling
- Sheila Corson
- Carlene Anders
- Kathy Johnson
- Kim Jacobs
- Kirsten Cook
- Eric Nelson
- Brad Tucker
- Adam Herrenbruck

JULY 8, 2020

A G E N D A	Okanogan County Hazard Mitigation Plan Update Wednesday July 8, 2020 2:00 p.m. – 4:00 p.m. Virtual Meeting	
2:00 p.m.	I. Opening Introductions/Updates	Maurice Goodall
2:15 p.m.	II. Any Comments from the Planning Team? ✓ Chapters 1-4 ✓ Chapter 5: County Risk Assessment ✓ Information requests ✓ Maps or discussion from the last meeting ✓ Anything else? III. Hazard Area/Risk Maps ✓ Present updated hazard maps ✓ Review HAZUS, DNR landslide data (?) IV. Public Meeting Strategy ✓ Zoom meeting format ✓ Carlene – Wildfire and fire-flooding meeting ✓ NMI – Multiple meetings to cover other hazards V. Information request reminder ✓ Capability assessments ✓ Critical facilities checklist ✓ Projects VI. Next Meeting ✓ Discuss Mitigation Action Items ✓ Update old MAI's? Start over with new MAI's? ✓ Meeting time	Northwest Management / Group
3:45 p.m.	Final Comments	CWPP Team
4:00 p.m.	ADJOURNMENT	

Contact Info:

Project Lead: Brad Tucker tucker@northwestmanagement.com Northwest Management Office: 208-883-4488	Eric Nelson nelson@northwestmanagement.com	Vaiden Bloch bloch@northwestmanagement.com
	Adam Herrenbruck herrenbruck@northwestmanagement.com	

Meeting Notes – Meeting #5: July 8, 2020 2:00 p.m.

These are not “official” meeting minutes. All notes, especially comments made from planning team members, are paraphrased and not direct quotations.

Eric Nelson with Northwest Management, Inc. (NMI) led the meeting.

Any comments from the planning team:

- None at this time. Most comments provided during the last meeting have been addressed or they are in the process of being addressed.

Risk Maps and Hazard Areas:

- Eric led the group through changes made to the maps that were presented during the last meeting.

10. Changes to Fire History Map

- The information presented in the single map was split into two maps.
 - i. **Large Fire Perimeters map:** map shows only the large fire perimeters but color codes them by year and each fire is labeled with the fire name.
 - a. Note on years included: this map represents three years (2014, 2015, 2016). 2016 is the most recent data we have available to us. If there is a dataset that includes fire perimeters from 2017 – 2019, please share with us. We could have included more years going back before 2014 but the polygons begin to lay on top of each other and it is not as clean of a map. This display shows the large fires since the previous plan was approved.
 - ii. **Fire Points Map:** this displays the fire starts from 2000 to the most recent data available. (For WA DNR and USFS data is up to 2019 and for BIA data is up to 2016) Starts are color-coded by agency. Also, starts are assigned different symbols to represent lightning-caused vs. human-caused.
- **Comment:** the map with all the starts is too busy and would be helpful if natural-caused fire starts are on a separate map from human-caused fire starts.
 - i. **Follow-up comment:** the human-caused starts and the lightning starts should remain on the same map but the differentiation between the agencies reporting is unnecessary and should be removed. This will improve map visuals. The group seems to agree with this and the NMI team will make the proposed changes.
- **Comment:** is there a way to display which starts turned into the large fires presented on the other map?
 - i. **Follow-up comment:** the data used on the starts map does not necessarily include fire name or acres burned, etc.
 - ii. **Follow-up comment:** the solution is to include information on the large-fire perimeters map about how the fire was started.

- a. **Side note:** large recent fires can be broken out into a table within the plan to give more details about each incident (exact dates, acres burned, cause, firefighting costs, etc.)

11. Changes to the WUI Map

- **WUI map:** this is a single-color designation of the WUI to serve as the official WUI map for the plan.
 - i. **Comment:** it is good to have a map like this with a broad definition of WUI to show that pretty much all the county is in the WUI.
- **“Address Point Density” and “Address Point Density with structure layer” maps:** Here we have two versions of the same map. The second version just includes the structure layer that shows the building footprints for the entire county. It expresses the areas that are more densely inhabited than other areas, but all are within the WUI.
 - i. **Comment:** What is the goal/objective of this map? What is its purpose?
 - a. **Explanation:** This map is another tool to be used in conjunction with the WUI map for planning purposes. It is expressing something different than the WUI map, but it is similar. Do the different colors (representing different densities) make sense, or do they detract?
 - b. **Follow-up comment:** the color-coding makes sense and it is useful to have the structures layer. The map is self-explanatory and could potentially be useful in planning or looking at fuel treatment projects. It is another tool.
 - c. **Follow-up comment:** the structures layer is useful and should be included.
 - ii. **Comment:** from a public relations standpoint, do we run the risk of confusing people who see that this map is different than the simpler WUI map?
 - a. **Follow-up discussion summary (multiple comments):** while components of the MHMP or CWPP can and should be used for public education/awareness, these are also planning documents. Having a broadly defined WUI is helpful, both because it can show residents that they are in the WUI, and it can include more areas for funding. Having the simpler WUI map is useful but having maps and tools that show more details is also useful. The latter can assist in planning, policy decisions, and project implementation.
 - b. **Conclusion:** the group seemed to agree that both maps have a place in this plan and that the address point density map with the structure layer should be included.

12. Changes to the Wildfire Hazard Potential Map (USFS)

- **USFS WHP map:** the data did not run correctly and so our GIS team re-created this map. The results changed the areas that were considered “high” and “very high” wildfire potential.
 - i. **Comment:** does this model include all fuel types?
 - a. Yes.
 - ii. **Comment:** this map is not especially useful and does not do much to help the group. This map might be a “no-go”.
 - a. The NMI team will investigate other tools on the USFS wildfire risk website to see if there is another map that might be more useful.

13. HAZUS Earthquake Scenario courtesy of the WA DNR

- The model replicates a 7.2 magnitude event on the Chelan fault south of the county. This is a multi-county county scenario. There are data outputs that are broken out by county, and some of the outputs are regional and not broken out by county. Eric scrolled through the data outputs briefly.
- The maps also show a regional perspective and display all kinds of impacts that an event would have to the region, including to infrastructure, medical facilities, etc. The team members need to review the data in more detail to decide how this information might be utilized in the plan.
 - i. **Comment:** the data will need to be pared down to a few components that are the most applicable.
 - ii. **Comment:** what about a scenario within the county?
 - a. The WA DNR says there are no active faults within Okanogan County.

Public Meeting Strategy:

The meeting has been scheduled for July 23. There will be two identical meetings, one at 10 a.m. and the second at 7 p.m. and they will be virtual meetings hosted by Northwest Management via Adobe Connect and live-streamed on the Okanogan County Emergency Management Facebook page. The meeting will consist of a presentation by the Northwest Management team and members of the planning team might be able to add comments during the presentation if desired. The topics covered will include an overview of the hazard mitigation process, risk in the county, and information about how members of the public will be able to review a draft of the plan and provide feedback.

Next Planning Meeting:

This will be held **Tuesday July 21, 2:00 – 4:00 p.m.** The purpose of the meeting will be to do a practice run of the virtual public meeting. We will also request feedback from the group regarding this meeting. The next planning meeting after the July 21 meeting will likely cover mitigation action items and will be scheduled later.

Meeting Attendance:

- Maurice Goodall
- Kevin Bowling
- Sheila Corson
- Kathy Johnson
- Kirsten Cook
- Rusty Stamps
- Eric Nelson
- Brad Tucker
- Adam Herrenbruck

OCTOBER 21, 2020

A G E N D A	Okanogan County Hazard Mitigation Plan Update Wednesday October 21, 2020 2:00 p.m. – 4:00 p.m. Virtual Meeting	
2:00 p.m. 2:15 p.m.	I. Opening Introductions/Updates II. Any Comments from the Planning Team? ✓ Chapters 1-3 ✓ Draft of Chapters 4 & 5 ✓ Anything since the last meeting? III. Hazard Summary Worksheet ✓ Has anyone completed one for the County? ✓ Complete Hazard Summary as a group (?) IV. Mitigation Action Items (Projects) ✓ Review old projects ✓ Update, modify, or delete old projects ✓ New projects V. Next Meeting ✓ Submit Hazard Summary Worksheets ✓ Bring/submit comments on projects ✓ Meeting time	Maurice Goodall Northwest Management / Group
3:45 p.m.	Final Comments	Planning Team
4:00 p.m.	ADJOURNMENT	

Contact Info:

Project Lead: Brad Tucker tucker@northwestmanagement.com	Eric Nelson nelson@northwestmanagement.com	Vaiden Bloch bloch@northwestmanagement.com
Northwest Management Office: 208-883-4488	Adam Herrenbruck herrenbruck@northwestmanagement.com	

Meeting Notes – Meeting #6: October 21, 2020 2:00 p.m.

These are not “official” meeting minutes. All notes, especially comments made from planning team members, are paraphrased and not direct quotations.

Eric Nelson with Northwest Management, Inc. (NMI) led the meeting.

Meeting Introduction:

- Eric started the meeting with a quick overview of the planning process:
 - No planning team meetings were held between the public meetings (end of July) and the October 21 meeting because of wildfires burning in Okanogan County.
 - During that time, the draft of the Hazard Profiles (chapter 4) and Risk Assessment (chapter 5 – Okanogan County only) was completed and distributed to the planning team for review.

Any comments from the planning team:

- No “big picture” comments concerning the draft of chapters 4 & 5 at this time (the draft has only been available to the group for a little over a week). Planning team members were encouraged to continue to leave comments on the PDF that is available online.
- QUESTION 1: Because of the length of the document, the group wanted to know about the possibility of producing a more condensed “quick-reference” version of the plan for distribution to the public (such as a brochure). This is not included in the scope of work for the plan-update, but it could be listed as a Mitigation Action Item.
- QUESTION 2: Because of the length of the chapter 4 & 5 draft, the team wanted to know what the focus should be if they only have limited time to review the document. It was suggested that if you have limited time to review the draft to please focus on your area of expertise or area of interest, but also skim through the document as a whole as you might catch a mistake or see something of interest (Thank you!).

Hazard Summary Worksheet:

- The Hazard Summary exercise was completed during the meeting; this exercise was presented to the group at the beginning of the project, but it was never completed due to disruptions from COVID-19.
- The results will be emailed to the group and included in the County Annex in Chapter 5. Because a different set of criteria was used to rate the hazards, some of the “Overall Significance Ratings” will be different from the 2014 plan (e.g. flood changed from “High” to “Medium”).
- As the group rated each hazard, additional impacts were discussed; those impacts will be incorporated into the draft of Chapter 5.
- QUESTION: The team asked about including an explanation in the plan of how or why they selected the ratings for each hazard. This will be taken into consideration when the draft of Chapter 5 is finalized.

Mitigation Action Items:

- During the final 15 to 20 minutes of the meeting Eric give a quick overview of the Mitigation Actions Items from the old version of the plan.
- Everyone needs to review the old projects and consider the following:
 - COMPLETED: Have any of the projects been completed? Which ones?
 - UPDATE: Which projects are active or still of interest and need to be updated? ALL fields need to be updated for the projects that will be carried over to the 2020 update.
 - CHANGE/DELETE: Should any of the projects be deleted if they do not make sense or are no longer considered advantageous? Before any projects are deleted, can they be changed so they meet the current needs of the county?
 - NEW: New projects need to be added. Please bring project ideas to the next meeting; we can work out the details of the project as a group (details being the different fields in the action item table from the old plan)
- The projects from the previous version of the plan will be made available online for comment and they will be sent to the group in an email.

Next Planning Meeting:

The next planning team meeting will be held **Wednesday November 4, 2:00 – 4:00 p.m.** This meeting will likely focus on comments regarding the draft of Chapters 4&5 and the review and revision of old mitigation actions items and the development of new mitigation action items. ***Comments on the draft of Chapters 4&5 are due by the November 4th planning team meeting. Please also bring ideas for or comments on the 2014 Okanogan County Mitigation Action Items. Thank you!***

Also Covered at the Meeting...

A request was made by the planning team for clarification about the adopting jurisdictions. Based on the contract, all fire districts will be adopting jurisdictions in both the HMP and CWPP so they can take advantage of all grant funding opportunities. Eric and Brad (Northwest Management) will discuss this matter in greater detail with Maurice before the next planning team meeting.

Meeting Attendance:

- Carlene Anders
- Maurice Goodall
- Kevin Bowling
- Nancy Farr
- Everette Hope
- Kim Jacobs
- Rusty Stamps
- Eric Nelson
- Brad Tucker

NOVEMBER 4, 2020

A G E N D A	Okanogan County Hazard Mitigation Plan Update Wednesday November 4, 2020 2:00 p.m. – 4:00 p.m. Virtual Meeting	
2:00 p.m. 2:15 p.m.	I. Opening Introductions/Updates II. Any Comments from the Planning Team? ✓ Chapters 1-3 ✓ Draft of Chapters 4 & 5 ✓ Anything since the last meeting? III. Mitigation Action Items (Projects) ✓ Review old projects ✓ Update, modify, or delete old projects ✓ New projects IV. Next Meeting ✓ Bring/submit comments on projects ✓ Meeting time	Maurice Goodall Northwest Management / Group
3:45 p.m.	Final Comments	Planning Team
4:00 p.m.	ADJOURNMENT	

Contact Info:

Project Lead: Brad Tucker tucker@northwestmanagement.com Northwest Management Office: 208-883-4488	Eric Nelson nelson@northwestmanagement.com	Vaiden Bloch bloch@northwestmanagement.com
	Adam Herrenbruck herrenbruck@northwestmanagement.com	

Meeting Notes – Meeting #7: November 4, 2020 2:00 p.m.

These are not “official” meeting minutes. All notes, especially comments made from planning team members, are paraphrased and not direct quotations.

Eric Nelson with Northwest Management, Inc. (NMI) led the meeting.

Meeting Introduction:

- Eric started the meeting with a quick overview of the planning process:
 - The last planning team meeting was held on October 21st. During that meeting, the Planning Team completed a Hazard Summary worksheet for Okanogan County. We also looked at the 2014 Mitigation Action Items.
 - After the meeting, the Planning Team was tasked with reviewing the 2014 Mitigation Action Items and with commenting on the drafts of Chapters 4 & 5.
 - The November 4 meeting would be focused entirely on the Mitigation Action Items.

Any comments from the planning team:

- No “big picture” comments concerning the draft of chapters 4 & 5 at this time. Planning team members were encouraged to continue to leave comments on the PDF that is available online.
- Eric sent documents to the wrong Okanogan HMP email list so the group will be given more time to review the drafts of chapters 4 & 5.

Mitigation Action Items:

- The group started to go through the 2014 projects but decided to change course after there was some confusion over how the projects should be identified.
- Eric presented a different project format (using the Payette County, Idaho Hazard Mitigation Plan as an example). After deliberating, the group decided to move forward with the new project format).
- Moving forward with the new project layout, the group should focus on the following when drafting new projects and updating existing projects:
 - Limit the number of projects for each hazard: There is absolutely no need to try to think of and include every possible project. The projects in the Payette County document, for example, were only those that were of immediate concern to each adopting jurisdiction. Other project ideas that they were uncertain about were listed after the last mitigation action item; those project ideas needed more input, more development, and were not an immediate need. However, they are documented in the plan so they can be considered for inclusion the next time the plan is reviewed or updated.
 - Focus on project details: The two most important fields in the action item table are the Description of the Problem and the Description of the Project. The other fields need to be populated, but the State and FEMA will be most interested in seeing that adequate

detail has been provided for each project (see the Payette County document for examples).

Next Planning Meeting:

The next planning meeting was not scheduled as some members of the Planning Team were going to meet and discuss mitigation action items. An email will be sent to the group when the next meeting has been scheduled.

Meeting Attendance:

- Carlene Anders
- Robert Seyler
- Kirsten Cook
- Maurice Goodall
- Kevin Bowling
- Nancy Farr
- Everette Hope
- Kim Jacobs
- Rusty Stamps
- Rocklynn Culp
- Chris Branch
- Eric Nelson
- Brad Tucker

DECEMBER 23, 2020

A G E N D A	Okanogan County Hazard Mitigation Plan Update Wednesday December 23, 2020 2:00 p.m. – 3:00/3:30 p.m. Virtual Meeting	
2:00 p.m. 2:15 p.m.	I. Opening Introductions/Updates II. Any Comments from the Planning Team? ✓ Last meeting was held on Nov. 4 th ✓ We focused on mitigation projects and project development III. Mitigation Action Items (Projects) ✓ Toss out old projects and start over (?) ✓ Hold a series of meetings to discuss projects (identify projects for a few hazards each meeting). ✓ Look for opportunities to invite towns and cities to participate in select meetings? ✓ Look at the 2014 projects and FEMA project ideas on the following pages... IV. Next Meeting ✓ Think about project ideas -we need to start putting some projects together. ✓ When do we want to meet next? January 6 th is the first Wednesday of the new year. ✓ CWPP???	Maurice Goodall Northwest Management / Group
3:00 p.m.	Final Comments	Planning Team
3:00/3:30 p.m.	ADJOURNMENT	

Contact Info:

Project Lead: Brad Tucker tucker@northwestmanagement.com Northwest Management Office: 208-883-4488	Eric Nelson nelson@northwestmanagement.com	Vaiden Bloch bloch@northwestmanagement.com
	Adam Herrenbruck herrenbruck@northwestmanagement.com	

Meeting Notes – Meeting #8: December 23, 2020 2:00 p.m.

These are not “official” meeting minutes. All notes, especially comments made from planning team members, are paraphrased and not direct quotations.

Eric Nelson with Northwest Management, Inc. (NMI) led the meeting.

Meeting Introduction:

- Eric started the meeting with a quick overview of the planning process:
 - The last planning team meeting was held on November 4th. During that meeting, the Planning Team discussed a new layout for mitigation action items and looked at examples from Payette County, Idaho.
 - The purpose of this meeting is simply to reconvene one more time before the Christmas/New Years break and discuss a strategy moving forward for the development of new mitigation action items.

Any comments from the planning team:

- No comments or questions at this time.

Mitigation Action Items (Projects):

- The group thought it would be helpful if meetings were held more frequently at the beginning of the new year. That would help Planning Team members stay on task with the development of mitigation action items.
- It was asked that project leadership from Northwest Management Inc. be specific about the upcoming schedule of meetings and expectations for the group (increase frequency of emails, include specific due dates for assignments, etc.).

Next Planning Meeting:

The next planning team meeting was scheduled for January 6, 2021. The Planning Team will review old mitigation action items one more time at the next meeting.

Meeting Attendance:

- Maurice Goodall
- Everette Hope
- Rusty Stamps
- Chris Branch
- Sheila Corson
- Eric Nelson
- Brad Tucker

JANUARY 6, 2021

A G E N D A	Okanogan County Hazard Mitigation Plan Update Wednesday January 6, 2020 2:00 p.m. – 4:00 p.m. Virtual Meeting	
2:00 p.m. 2:15 p.m.	I. Opening Introductions/Updates II. Any Comments from the Planning Team? ✓ Last meeting was held on Nov. 4 th ✓ We discussed a strategy for moving forward with the development of mitigation action items. III. Mitigation Action Items (Projects) ✓ Review projects from 2014 plan <ul style="list-style-type: none"> i. Revise and condense projects for inclusion in plan update ii. Toss out projects that are unclear or no long <u>needed</u> ✓ Develop new projects (if time allows) <ul style="list-style-type: none"> i. Use suggestions from the FEMA Mitigation Ideas handbook. IV. Homework (If necessary) ✓ Assign projects to planning team members for completion ✓ Think of new projects to bring to the next meeting V. Next Meeting ✓ When do we want to meet next? ✓ Do we need to finish reviewing the 2014 projects or can we start discussing new projects?	Maurice Goodall Northwest Management / Group
3:45 p.m.	Final Comments	Planning Team
4:00 p.m.	ADJOURNMENT	

Contact Info:

Project Lead: Brad Tucker tucker@northwestmanagement.com Northwest Management Office: 208-883-4488	Eric Nelson nelson@northwestmanagement.com	Vaiden Bloch bloch@northwestmanagement.com
	Adam Herrenbruck herrenbruck@northwestmanagement.com	

Meeting Notes – Meeting #9: January 6, 2021 2:00 p.m.

These are not “official” meeting minutes. All notes, especially comments made from planning team members, are paraphrased and not direct quotations.

Brad Tucker with Northwest Management, Inc. (NMI) led the meeting. The purpose of the meeting was to review and update the projects from the 2014 Hazard Mitigation Plan and to begin discussing and developing new projects for the 2020-2022 update.

JANUARY 20, 2021

A G E N D A	Okanogan County Hazard Mitigation Plan Update Wednesday January 20, 2020 2:00 p.m. – 4:00 p.m. Virtual Meeting	
2:00 p.m. 2:15 p.m.	<p>I. Opening Introductions/Updates</p> <p>II. Any Comments from the Planning Team? ✓ Last meeting was held on Jan. 6th ✓ We discussed existing mitigation action items.</p> <p>III. Mitigation Action Items (Projects) ✓ Review updates to projects from 2014 plan</p> <p>IV. Develop new Action Items (Projects) ✓ Project ideas from Northwest Management ✓ Use suggestions from the FEMA Mitigation Ideas handbook.</p> <p>V. Final Draft Review Strategy ✓ Planning team review ✓ Public review i. timeframe ii. access/locations</p> <p>VI. Homework (If necessary) ✓ Assign projects to planning team members for completion. ✓ Update existing projects. ✓ Think of new projects to bring to the next meeting.</p> <p>VII. Next Meeting ✓ Do we need to finish reviewing the new projects?</p>	Maurice Goodall Northwest Management / Group
3:45 p.m.	Final Comments	Planning Team
4:00 p.m.	ADJOURNMENT	

Contact Info:

Project Lead: Brad Tucker tucker@northwestmanagement.com	Eric Nelson nelson@northwestmanagement.com	Vaiden Bloch bloch@northwestmanagement.com
Northwest Management Office: 208-883-4488	Adam Herrenbruck herrenbruck@northwestmanagement.com	

Meeting Notes – Meeting #10: January 20, 2021 2:00 p.m.

These are not “official” meeting minutes. All notes, especially comments made from planning team members, are paraphrased and not direct quotations.

Eric Nelson with Northwest Management, Inc. (NMI) led the meeting. The purpose of the meeting was to review what was discussed at the January 6th meeting regarding the projects from the 2014 Hazard Mitigation Plan and to begin discussing and developing new projects for the 2020-2022 update.

Any comments from the planning team:

- None at this time. The last meeting was held on January 6th and the planning team reviewed mitigation action items from the 2014 plan.

Mitigation Action Items (projects):

- The group quickly reviewed some of the updated wildfire projects from the 2014 Hazard Mitigation Plan (the projects were updated by the wildfire subcommittee). The group looked at some of the changes made by the wildfire subcommittee, as an example of the process they used to review and edit projects, as well as some of the projects in the new project format.

Develop New Action Items (Projects):

- The group came up with several ideas for new mitigation action items that could be included in the 2020-2022 HMP update. Some planning team members volunteered to take the lead on the development of new project ideas (their names are in parenthesis):
 - **Landslide:**
 - *Identify areas in the county where landslides/rockslides are recurring issues; this is of particular concern along highways.* Does Public Works already have an inventory of slide-prone areas along highways? If so, do we need to include it in the plan or can we just reference it? (Maurice will investigate this)
 - *Create guidelines for development in landslide hazard areas.* Does Planning and Zoning have any guidance related to development in landslide hazard areas? If not, should we include a project aimed at the development of guidelines or policy? (Maurice will investigate this)
 - **Hazardous Materials:**
 - *Look for HazMat training opportunities for first responders.* What types of training opportunities are available? Who should attend and how often should it be offered? (Rusty, with support from Maggie, will write a description for this project).
 - **Pandemic:**
 - *Recruit county health officials and professionals to participate in an “after action review” type of meeting aimed at evaluating the response to the COVID-19 pandemic.* (Kim Jacobs is going to conduct outreach efforts for this project).

- **Earthquake:**
 - *Develop a response plan to the Cascadia earthquake.* The Cascadia earthquake will displace a significant number of people on the west side of the state. Those people will head east to look for shelter and resources. How should Okanogan County respond to that situation? Can the Eastern Oregon earthquake evacuation plans provide some guidance? (Maurice and Carlene will explore ideas for an action item)
 - *Participate in Region 7/Cascadia exercises hosted by the state.* These exercises will provide some insight on what the county could expect to happen after the Cascadia earthquake.
- **Dam Failure:**
 - Establish a dam-hazards committee as a means of communicating with dam officials and identifying and evaluating potential hazards related to dams on the Columbia River.

Next Planning Meeting:

All mitigation action items are due by February 3rd and the next planning team meeting will be held on February 10th from 2:00 to 4:00. Ideally, all submitted projects will be reformatted and presented at the meeting, giving planning team members one more opportunity to provide comments and feedback.

Meeting Attendance:

- Maurice Goodall
- Maggie Duggan
- Everett Hope
- Kim Jacobs
- Kathy Johnson
- Kirsten Cook
- Rusty Stamps
- Nancy Farr
- Carlene Anders
- Eric Nelson
- Brad Tucker

FEBRUARY 17, 2021

A G E N D A	Okanogan County Hazard Mitigation Plan Update Wednesday February 17, 2021 2:30 p.m. – 4:30 p.m. Virtual Meeting	
2:30 p.m. 2:45 p.m.	<p>I. Opening Introductions/Updates</p> <p>II. Any Comments from the Planning Team? ✓ Last meeting was held on Jan. 20th ✓ We discussed new mitigation action items (MAIs).</p> <p>III. Mitigation Action Items (Projects) ✓ Review MAIs that were submitted since the last meeting. i. Wildfire action items ii. HAZMAT action item ✓ Discuss the DRAFT Communications Redundancy and Resiliency Plan (Maggie) ✓ Any additional MAIs? Did anyone submit projects that I missed?</p> <p>IV. Homework (If necessary) ✓ Continue to think about new MAIs or revisions to existing MAIs</p> <p>V. Next Meeting ✓ Probably no need to meet again until we have a full draft, and it is ready for review by the Planning Team. At that time, we can discuss other edits, comments, MAIs, etc.</p>	Maurice Goodall Northwest Management / Group
4:15 p.m.	Final Comments	Planning Team
4:30 p.m.	ADJOURNMENT	

Contact Info:

Project Lead: Brad Tucker tucker@northwestmanagement.com	Eric Nelson nelson@northwestmanagement.com	Vaiden Bloch bloch@northwestmanagement.com
Northwest Management Office: 208-883-4488	Adam Herrenbruck herrenbruck@northwestmanagement.com	

Meeting Notes – Meeting #10: January 20, 2021 2:00 p.m.

These are not “official” meeting minutes. All notes, especially comments made from planning team members, are paraphrased and not direct quotations.

Eric Nelson with Northwest Management, Inc. (NMI) led the meeting. The purpose of the meeting was to review some of the new mitigation action items and edits to existing wildland fire action items that were submitted since the previous meeting. The group also discussed the rest of the remaining steps of the planning process.

Any comments from the planning team:

- None at this time. The last meeting was held on January 20th and the planning team worked on developing new mitigation action items.

Mitigation Action Items (projects):

- The group reviewed suggested edits to some of the wildland fire mitigation action items (edits were submitted and reviewed by members of the wildland fire subcommittee). Most comments were of the following nature:
 - Combining two or more projects together in one project table; both projects addressed the same problem statement.
 - Adding additional detail to some projects to clarify the aims of the project and add additional mechanisms through which the stated problem could be addressed.
 - Clarifying the need to delete some projects (particularly those that pertained to evacuation routes).
- The group reviewed the new HAZMAT project that was developed at the previous meeting. There was only one question about the scope of the project -the first responder HAZMAT training will be hosted by Methow Valley emergency response agencies, but it will be open to all first responders in the county.
- Maggie Dungan presented the Draft Communications Redundancy and Resiliency Plan to the group as a potential mitigation action item. It would likely be a multi-stage project with the first stage being oriented towards project exploration and recruitment of interested agencies, organizations, etc.

Homework (if necessary):

- No specific homework assignments were given to the group. However, Eric encouraged the group to continue to submit projects if anyone has ideas. The group agreed that it would not be necessary to have another meeting if additional projects are submitted; new projects and comments or questions about new projects will be handled through email.

Next Planning Meeting:

No planning meeting was scheduled. The Planning Team will assess the need to meet over the next month -it is likely that another meeting will not be scheduled until a full draft of the plan has been assembled and it is ready for review by the Planning Team.

Meeting Attendance:

- Maggie Duggan
- Everett Hope
- Kim Jacobs
- Kirsten Cook
- Rusty Stamps
- Nancy Farr
- Carlene Anders
- Mike Worden
- Sheila Corson
- Jake Hardt
- Eric Nelson
- Brad Tucker

PUBLIC INVOLVEMENT DOCUMENTATION

The public was invited to participate in the planning process by means of public meetings and document review. Three different public meetings were held in July 2020 and the public review period of a complete draft of the MHMP (approved by the Planning Team) was in August 2021.

PUBLIC MEETINGS

Three web-based public meetings were held in July 2020 using Adobe Connect. The meetings were held on July 23 at 10:00 am and July 30 at 10:00 am and 7:00 pm. In total, approximately 40 people attended the public meetings (because the meetings were held virtually it was difficult to get an accurate count of people in attendance at the meetings).

Media Release

From: Maurice Goodall, Emergency Management Director

Date: July 7, 2020

RE: Okanogan County Hazard Mitigation Plan Update Public Awareness Meetings

Okanogan County to Host Virtual Public Meetings

OKANOGAN, WASH – Okanogan County has announced a set of upcoming virtual meetings that will discuss the Hazard Mitigation Plan update. These meetings will take place on July 23 at 10 a.m. with a repeat of the same meeting at 7 p.m. Both meetings will be accessible to the public through an online virtual meeting link, and they will be live-streamed on the Okanogan County Emergency Management Facebook page through the link _____.

Topics discussed at the meetings will include the hazard mitigation process, risks to the county regarding various hazards, and information about how the public can provide input and feedback to the planning team. These meetings will not address the specific topic of wildland fire in detail. Plans are underway to hold separate virtual public meetings designed to discuss wildland fire and flooding after wildfires. These meetings will be held at another date and time and are expected to be announced later this month.

The county began updating its Multi-Hazard Mitigation Plan in October and is still in the planning process. The plan examines the risks posed by the hazards that affect Okanogan County and its various communities. The plan also outlines a mitigation strategy, aimed at reducing the impacts from those hazards.

The Federal Emergency Management Agency (FEMA) requires counties to update this plan every five years to remain eligible for federal funding for hazard mitigation projects. Entities in Okanogan County that will also adopt the Hazard Mitigation Plan include incorporated cities and towns, fire protection districts, and the Okanogan County Conservation District.

Questions can be addressed to:

Maurice Goodall
Okanogan County Emergency Management Director
509 – 422 – 7206
em@co.okanogan.wa.us

PUBLIC MEETING PRESENTATION

<p style="text-align: center;">Okanogan County, WA Hazard Mitigation Plan Update</p>  <p style="text-align: center;">Northwest Management, Inc. 233 East Palouse River Drive Moscow, Idaho 83843 208-883-4488 Telephone</p>	<p style="text-align: center;">Northwest Management, Inc.</p> <ul style="list-style-type: none"> • Natural Resource Consultants • Serving the Western U.S. since 1984 • Main Office in Moscow, Idaho <ul style="list-style-type: none"> • Colville, Washington • Hoquiam, Washington • Helena, Montana • At the Meeting Today: <ul style="list-style-type: none"> • Adam Herrenbruck • Eric Nelson • Brad Trucker  <p style="text-align: right;"><i>"Providing a balanced approach to natural resource management"</i></p>
<p style="text-align: center;">1</p> <p style="text-align: center;">What is Hazard Mitigation?</p> <ul style="list-style-type: none"> • The Effort to Reduce the Risk of... <ul style="list-style-type: none"> • Loss of Life and Property • Human Suffering • Economic Disruption • Disaster Assistance Costs • ...by lessening the impact of disasters. <p style="text-align: center;">Create more Resilient Communities</p>	<p style="text-align: center;">2</p> <p style="text-align: center;">A Resilient Community</p> <p><i>Resilience: the ability to adapt to changing conditions and prepare for, withstand, and rapidly recover from disruptions caused by a hazard.</i></p> <ul style="list-style-type: none"> • Makes proactive investments & policy decisions • Communicates risk & vulnerability to all • Builds public & private sector capabilities & partnerships • Resumes normal operations & recovers rapidly after hazard events
<p style="text-align: center;">3</p> <p style="text-align: center;">Local Mitigation Strategy</p> <p><i>Mitigation: the reduction or elimination of long-term risk to human life and property from hazards.</i></p> <p>Not IF the next disaster will happen, but WHEN.</p> <p>Develop a plan to reduce risk BEFORE the next disaster happens.</p> 	<p style="text-align: center;">4</p> <p style="text-align: center;">Community Preparedness</p> <ul style="list-style-type: none"> • Hazard Readiness • Emergency Response Services • Infrastructure Readiness • Communications • Planning  <p><small>Burned areas are seen around the town of Pateros, Wash., along the Columbia and Methow rivers during summer 2014 fires. (Associated Press)</small></p>
<p style="text-align: center;">5</p>	<p style="text-align: center;">6</p>

Hazard Mitigation Planning

- Local entities are empowered to mitigate hazards and reduce risk through...
 - Identification of risks & vulnerabilities
 - Development of long-term strategies for protecting people & property
 - Break/change the cycle of damage, reconstruction, & repeated damage
 - Increasing education & awareness
 - Building partnerships for risk reduction
 - Aligning mitigation objectives with other objectives
 - Prioritizing mitigation projects and project funding

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FEMA Hazard Mitigation Plan

- Disaster Mitigation Act of 2000
 - Establishes eligibility for FEMA Hazard Mitigation Assistance (HMA)
 - Requires Tribal, State, and local governments to submit plans to FEMA for review
- Title 44 Code of Federal Regulations (CFR) 201.6 or 201.7
 - Approval by FEMA in order to receive mitigation project grants
 - Complete update of plan every five years

As of November 1, 2004 FEMA requires ALL counties to have an HMP



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What is in a Mitigation Plan?

- Adoption Resolutions
- Vision and Goals
- Documented Planning Process and Public Involvement Process
- The Planning Team
 - Jurisdiction Reps, Key Stakeholders, Planning Partners
- Descriptions of the Region and Communities
- Hazard Profiles and Risk Assessments
 - Maps, Impacts, Future Probability, History of Events
- Mitigation Strategy
 - Action Items (projects), Prioritization Method, Implementation
- Monitoring and Maintenance Schedule
 - Continued public outreach, yearly reviews, five-year updates

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The Planning Team

- Okanogan County Emergency Management
- Okanogan County Staff
- Representatives from the Adopting Jurisdictions
- Okanogan County PUD
- Confederated Tribes of the Colville Reservation
- Okanogan Conservation District
- Methow Amateur Radio Association
- Okanogan County Long Term Recovery Group
- Fire AdaptedMethow Valley
- Okanogan County Commissioners
- North Valley Hospital
- U.S. Forest Service

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Adopting Jurisdictions

- | | |
|----------------------|-------------------------------------------------------------------------------------|
| • Okanogan County | • Town of Elmer City |
| • City of Brewster | • Town of Nespalem |
| • City of Okanogan | • Town of Riverside |
| • City of Omak | • Town of Twisp |
| • City of Oroville | • Town of Winthrop |
| • City of Pateros | • Okanogan Conservation District |
| • City of Tonasket | • Okanogan Fire Protection Districts 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 15, and 16 |
| • Town of Conconully | |
| • Town of Coulee Dam | |

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The Hazards

- Flood
- Earthquake
- Landslide
- Severe Weather
- Wildland Fire
- Volcano
- Dam Failure
- Hazardous Materials
- Terrorism and Civil Unrest
- Pandemic



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Okanogan County Hazard Summaries

- Hazards were discussed and evaluated by the Planning Team in terms of:
 - Location (Geographic Area Affected):
 - Of the total populated area, what percentage is typically affected by the hazard?
 - Maximum Probable Extent (Magnitude/Strength):
 - How intense or severe can a hazard event be?
 - What about severity of damage and other types of loss?
 - Probability of Future Events:
 - What is the frequency of occurrence?
 - On average, how often does the hazard occur each year?

These questions will be answered by each adopting jurisdiction; answers will be documented in the plan.

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WAEMD Hazard Ratings

- Washington Emergency Management Division
 - Risk Index ratings for each natural hazard for Okanogan County
 - Washington State Enhanced Hazard Mitigation Plan (2018)

Hazard	Risk Index
Earthquake	MEDIUM
Flood	HIGH
Landslide	MEDIUM-HIGH
Severe Weather	HIGH
Volcano	NOT RATED
Wildfire	HIGH

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Hazard Profile & Risk Assessment

- Each Hazard and Each Jurisdiction:
 - Background Information:**
 - Profile of the hazard in the region/state, hazard mechanisms
 - Local Event History:**
 - Notable/significant events that have affected the jurisdiction
 - Probability of Future Occurrence:**
 - Frequency, magnitude, scope of future hazard events
 - Impacts of Hazard Events:**
 - General impacts and analysis of impact areas
 - Development Trends:**
 - Changes in exposure or vulnerability to a hazard because of housing expansion, economic growth, etc.
 - Value of Resources at Risk:**
 - Estimate of loss to the hazard-damage to structures, economic impacts, etc.

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Flood – NFIP Flood Zones

“A” Flood Zones:
100-year flood zones;
1% probability of occurring each year.

X500 Flood Zone:
500-year flood zones;
0.2% probability of occurring each year.

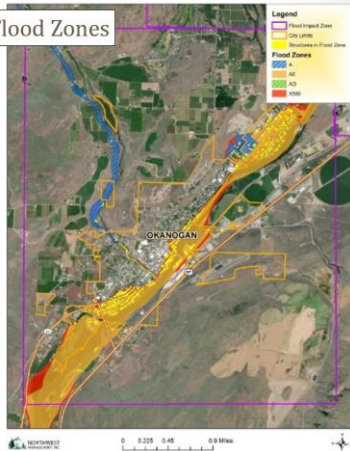


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Flood – NFIP Flood Zones

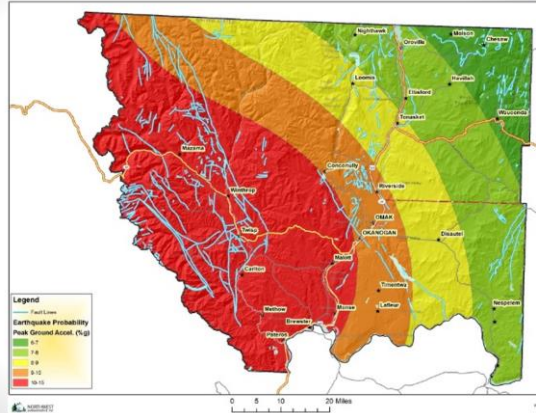
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500-year flood zones;
0.2% probability of occurring each year.

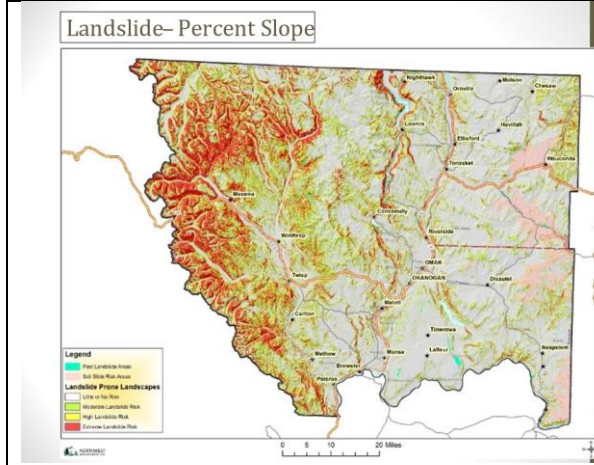


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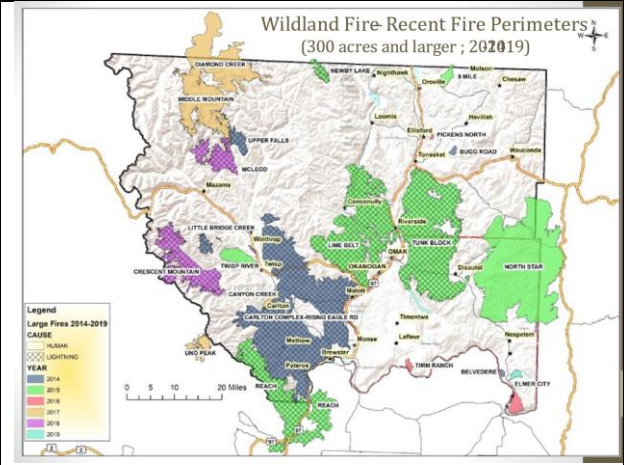
Earthquake – Peak Ground Acceleration



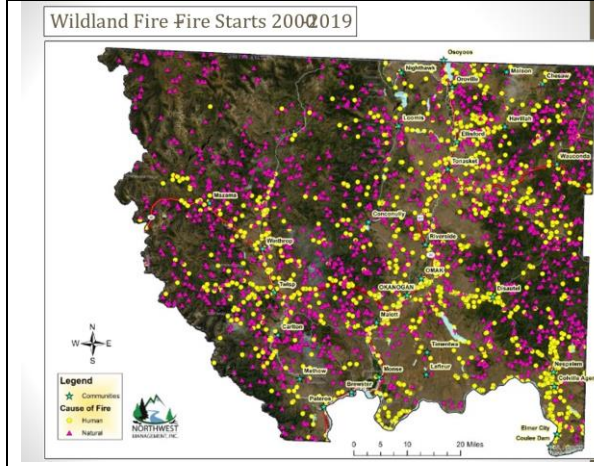
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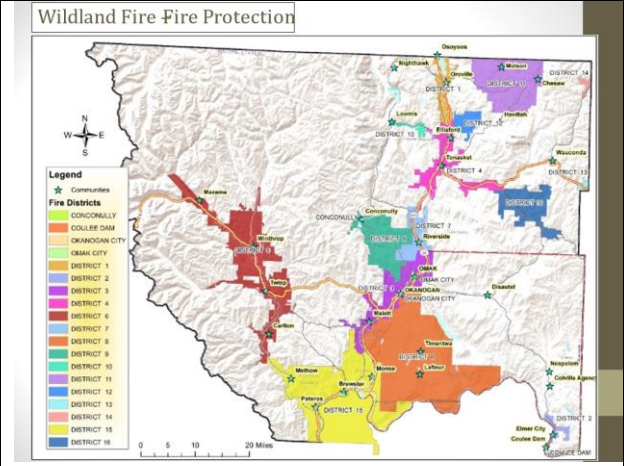
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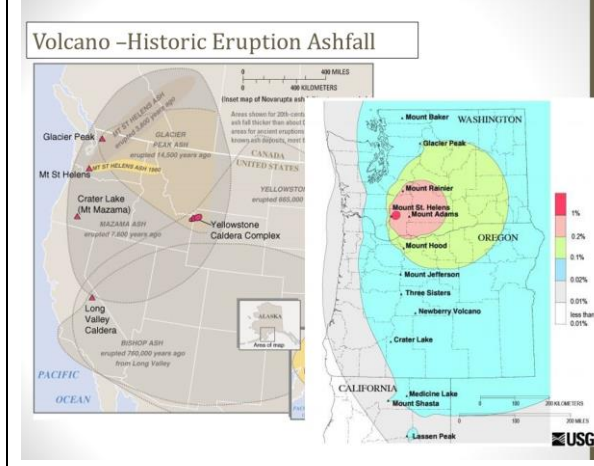
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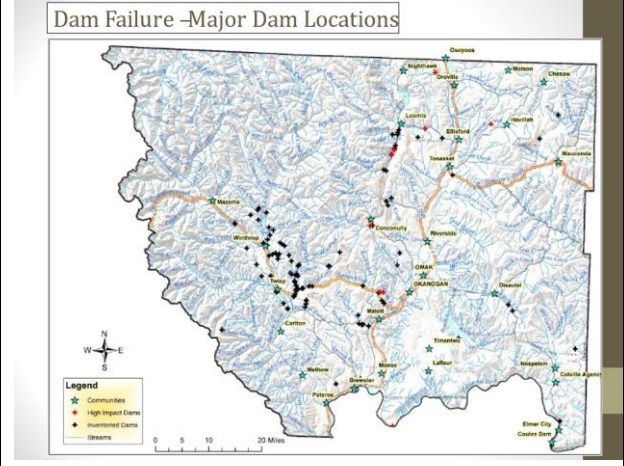
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<h3>Mitigation Strategy</h3> <ul style="list-style-type: none"> • Could Include: <ul style="list-style-type: none"> • Defensible Space & Fuels Treatments • Floodplain Management • Infrastructure Upgrades & Hardening • Communications & Planning • Studies & Evaluations • Access Improvement Projects • Emergency Response Needs • Policy Issues • Public Education Campaigns • Slope Stabilization Projects  <p>25</p>	<h3>Community Wildfire Protection Plan (CWPP)</h3> <p><i>Will be incorporated into the Hazard Mitigation Plan and be a stand-alone document.</i></p> <ul style="list-style-type: none"> • Collaboration Opportunities • Streamlined Planning Process • Improved Hazard Risk Assessments • Leverage Resources • Coordinated Updates • Grant Eligibility • Funding Plan Development  <p>26</p>		
<h3>Community Wildfire Protection Plan (CWPP)</h3> <ul style="list-style-type: none"> • Comprehensive wildfire planning tool for counties & communities <ul style="list-style-type: none"> • Provides a specific risk assessment & identifies values at risk • Plans may address wildfire response, hazard mitigation, community preparedness, or structure protection—or all of the above • Healthy Forests Restoration Act (HFRA) of 2003 <ul style="list-style-type: none"> • Outlines requirements for CWPP: <ul style="list-style-type: none"> • Collaboration (local governments, local fire departments, state officials) • Prioritized fuel reduction projects • Measures to reduce structural ignitability (e.g. Firewise) • Supports the role of communities in Federal land management planning through CWPP's or other planning tools <ul style="list-style-type: none"> • Communities recommend areas within which HFRA-authorized projects may take place on NFS and BLM land • Incentivizes USFS, BLM to consider community priorities as they plan and implement forest management and hazardous fuel reduction projects <p>27</p>	<h3>Public Involvement</h3> <ul style="list-style-type: none"> • Media Releases about planning efforts • Public Meetings • Public Review and Comment Period <ul style="list-style-type: none"> • This will be facilitated once all sections have been completed and reviewed by the planning team • Anyone can review the most current DRAFT of the plan and provide feedback • Open public adoption hearings <p>28</p>		
<h3>Wildland Fire Public Meetings</h3> <ul style="list-style-type: none"> • Methow Valley & Pateros: <ul style="list-style-type: none"> • August 11th 1:30 pm & 7:00 pm • Omak, Okanogan, Nespelem, & Brewster: <ul style="list-style-type: none"> • August 12th 1:30 pm & 7:00 pm • Tonasket & Oroville <ul style="list-style-type: none"> • August 13th 1:30 pm & 7:00 pm <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Questions? Please Contact:</p> <table border="0"> <tr> <td style="padding-right: 20px;"> Carlton Complex Rebuild Phone: 509-733-0318 Email: carltoncomplexrebuild@gmail.com </td> <td> Carlene Anders Phone: 509-733-0318 </td> </tr> </table> </div> <p>29</p>	Carlton Complex Rebuild Phone: 509-733-0318 Email: carltoncomplexrebuild@gmail.com	Carlene Anders Phone: 509-733-0318	<h3>Your Input</h3> <ul style="list-style-type: none"> • Do you have questions or comments about the... <ul style="list-style-type: none"> • Presentation? • Hazard Mitigation Plan? • Community Wildfire Protection Plan? • Contact: <div style="border: 1px solid black; padding: 5px; margin-top: 5px; text-align: center;"> <p>Eric Nelson Northwest Management, Inc. 208 883-4488 environmentalplanning@northwestmanagement.com</p> </div> <p style="text-align: center; color: green; font-weight: bold;">Thank you for attending and participating!</p> <p>30</p>
Carlton Complex Rebuild Phone: 509-733-0318 Email: carltoncomplexrebuild@gmail.com	Carlene Anders Phone: 509-733-0318		

PUBLIC COMMENT PERIOD

Refer to the Public Involvement section in Chapter 2 for more information about this topic.

APPENDIX 2 – UNDERSTANDING MUDFLOW AND THE NFIP



Mudflows often come in the wake of wildfires that destroy vegetation needed to support and strengthen hillsides. Mudflows can occur quickly and with little warning, destroying lives and property that you worked so hard to build and protect.

The National Flood Insurance Program’s (NFIP) Coverage for Mudflow and reporting your loss:

The good news is when Congress authorized the National Flood Insurance Program, they intended for the program to include mudflow within the NFIP’s scope of coverage.

Here are important things to know concerning mudflow:

- The Standard Flood Insurance Policy (SFIP) defines **flood** as:
 1. “A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is your property) from:
 - a. Overflow of inland or tidal waters;
 - b. Unusual and rapid accumulation or runoff of surface waters from any source;
 - c. **Mudflow.**”
 2. Collapse or subsidence of land along a shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a **flood** as defined in A1.a above.
- The SFIP defines a **mudflow** as “a river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water. Other earth movements, such as landslide, slope failure, or a saturated soil mass moving by liquidity down a slope, are not **mudflows.**”
- The SFIP pays for direct physical loss to covered property, meaning the insured building on the residence premises, and personal property contained in a building (if you purchased personal property coverage) from **mudflow**. Covered property does not include the yard.
- The SFIP will not pay for loss to covered property caused directly by earth movement even if the earth movement is caused by a flood. Some examples of earth movement that we do not cover are landslides and gradual erosion; or to replenish the land that subsided or collapsed along the shore of a lake or similar body of water.

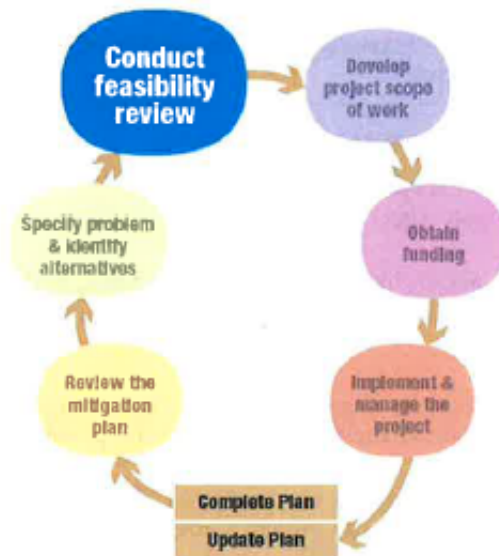
In the event that you experience a flood loss that includes mudflow you should report your loss as quickly as possible.

Immediately

- Call your agent or insurance company. If you or your representatives do not have the policy information they should be able to look it up, or you may call the Flood Insurance number at 1-800-427-4661.
- Have the following information with you when you place your call:
 - (1) the name of your insurance company (your agent may write policies for more than one company);
 - (2) a telephone number/e-mail address where you can be reached.
- When you file your claim, ask for an approximate time frame during which an adjuster can be expected to visit your home so you can plan accordingly.
- Insurance agents and claims adjusters will work closely with you on your claim.

APPENDIX 3 – STAPLEE SCORING SYSTEM

Step 3: Conduct a Feasibility Review to Evaluate Alternatives



Begin to examine the feasibility of a proposed mitigation project alternative, by asking questions such as:

- Will this alternative present a long-term solution to a specific problem?
- Is this alternative consistent with future development plans, government priorities, environmental and historic preservation goals, and with the local hazard mitigation plan?

If an alternative presents only a short-term or temporary solution, consider a mitigation action that is longer term or eliminates the risk entirely. If an alternative is not consistent with existing plans, priorities, or goals, consider a different solution to the problem that is supported by existing plans.

Mitigation Plan Update Tip: If a suggested alternative seems to be an excellent solution to a problem but is not consistent with the current hazard mitigation plan, the plan may need to be revised and updated to include more accurate data.

As recommended in How-to Guides #3 and #5 (FEMA 386-3 and 386-5), a planning process known as STAPLEE may be used to prioritize mitigation actions in the plan. STAPLEE can also be used to conduct a systematic feasibility review of alternatives that appear to provide a long-term solution to the problem and are consistent with the hazard mitigation plan. STAPLEE is discussed in detail below.

STAPLEE

STAPLEE is an acronym for the seven criteria used to conduct a feasibility review. These criteria are: **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic, and **E**nvironmental feasibility.

Step 3: Conduct a Feasibility Review to Evaluate Alternatives

Table 2 suggests questions to pose for each alternative under review and offers comments that may be helpful in identifying the positive and negative consequences associated with an action for each of the STAPLEE criteria.

Table 2: Using the STAPLEE Criteria to Assess the Feasibility of an Alternative

Feasibility Criteria	Questions to Answer and Comments
Social	<ul style="list-style-type: none"> ▪ Is the mitigation action socially acceptable? ▪ Will the action adversely affect any one segment of the population? ▪ What effects will the action have on the social, historic, and cultural environment of the community? <p>Comments:</p> <p>If some of the population may be negatively affected by a proposed mitigation project, it may not be the best solution to the problem.</p> <p>Unless detrimental effects of a project on the disruption of community life can be minimized, the project under consideration may not be a good fit for the community.</p>
Technical	<ul style="list-style-type: none"> ▪ Is the proposed action technically feasible and does it provide the appropriate level of protection? ▪ What types of technical/professional expertise will be required to plan and implement the project? ▪ Will the action create more problems than it solves? ▪ How long will it take to complete the project? Is this a reasonable timeframe? <p>Comments:</p> <p>In developing a mitigation project, the community must ensure that the project will actually mitigate the risk posed by a particular hazard. A project to protect one community asset at the expense of another or a project that will protect a structure from one hazard while making it more vulnerable to another hazard may not benefit the community.</p> <p>Alternatives for flood mitigation projects are presented in <i>Selecting Appropriate Mitigation Measures for Floodprone Structures</i>, FEMA 551, which is available through the FEMA online library (http://www.fema.gov/library/index.jsp). The FEMA Technical Assistance Helpline (1-866-222-3580) is available to provide assistance regarding grant requirements, engineering feasibility, cost effectiveness, and environmental/historic preservation compliance. Additional information is available online at: http://www.fema.gov/government/grant/resources/index.shtm#5</p>

Step 3: Conduct a Feasibility Review to Evaluate Alternatives

Feasibility Criteria	Questions to Answer and Comments
Administrative	<ul style="list-style-type: none"> ▪ Does the community have the capability (staff, expertise, time, funding) to implement the action? ▪ Can the community provide the necessary maintenance of the project? <p>Comments: A complicated project that will demand a great deal of attention from already busy municipal staff will be difficult to implement successfully.</p> <p>If the administrative costs associated with a project are too great, the community can consider hiring additional staff, providing additional training for existing staff, implementing a less complicated project, or implementing a complex project in phases.</p>
Political	<ul style="list-style-type: none"> ▪ Is the mitigation action politically acceptable? ▪ Will the general public support or oppose this project? <p>Comments: A highly visible project that is costly and does not have broad public support will be very difficult to implement.</p> <p>When committing to a controversial project, the community should prepare for the time and expense required to work through the controversy.</p>
Legal	<ul style="list-style-type: none"> ▪ Does the community have the authority to implement the proposed action? ▪ Will the action comply with local, State, and Federal environmental regulations? ▪ Do homeowner association bylaws apply to the project site? ▪ Is the action likely to be challenged by stakeholders whose interests may be adversely affected? <p>Comments: Examine the project relative to Federal, State, Tribal, and local laws to determine whether there is potential for violating a law. If a project has the potential to violate a law, it may not be the best alternative.</p> <p>Model deed restrictions resources that may be helpful for mitigation projects involving voluntary acquisition of real property are available online at: http://www.fema.gov/government/grant/resources/pre-award.shtm.</p>

Step 3: Conduct a Feasibility Review to Evaluate Alternatives

Feasibility Criteria	Questions to Answer and Comments
Economic	<ul style="list-style-type: none"> ▪ Do the costs of the action seem reasonable for the size of the problem and the likely benefits? ▪ What burden will be placed on the local economy to implement and maintain the action? ▪ Will the action generate additional jobs locally? <p>Comments:</p> <p>When evaluating capabilities, the community should estimate the long-term annual cost of maintaining the project, such as the costs of mowing grass when property is acquired as part of a buyout project and used as a park (see Figure 7). FEMA will not pay for project maintenance.</p> <p>A project that will endanger public health or reduce employment opportunities is not likely to be widely supported.</p> <p>An action cannot be implemented without sufficient funding. Examine various avenues for funding a mitigation project; a costly mitigation project could be financially feasible if the community applies for and receives grant funds to supplement available community resources.</p>
Environmental	<ul style="list-style-type: none"> ▪ Is the proposed action in a floodplain or wetland or will it indirectly impact the natural and beneficial functions of a floodplain or wetland? ▪ How will the action affect the natural environment? ▪ How will the action affect utility and transportation systems? <p>Comment:</p> <p>Unless detrimental effects of a project on the natural environment can be minimized, the project under consideration may not be a good fit for the community.</p>

APPENDIX 4 – CAPABILITY ASSESSMENTS

The capability assessment form completed for each adopting jurisdiction is an adaptation of FEMA Worksheet 4.1. This is a condensed version of the original form; the number of categories has been reduced to those that are most likely to be applicable to smaller counties, cities, and towns that likely have fewer resources. Each adopting jurisdiction was asked to complete a capability assessment form so it reflects any and all policies, programs, or resources already in place that could be used to support hazard mitigation efforts.

It should also be noted that all adopting jurisdictions have the ability to expand upon and improve existing policies and programs as needed. If an adopting jurisdiction is in need of assistance, Okanogan County has a number of resources available to support the expansion of such policies and programs.

OKANOGAN COUNTY

CAPABILITY ASSESSMENT		JURISDICTION: Okanogan County
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	Yes, it is in the process of being adopted (as of July 2021)
	Capital Improvements Plan	Yes
	Economic Development Plan	Yes, but it needs to be updated
	Local Emergency Operations Plan	Yes
	Continuity of Operations Plan	Yes
	Transportation Plan	Yes (Okanogan County Council of Governments)
	Stormwater Management Plan	Management plans are left up to the cities, but county does play a role in diverting stormwater (there is a plan, but not a formal plan)
	Community Wildfire Protection Plan	Yes, it is currently being updated
	Other	

CAPABILITY ASSESSMENT		JURISDICTION: Okanogan County
Category	Planning Tool/Capability	Yes/No; Year; Comments
Administrative	Maintenance programs (tree trimming, drain cleaning, etc.)	County Public Works maintains roads, right-of-ways, and buildings. Most work is left up to the cities.
	Mutual aid agreements	No
	Memorandums of understanding	Law enforcement and fire have MOU's throughout the state, but not necessarily the county
	Other	
Technical	Warning systems/services	Yes. Emergency Alert System, Wireless Emergency Alerts, Emergency Notification System
	Hazard data and information	Yes. Tier 2 which is run through Dept of Ecology
	GIS capabilities	Yes. The county has a GIS department
	Grant Writing	No. It is left up to individual departments to resource any assistance or expertise that is needed for grant writing
	Flood Plain Manager	Through the planning department. Floodplain maps are currently being updated.
	Other	
Codes and Ordinances	Building code	Yes
	Zoning ordinance	Yes
	Subdivision ordinance	Yes
	Floodplain ordinance	Yes
	Natural hazard specific ordinance	No
	Flood insurance rate maps	Yes

CAPABILITY ASSESSMENT		JURISDICTION: Okanogan County
Category	Planning Tool/Capability	Yes/No; Year; Comments
	Other	
Project Funding Sources	Capital improvements project funding	Unsure, has not been integral in funding hazard mitigation projects
	Community Development Block Grant	Unsure, has not been integral in funding hazard mitigation projects
	Other federal funding program	Unsure, has not been integral in funding hazard mitigation projects
	State funding programs	Unsure, has not been integral in funding hazard mitigation projects
	Other	Hazard mitigation money received from a federal declaration or fire assistance money.
Education and Outreach	Ongoing public education or information programs	Yes, through all county departments
	Firewise Communities certification	Yes, there several communities that are Firewise
	StormReady certification	No, but the Conservation District will perform home assessments (fire and flood).
	Other	
Other Comments:		

OKANOGAN CONSERVATION DISTRICT

CAPABILITY ASSESSMENT		JURISDICTION: Okanogan Conservation District
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	n/a
	Capital Improvements Plan	n/a
	Economic Development Plan	n/a
	Local Emergency Operations Plan	n/a
	Continuity of Operations Plan	n/a
	Transportation Plan	n/a
	Stormwater Management Plan	n/a
	Community Wildfire Protection Plan	n/a
	Other	Yes :1 year operations plan, 5 year strategic plan
Administrative	Maintenance programs (tree trimming, drain cleaning, etc.)	n/a
	Mutual aid agreements	n/a
	Memorandums of understanding	Yes, multiple
	Other	Interagency agreements with multiple agencies
Technical	Warning systems/services	n/a
	Hazard data and information	Yes, interagency BAER team data
	GIS capabilities	Yes

CAPABILITY ASSESSMENT		JURISDICTION: Okanogan Conservation District
Category	Planning Tool/Capability	Yes/No; Year; Comments
	Grant Writing	Yes
	Flood Plain Manager	n/a
	Other	Conservation technical expertise in water quality, wildfire preparedness and recovery, range management, irrigation water management, riparian restoration
Codes and Ordinances	Building code	n/a
	Zoning ordinance	n/a
	Subdivision ordinance	n/a
	Floodplain ordinance	n/a
	Natural hazard specific ordinance	n/a
	Flood insurance rate maps	n/a
	Other	
Project Funding Sources	Capital improvements project funding	n/a
	Community Development Block Grant	n/a
	Other federal funding program	Yes we have received federal grant
	State funding programs	Yes we received state grants
	Other	Yes we have local funding through a rates and charged system

CAPABILITY ASSESSMENT		JURISDICTION: Okanogan Conservation District
Category	Planning Tool/Capability	Yes/No; Year; Comments
Education and Outreach	Ongoing public education or information programs	Yes, we offer pre-K-12 and adult conservation education and wildfire preparedness programs and maintain active social media presence to provide information on a range of topics to the public
	Firewise Communities certification	Yes, we facilitate the process of becoming certified for local neighborhoods who request assistance
	StormReady certification	n/a
	Other	Technical assistance to landowners: conservation planning staff provide consultations on natural resource concerns and wildfire preparedness to landowners/land managers who request assistance
Other Comments:		

CITY OF OMAK

CAPABILITY ASSESSMENT		JURISDICTION: City of Omak
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	Greater Omak Area Comprehensive Plan 2019
	Capital Improvements Plan	Included in the Comp Plan
	Economic Development Plan	Included in the Comp Plan
	Local Emergency Operations Plan	Included in the Comp Plan
	Continuity of Operations Plan	Included in the County plan
	Transportation Plan	Transportation is covered in the Comp Plan.
	Stormwater Management Plan	Included in Comp Plan; Some municipal codes apply to storm drainage and surface water
	Community Wildfire Protection Plan	Yes, currently being updated
	Other	Shoreline Master Plan
Administrative	Maintenance programs (tree trimming, drain cleaning, etc.)	Yes
	Mutual aid agreements	Probably
	Memorandums of understanding	Probably
	Other	
Technical	Warning systems/services	Yes
	Hazard data and information	Some is kept in-house

CAPABILITY ASSESSMENT		JURISDICTION: City of Omak
Category	Planning Tool/Capability	Yes/No; Year; Comments
	GIS capabilities	Can use County office if needed
	Grant Writing	Can do some in-house; the City also uses contractors
	Flood Plain Manager	
	Other	
Codes and Ordinances	Building code	Yes (International Building Codes)
	Zoning ordinance	Yes
	Subdivision ordinance	Yes
	Floodplain ordinance	Yes
	Natural hazard specific ordinance	
	Flood insurance rate maps	Yes
	Other	
Project Funding Sources	Capital improvements project funding	Yes
	Community Development Block Grant	Yes
	Other federal funding program	Yes
	State funding programs	Yes
	Other	

CAPABILITY ASSESSMENT		JURISDICTION: City of Omak
Category	Planning Tool/Capability	Yes/No; Year; Comments
Education and Outreach	Ongoing public education or information programs	Fire and safety awareness through fire department and district
	Firewise Communities certification	No, but Firewise standards are encouraged
	StormReady certification	No
	Other	
Other Comments:		

CITY OF TONASKET

CAPABILITY ASSESSMENT		JURISDICTION: City of Tonasket
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	Yes
	Capital Improvements Plan	Yes
	Economic Development Plan	No
	Local Emergency Operations Plan	Part of County plan, no individual plan
	Continuity of Operations Plan	No formal plan
	Transportation Plan	Yes
	Stormwater Management Plan	Currently working on it
	Community Wildfire Protection Plan	No city plan, part of the county plan
	Other	Water plan, sewer plan
Administrative	Maintenance programs (tree trimming, drain cleaning, etc.)	Yes, city has a public works department
	Mutual aid agreements	Yes
	Memorandums of understanding	Yes
	Other	
Technical	Warning systems/services	Water and sewer warning systems
	Hazard data and information	County has a Tier 2; contains information on chlorine that is used for water wells

CAPABILITY ASSESSMENT		JURISDICTION: City of Tonasket
Category	Planning Tool/Capability	Yes/No; Year; Comments
	GIS capabilities	Some/limited; the city typically uses the county GIS department
	Grant Writing	Some in-house grant writing, city also uses engineers
	Flood Plain Manager	No
	Other	
Codes and Ordinances	Building code	Yes
	Zoning ordinance	Yes
	Subdivision ordinance	Yes
	Floodplain ordinance	Part of zoning ordinance
	Natural hazard specific ordinance	No
	Flood insurance rate maps	Yes
	Other	
Project Funding Sources	Capital improvements project funding	
	Community Development Block Grant	Yes
	Other federal funding program	Yes
	State funding programs	Yes
	Other	

CAPABILITY ASSESSMENT		JURISDICTION: City of Tonasket
Category	Planning Tool/Capability	Yes/No; Year; Comments
Education and Outreach	Ongoing public education or information programs	No
	Firewise Communities certification	No
	StormReady certification	No
	Other	Potential participation in county outreach programs/efforts
Other Comments:		

CITY OF OKANOGAN

CAPABILITY ASSESSMENT		JURISDICTION: City of Okanogan
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	Comprehensive Plan adopted 1996 - Parks and Recreation element updated in 2017
	Capital Improvements Plan	A Capital Facility Element is included in the Comprehensive Plan. Capital Improvement plans are developed through the Public Works department for water, sewer, and road infrastructure.
	Economic Development Plan	An Economic Development Element is included in the Comprehensive Plan.
	Local Emergency Operations Plan	Yes
	Continuity of Operations Plan	
	Transportation Plan	Yes/Annually. A Transportation Plan Element is included in the Comprehensive Plan. Annual review and updates are completed through the 6-year street plan.
	Stormwater Management Plan	No
	Community Wildfire Protection Plan	Yes
	Other	
Administrative	Maintenance programs (tree trimming, drain cleaning, etc.)	Yes/annually
	Mutual aid agreements	Yes/annually
	Memorandums of understanding	Yes/Several
	Other	

CAPABILITY ASSESSMENT		JURISDICTION: City of Okanogan
Category	Planning Tool/Capability	Yes/No; Year; Comments
Technical	Warning systems/services	Yes/ Okanogan County
	Hazard data and information	The current Critical Areas Regulations identify areas of flooding and steep slope hazards. The CAO update is slated to be completed in 2021.
	GIS capabilities	The City coordinates with Okanogan County for GIS needs
	Grant Writing	Yes
	Flood Plain Manager	Floodplain permitting and review is processed by the City Permitting and Planning staff.
	Other	
Codes and Ordinances	Building code	The City of Okanogan currently regulates building under the 2015 IBC and IRC.. The City is in the process of updating to use the 2018 IBC and IRC.
	Zoning ordinance	The Zoning Code is current through Ordinance 1202, passed July 7, 2020.. Updates are made periodically, Recent updates were incorporated for congregate housing and accessory dwelling structures.
	Subdivision ordinance	The subdivision ordinance is current through Ordinance 1202, passed July 7, 2020. The City is reviewing updates for Tiny housing communities
	Floodplain ordinance	The City Flood Ordinance was adopted by Ord. 988 § 1, 2004; Ord. 943 § 1, 2002)
	Natural hazard specific ordinance	
	Flood insurance rate maps	FIRM Maps are being updated by FEMA in 2021. The City has not filed in LOMAR or CLOMAR changes since adoption of the current maps.
	Other	

CAPABILITY ASSESSMENT		JURISDICTION: City of Okanogan
Category	Planning Tool/Capability	Yes/No; Year; Comments
Project Funding Sources	Capital improvements project funding	
	Community Development Block Grant	YES. The City has completed numerous Public Works Projects with assistance from CDBD. The city is currently completing a POG for the Second Avenue North Levee.
	Other federal funding program	Yes
	State funding programs	Yes
	Other	
Education and Outreach	Ongoing public education or information programs	Yes
	Firewise Communities certification	Yes. In coordination with Washington State Dept of Natural Resources
	StormReady certification	
	Other	
Other Comments:		

TOWN OF TWISP

CAPABILITY ASSESSMENT		JURISDICTION: Town of Twisp
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	Yes
	Capital Improvements Plan	Yes
	Economic Development Plan	Yes
	Local Emergency Operations Plan	Yes
	Continuity of Operations Plan	
	Transportation Plan	
	Stormwater Management Plan	Yes
	Community Wildfire Protection Plan	
	Other	
Administrative	Maintenance programs (tree trimming, drain cleaning, etc.)	Yes
	Mutual aid agreements	Yes
	Memorandums of understanding	Yes
	Other	
Technical	Warning systems/services	Yes
	Hazard data and information	

CAPABILITY ASSESSMENT		JURISDICTION: Town of Twisp
Category	Planning Tool/Capability	Yes/No; Year; Comments
	GIS capabilities	
	Grant Writing	Yes
	Flood Plain Manager	
	Other	
Codes and Ordinances	Building code	Yes
	Zoning ordinance	Yes
	Subdivision ordinance	
	Floodplain ordinance	Yes
	Natural hazard specific ordinance	
	Flood insurance rate maps	
	Other	
Project Funding Sources	Capital improvements project funding	Yes
	Community Development Block Grant	Yes
	Other federal funding program	Yes
	State funding programs	Yes
	Other	

CAPABILITY ASSESSMENT		JURISDICTION: Town of Twisp
Category	Planning Tool/Capability	Yes/No; Year; Comments
Education and Outreach	Ongoing public education or information programs	Yes
	Firewise Communities certification	
	StormReady certification	
	Other	
Other Comments:		

TOWN OF WINTHROP

CAPABILITY ASSESSMENT		JURISDICTION: Town of Winthrop
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	Yes, 2015
	Capital Improvements Plan	No, we have a Capital Facilities Element in our Comp Plan
	Economic Development Plan	Yes, as an element of the Comp Plan
	Local Emergency Operations Plan	Yes
	Continuity of Operations Plan	No
	Transportation Plan	Yes, as an element of the Comp Plan
	Stormwater Management Plan	No
	Community Wildfire Protection Plan	No
	Other	
Administrative	Maintenance programs (tree treeming, drain cleaing, etc.)	Yes, our public works department conducts routine maintenance
	Mutual aid agreements	Yes
	Memorandums of understanding	Yes
	Other	
Technical	Warning systems/services	Yes
	Hazard data and informaiton	Some, in a limited capacity based on what is available.

CAPABILITY ASSESSMENT		JURISDICTION: Town of Winthrop
Category	Planning Tool/Capability	Yes/No; Year; Comments
	GIS capabilities	Yes, we do some GIS, but mostly rely on data from outside sources.
	Grant Writing	Yes
	Flood Plain Manager	Yes
	Other	
Codes and Ordinances	Building code	Yes
	Zoning ordinance	Yes
	Subdivision ordinance	Yes
	Floodplain ordinance	Yes
	Natural hazard specific ordinance	Yes, critical areas ordinance
	Flood insurance rate maps	Yes
	Other	
Project Funding Sources	Capital improvements project funding	Yes
	Community Development Block Grant	No
	Other federal funding program	Yes
	State funding programs	Yes
	Other	

CAPABILITY ASSESSMENT		JURISDICTION: Town of Winthrop
Category	Planning Tool/Capability	Yes/No; Year; Comments
Education and Outreach	Ongoing public education or information programs	No
	Firewise Communities certification	No, we do promote Firewise, but are not a certified community
	StormReady certification	No
	Other	
Other Comments:		

TOWN OF RIVERSIDE

CAPABILITY ASSESSMENT		JURISDICTION: Town of Riverside
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	Yes, expires in 2021
	Capital Improvements Plan	No
	Economic Development Plan	No
	Local Emergency Operations Plan	No town plan, but the fire district might have one
	Continuity of Operations Plan	No formal plan, but the town has a partial document
	Transportation Plan	No formal plan, issues are dealt with as needed
	Stormwater Management Plan	No formal plan, but stormwater is considered when issuing building permits. Public works department is responsible for drain clean out.
	Community Wildfire Protection Plan	Yes, currently being updated
	Other	Shoreline Master Plan
Administrative	Maintenance programs (tree trimming, drain cleaning, etc.)	Public works handles tree trimming, drain cleaning
	Mutual aid agreements	Yes, with Fire District #7, OC Emergency Management, Sheriff's department, Riverside Flood Control District
	Memorandums of understanding	
	Other	
Technical	Warning systems/services	Fire station has a siren
	Hazard data and information	No

CAPABILITY ASSESSMENT		JURISDICTION: Town of Riverside
Category	Planning Tool/Capability	Yes/No; Year; Comments
	GIS capabilities	No, but county office is available
	Grant Writing	Yes
	Flood Plain Manager	Yes
	Other	
Codes and Ordinances	Building code	Yes
	Zoning ordinance	No
	Subdivision ordinance	Yes
	Floodplain ordinance	Yes
	Natural hazard specific ordinance	Nothing recent
	Flood insurance rate maps	Yes, currently being updated
	Other	
Project Funding Sources	Capital improvements project funding	USDA RV
	Community Development Block Grant	Yes
	Other federal funding program	
	State funding programs	
	Other	

CAPABILITY ASSESSMENT		JURISDICTION: Town of Riverside
Category	Planning Tool/Capability	Yes/No; Year; Comments
Education and Outreach	Ongoing public education or information programs	Promotion of DNR funding for fire risk mitigation
	Firewise Communities certification	The fire district is promoting Firewise guidelines
	StormReady certification	
	Other	
Other Comments:		

TOWN OF CONCONULLY

CAPABILITY ASSESSMENT		JURISDICTION: Town of Conconully
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	Yes
	Capital Improvements Plan	Yes
	Economic Development Plan	Yes, need to be updated
	Local Emergency Operations Plan	Yes
	Continuity of Operations Plan	No
	Transportation Plan	Yes
	Stormwater Management Plan	No
	Community Wildfire Protection Plan	Yes, it is currently being updated
	Other	
Administrative	Maintenance programs (tree trimming, drain cleaning, etc.)	Tree maintenance, sewer system cleaning, road maintenance, cut grass, etc.
	Mutual aid agreements	
	Memorandums of understanding	Yes, with different fire entities (fire districts, DNR, Forest Service, etc.)
	Other	NFIP
Technical	Warning systems/services	Siren on the fire house is used to alert the community (mudslide, dam failure, fire, etc.)
	Hazard data and information	Yes, the Town receives information and stores some data

CAPABILITY ASSESSMENT		JURISDICTION: Town of Conconully
Category	Planning Tool/Capability	Yes/No; Year; Comments
	GIS capabilities	Not in-house; the Town utilizes the County GIS office
	Grant Writing	Yes
	Flood Plain Manager	Yes
	Other	
Codes and Ordinances	Building code	Yes
	Zoning ordinance	No
	Subdivision ordinance	Yes
	Floodplain ordinance	Yes
	Natural hazard specific ordinance	No
	Flood insurance rate maps	Yes
	Other	Greenhouse gas ordinance, no fireworks, burning ordinances, fire permits
Project Funding Sources	Capital improvements project funding	Yes, almost every year
	Community Development Block Grant	Yes, not annually
	Other federal funding program	USDA Rural Development, not annually
	State funding programs	Yes, not annually
	Other	Trauma and EMS grants

CAPABILITY ASSESSMENT		JURISDICTION: Town of Conconully
Category	Planning Tool/Capability	Yes/No; Year; Comments
Education and Outreach	Ongoing public education or information programs	Yes, brochures and other educational outreach related to fire; brochures for vulnerable populations;
	Firewise Communities certification	No, but the Firewise standards are being encouraged
	StormReady certification	No
	Other	
Other Comments:		

CITY OF OROVILLE

CAPABILITY ASSESSMENT		JURISDICTION: City of Oroville
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	yes
	Capital Improvements Plan	yes
	Economic Development Plan	no
	Local Emergency Operations Plan	yes
	Continuity of Operations Plan	no
	Transportation Plan	yes
	Stormwater Management Plan	yes
	Community Wildfire Protection Plan	no
	Other	
Administrative	Maintenance programs (tree trimming, drain cleaning, etc.)	yes
	Mutual aid agreements	yes
	Memorandums of understanding	yes
	Other	
Technical	Warning systems/services	no
	Hazard data and information	no

CAPABILITY ASSESSMENT		JURISDICTION: City of Oroville
Category	Planning Tool/Capability	Yes/No; Year; Comments
	GIS capabilities	no
	Grant Writing	no
	Flood Plain Manager	yes
	Other	
Codes and Ordinances	Building code	yes
	Zoning ordinance	yes
	Subdivision ordinance	yes
	Floodplain ordinance	yes
	Natural hazard specific ordinance	yes
	Flood insurance rate maps	yes
	Other	
Project Funding Sources	Capital improvements project funding	yes
	Community Development Block Grant	no
	Other federal funding program	yes
	State funding programs	yes
	Other	

CAPABILITY ASSESSMENT		JURISDICTION: City of Oroville
Category	Planning Tool/Capability	Yes/No; Year; Comments
Education and Outreach	Ongoing public education or information programs	yes
	Firewise Communities certification	
	StormReady certification	no
	Other	
Other Comments:		

CITY OF BREWSTER

CAPABILITY ASSESSMENT		JURISDICTION: City of Brewster
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	Yes, 2014, Needs updated
	Capital Improvements Plan	Yes, Outdated, Needs updated
	Economic Development Plan	Element in Comp Plan
	Local Emergency Operations Plan	Okanogan County Plan signatory
	Continuity of Operations Plan	
	Transportation Plan	Yes, updated annually
	Stormwater Management Plan	Comply with Eastern WA Manual
	Community Wildfire Protection Plan	County Multi-Hazard Plan
	Other	
Administrative	Maintenance programs (tree trimming, drain cleaning, etc.)	Yes
	Mutual aid agreements	Yes
	Memorandums of understanding	Yes
	Other	
Technical	Warning systems/services	Yes: Water, Sewer
	Hazard data and information	Yes, for the City, i.e. SDS

CAPABILITY ASSESSMENT		JURISDICTION: City of Brewster
Category	Planning Tool/Capability	Yes/No; Year; Comments
	GIS capabilities	Yes
	Grant Writing	Yes, with consultants and in house
	Flood Plain Manager	Yes
	Other	
Codes and Ordinances	Building code	Yes
	Zoning ordinance	Yes
	Subdivision ordinance	Yes
	Floodplain ordinance	Yes
	Natural hazard specific ordinance	Yes
	Flood insurance rate maps	Yes
	Other	
Project Funding Sources	Capital improvements project funding	Yes
	Community Development Block Grant	Yes
	Other federal funding program	Yes
	State funding programs	Yes
	Other	

CAPABILITY ASSESSMENT		JURISDICTION: City of Brewster
Category	Planning Tool/Capability	Yes/No; Year; Comments
Education and Outreach	Ongoing public education or information programs	As needed
	Firewise Communities certification	Yes, through local Fire District
	StormReady certification	No
	Other	
Other Comments:		

CITY OF PATEROS

CAPABILITY ASSESSMENT		JURISDICTION: City of Pateros
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	Yes; 2018
	Capital Improvements Plan	Yes; 2010; Scheduled to be updated 4/2020
	Economic Development Plan	Yes;2016
	Local Emergency Operations Plan	No
	Continuity of Operations Plan	No
	Transportation Plan	Yes; 2018; part of the comp plan
	Stormwater Management Plan	no
	Community Wildfire Protection Plan	Yes; we are part of the county plan
	Other	
Administrative	Maintenance programs (tree treeming, drain cleaing, etc.)	Yes we do regular tree trimming, with arborist on staff, we have an asset management system that is assisting us in implementing a storm drain maintenance program; water and sewer system maintenance programs.
	Mutual aid agreements	Yes; Chelan Co. Fire District, Okanogan Douglas County Fire District, WAWARN
	Memorandums of understanding	
	Other	
Technical	Warning systems/services	Yes, Okanogan County Emergency Management
	Hazard data and informaiton	No

CAPABILITY ASSESSMENT		JURISDICTION: City of Pateros
Category	Planning Tool/Capability	Yes/No; Year; Comments
	GIS capabilities	Yes, we have some infrastructure GIS located and accessible through our asset management program
	Grant Writing	Yes, Grant writer on staff
	Flood Plain Manager	No
	Other	
Codes and Ordinances	Building code	Yes
	Zoning ordinance	Yes
	Subdivision ordinance	Yes
	Floodplain ordinance	Yes
	Natural hazard specific ordinance	Yes
	Flood insurance rate maps	No; There is no FEMA floodplain within the City limits.
	Other	
Project Funding Sources	Capital improvements project funding	Limited budget, primarily grants
	Community Development Block Grant	Yes, We have had numerous CDBG grants
	Other federal funding program	Yes, we have used Rural Development
	State funding programs	Yes, we have used the CERB program; Energy services; and direct state appropriations
	Other	

CAPABILITY ASSESSMENT		JURISDICTION: City of Pateros
Category	Planning Tool/Capability	Yes/No; Year; Comments
Education and Outreach	Ongoing public education or information programs	We use our website, utility billing, and newsletters to highlight emergency management issues especially emergency notification awareness.
	Firewise Communities certification	No
	StormReady certification	No
	Other	
Other Comments:		

TOWN OF NESPELEM

CAPABILITY ASSESSMENT		JURISDICTION: Town of Nespelem
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	Yes 2021
	Capital Improvements Plan	No
	Economic Development Plan	No
	Local Emergency Operations Plan	Yes
	Continuity of Operations Plan	No
	Transportation Plan	No
	Stormwater Management Plan	No
	Community Wildfire Protection Plan	Yes
	Other	
Administrative	Maintenance programs (tree trimming, drain cleaning, etc.)	No
	Mutual aid agreements	No
	Memorandums of understanding	
	Other	
Technical	Warning systems/services	Yes
	Hazard data and information	No

CAPABILITY ASSESSMENT		JURISDICTION: Town of Nespelem
Category	Planning Tool/Capability	Yes/No; Year; Comments
	GIS capabilities	Yes
	Grant Writing	Yes
	Flood Plain Manager	No
	Other	
Codes and Ordinances	Building code	No
	Zoning ordinance	No
	Subdivision ordinance	No
	Floodplain ordinance	No
	Natural hazard specific ordinance	No
	Flood insurance rate maps	No
	Other	
Project Funding Sources	Capital improvements project funding	
	Community Development Block Grant	
	Other federal funding program	
	State funding programs	
	Other	

CAPABILITY ASSESSMENT		JURISDICTION: Town of Nespelem
Category	Planning Tool/Capability	Yes/No; Year; Comments
Education and Outreach	Ongoing public education or information programs	No
	Firewise Communities certification	No
	StormReady certification	No
	Other	No
Other Comments:		

TOWN OF ELMER CITY

CAPABILITY ASSESSMENT		JURISDICTION: Town of Elmer City
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	No, need to check if Elmer City is included in the County or Tribal plans
	Capital Improvements Plan	No formal plan, the city has an asset management program for all infrastructure
	Economic Development Plan	No
	Local Emergency Operations Plan	Yes, for water system
	Continuity of Operations Plan	No formal plan
	Transportation Plan	Yes
	Stormwater Management Plan	No
	Community Wildfire Protection Plan	Yes, currently being updated
	Other	Critical areas
Administrative	Maintenance programs (tree trimming, drain cleaning, etc.)	Yes
	Mutual aid agreements	Wildfire agreements, BOR, BIA
	Memorandums of understanding	Yes, help or assistance from neighboring communities
	Other	
Technical	Warning systems/services	Air raid sirens and alarms systems for water and sewer
	Hazard data and information	Typical MSD sheets

CAPABILITY ASSESSMENT		JURISDICTION: Town of Elmer City
Category	Planning Tool/Capability	Yes/No; Year; Comments
	GIS capabilities	No, work with the county GIS office
	Grant Writing	Yes, but most is done with consulting engineers
	Flood Plain Manager	No
	Other	
Codes and Ordinances	Building code	Yes
	Zoning ordinance	Yes
	Subdivision ordinance	Yes
	Floodplain ordinance	No
	Natural hazard specific ordinance	No
	Flood insurance rate maps	No
	Other	
Project Funding Sources	Capital improvements project funding	Yes, apply annually
	Community Development Block Grant	Yes, apply as needed
	Other federal funding program	Yes, apply as needed
	State funding programs	Yes, apply as needed. Public Works Trust Board, transportation programs, etc.
	Other	Indian Health Services, Rural Development

CAPABILITY ASSESSMENT		JURISDICTION: Town of Elmer City
Category	Planning Tool/Capability	Yes/No; Year; Comments
Education and Outreach	Ongoing public education or information programs	Public postings, annual information letter, utilize local media sources
	Firewise Communities certification	No, but the Town does make efforts to reduce fire risk and spread awareness
	StormReady certification	No, but the Town does make efforts to reduce storm-related hazards
	Other	
Other Comments:		

TOWN OF COULEE DAM

CAPABILITY ASSESSMENT		JURISDICTION: Town of Coulee Dam
Category	Planning Tool/Capability	Yes/No; Year; Comments
Planning and Regulatory	Comprehensive or Master Plan	Yes, December 2020
	Capital Improvements Plan	Yes, December 2020
	Economic Development Plan	No
	Local Emergency Operations Plan	No local plan, follow county plan
	Continuity of Operations Plan	No
	Transportation Plan	Yes
	Stormwater Management Plan	No
	Community Wildfire Protection Plan	Yes, currently being updated
	Other	
Administrative	Maintenance programs (tree trimming, drain cleaning, etc.)	Parks and tree maintenance programs, utility clearing, public works handles maintenance
	Mutual aid agreements	Wildfire, EMS, electrical
	Memorandums of understanding	Yes, some are temporary
	Other	
Technical	Warning systems/services	Fire sirens, sirens for water and sewer systems
	Hazard data and information	MSDS forms for public works, often rely on county

CAPABILITY ASSESSMENT		JURISDICTION: Town of Coulee Dam
Category	Planning Tool/Capability	Yes/No; Year; Comments
	GIS capabilities	No, use the county office
	Grant Writing	Mostly use contractors
	Flood Plain Manager	No
	Other	
Codes and Ordinances	Building code	Yes
	Zoning ordinance	Yes
	Subdivision ordinance	No
	Floodplain ordinance	No, but the Town has a shoreline master plan
	Natural hazard specific ordinance	No
	Flood insurance rate maps	No
	Other	
Project Funding Sources	Capital improvements project funding	
	Community Development Block Grant	
	Other federal funding program	
	State funding programs	
	Other	USDA, Public Works Trust Fund, Dept of Ecology, Dept of Health, Improvement Board, Dept of Commerce

CAPABILITY ASSESSMENT		JURISDICTION: Town of Coulee Dam
Category	Planning Tool/Capability	Yes/No; Year; Comments
Education and Outreach	Ongoing public education or information programs	Not on a regular basis, distribute annual drinking water report
	Firewise Communities certification	No
	StormReady certification	No
	Other	
Other Comments:		

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For more information about the 2022 Okanogan County Multi-Hazard Mitigation Plan, please contact:

Okanogan County Emergency Management:

Phone: (509) 422-7206

Website: https://www.okanogancounty.org/government/emergency_management/index.php

Citation of this work:

Nelson, Eric and Brad, Tucker. *Lead Authors*. 2022 Multi-Hazard Mitigation Plan: Okanogan County, Washington. Northwest Management, Inc., Moscow, Idaho. 2022.



Northwest Management, Inc.

233 East Palouse River Drive

PO Box 9748

Moscow ID 83843

208-883-4488 Telephone

208-883-1098 Fax

nwmanage@northwestmanagement.com

<http://www.northwestmanagement.com/>