2022

YAKIMA COUNTY

Multi-Jurisdictional Hazard Mitigation Plan

Prepared For:
Yakima Valley Office of
Emergency Management

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EXECUTIVE SUMMARY

Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), 42 U.S.C. 5165, as amended by the Disaster Mitigation Act of 2000 (DMA) (P.L. 106-390), provides for States, Tribes, and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning. The National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001 et seq, reinforced the need and requirement for mitigation plans, linking flood mitigation assistance programs to State, Tribal and Local Mitigation Plans.

After a presidential major disaster declaration, mitigation funding becomes available. The amount is based on a percentage of the total federal grants awarded under the Public Assistance and Individuals and Households Programs for the entire disaster. Projects are funded with a combination of federal, state, and local funds.

Section 322 of the amended Stafford Act essentially states that as a condition of receiving a disaster loan or grant:

"The state and local government(s) shall agree that natural hazards in the areas affected shall be evaluated and appropriate action taken to mitigate such hazards, including safe land-use and construction practices. For disasters declared after November 1, 2004, all potential applicants (sub-grantees) must have either their own, or be included in a regional, locally adopted and FEMA approved all hazard mitigation plan to be eligible to apply for mitigation grant funds."

The regulations governing the mitigation planning requirements for local mitigation plans are published under 44 CFR §201.6. Under 44 CFR §201.6, local governments must have a FEMA-approved Local Mitigation Plan to apply for and/or receive certain project grants under various FEMA hazard mitigation assistance programs.

About the Plan Update

The 2022 Yakima County Multi-Jurisdiction Hazard Mitigation Plan (HMP) is an update to the 2015 Yakima County and 2020 City of Yakima plans. This plan update included a thorough review of each required element, as well as the addition of 11 municipalities, one county-wide special district, and five Yakima County fire districts. The plan update was led by Yakima Valley Emergency Management (YVEM) in coordination with a Planning Committee representing county departments involved in hazard mitigation and participating municipalities and special districts. The Planning Committee met monthly between April – September 2022 to inform the plan update with contract support from Integrated Solutions Consulting. Municipalities and special districts not participating in the 2022 MJHMP update can work with YVEM to annex into the plan in the future, and a full update to the plan will be completed by 2027.

Hazard Identification and Risk Assessment

Hazard events happen somewhere in the world every day. Whether such events become a disaster depends on whether there are injuries, deaths, or significant property, natural resource, or cultural damage. Conducting a risk assessment can provide information on the location of hazards, the value of existing land and property in hazard locations, and an analysis of risk to life, property, and the environment. At the most fundamental level, both the U.S. Department of Homeland Security and FEMA recognize that:

Risk = Frequency of a Hazard X Consequence from that Hazard

To reach a certain level of **risk**, there must be a probability or likelihood for that event to occur (**frequency**). Likewise, if the event does happen, but there is no **impact or consequence**, the level of risk is negated or substantially reduced. To determine the risk for each hazard, this assessment considers frequency of the hazard based on historic occurrence and future climate conditions, as well as potential consequences.

The 2022 HMP includes 17 hazards of concern, including 12 natural hazards and 5 technological and human-caused hazards. The Planning Committee analyzed and scored each of the 17 hazards using a risk assessment methodology which considered probability, frequency, and six impact criteria, including: Human Health, Property Damage, Economic Disruption, Environmental Resource Damages/Degradation, Emergency Services Burden, and Critical Facilities Exposure. Total risk scores for each hazard were further refined into three categories to better illustrate which hazards present the greatest threat to Yakima County.

Table ES.1 provides a summary of the risk assessment results, as well as a comparison to the 2015 HMP risk assessment. It is important to note that the methodology has changed between the 2015 and 2022 HMPs, so a direct comparison of scores is not applicable.

Table ES.1. Risk Assessment Summary

Natural Hazards	2022 Risk Ranking and Score	2015 Risk Ranking
Wildfire	25 - High	Medium
Flooding	24 - High	High
Public Health Emergency	24 - High	N/A
Severe Winter Weather	24 - High	Medium
Drought	22 - Medium	Not Ranked
Agriculture Disease Outbreak	21 - Medium	N/A
Landslide and Geologic Hazards	20 - Medium	Medium
Severe Weather	20 - Medium	Medium-Low
Extreme Temperatures	19 - Medium	Not Ranked
Earthquake	18 - Medium	Medium-Low
Avalanche	14 - Low	Not Ranked
Volcanic Eruption	12 - Low	Low
Technological and Human-caused Hazards	**2022 Risk Ranking and Score**	**2015 Risk Ranking**
Dam/Levee Failure	24 - High	Medium
Hazardous Materials Incident	23 - High	Medium-Low
Cyber Incident	18 - Medium	N/A
Nuclear/Radiological Incident	16 - Low	N/A
Terrorism	16 - Low	N/A

Hazard Mitigation Strategy

The mitigation strategy is made up of three parts: ***Mission, Goals,*** and ***Action Items.***

The ***mission*** of the Yakima County HMP is to promote sound public policy designed to protect community members, critical facilities, infrastructure, private property, and the environment from natural, technological, and human-caused hazards. This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the county towards building a safer, more sustainable community.

The plan ***goals*** describe the overall direction that Yakima County agencies, jurisdictions, and community members can take to minimize the impacts of hazards. The goals are stepping-stones between the broad direction of the mission and the specific action items.

Protect Life, Property and Public Welfare

- Implement sustainable activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resilient to natural and technological hazards.
- Reduce losses and repetitive damages for chronic hazard events while promoting insurance coverage for catastrophic hazards.
- Improve hazard assessment information to make recommendations for encouraging higher standards for safer development in areas vulnerable to natural and technological hazards.

Public Awareness

- Develop and implement education and outreach programs to increase public awareness of the risks associated with natural and technological hazards.
- Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.

Natural Systems

- Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment.
- Preserve, rehabilitate, re-establish, and enhance natural systems to serve natural hazard mitigation functions.

Partnerships and Implementation

- Strengthen communication and coordinate participation among and within public agencies, community members, non-profit organizations, business, and industry to gain a vested interest in implementation.
- Encourage leadership within the public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.

Emergency Services

- Prioritize mitigation projects for critical facilities, services, and infrastructure.
- Improve understanding of hazard risks through monitoring and assessment projects.
- Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.
- Coordinate and integrate natural and technological hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

Action items are activities which county agencies, participating jurisdictions, special districts, and other stakeholders can implement to reduce risk. There are **70** total action items that represent a range of investments and projects to mitigate risk for the 17 identified hazards. For each action item, the following information is included: Coordinating Organization, Participating Jurisdictions and Supporting Agencies, Relevant Mitigation Goals, Timeline, Estimated Cost, Funding, and Potential Benefit. This information was used to complete a prioritization process based on a simple benefit-cost analysis, as well as support effective implementation by participating agencies.

Mitigation Strategy Implementation and Plan Integration

Successful implementation of the mitigation strategy depends on the capability of Yakima County and participating jurisdictions. The essential components for successful implementation are funding, resource allocation, and organizational capacity. The multi-jurisdictional mitigation strategy identifies the principal Yakima County and municipal agencies and departments that are responsible for implementing each identified action item. The strategy also considers other jurisdictions and state or federal partner agencies for collaboration.

FEMA requires the evaluation of existing hazard management policies, programs, and capabilities that exist and could be used to implement the mitigation strategy. Many Yakima County departments, programs, and collaborative groups can help reduce losses from emergencies and disasters. The capability of participating jurisdictions to implement mitigation activities is described briefly in each **Jurisdiction Annex.**

Plan Maintenance, Monitoring, and Evaluation

YVEM will lead a formal process to ensure that the HMP remains an active and relevant document. The process includes a schedule for monitoring and evaluating the HMP annually and producing a plan revision every five years.

YVEM will be responsible for facilitating the adoption of the HMP in coordination with participating jurisdictions. The Yakima County Board of County Commissioners (BOCC) will be responsible for adopting for the county, city councils for the cities/towns, and governing bodies for the special districts. These governing bodies have the authority to promote sound public policy regarding natural, technological, and human-caused hazards. Once the plan has been reviewed and approved by the HMP Committee, YVEM will be responsible for submitting it to the Mitigation Officer at WaEMD. WaEMD will then submit the plan to FEMA for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. FEMA will designate the HMP as “Approved Pending Adoption”, giving each governing body up to 12 months to formally adopt the plan. Upon local adoption, Yakima County and the participating jurisdictions will gain eligibility for Hazard Mitigation Grant Program funds. YVEM and each participating jurisdiction will maintain documentation of local plan adoption.

The HMP will be reviewed on an annual basis to determine the effectiveness of programs, and to reflect changes in land development or mitigation priorities. YVEM will convene meetings of the HMP Committee for the annual review. Plan implementation and evaluation will be a shared responsibility among the jurisdictions, but YVEM is responsible for plan maintenance. Jurisdictions will be responsible for monitoring and evaluating the progress of the mitigation strategies in the HMP based upon their area of expertise. Annual review of the plan allows for “mid-course” corrections to the plan and consider additional funding opportunities.

SECTION 1. INTRODUCTION

Throughout history, the residents of Yakima County have dealt with various natural, technological, and human-caused hazards affecting the area. The county is subject to 54 hazards. **Table 1.1** lists the 17 hazards of concern identified for this mitigation plan, including 12 natural hazards and 5 technological and human-caused hazards.

Table 1.1. 2022 Yakima County Hazards	
Natural Hazards	**Technological and Human-caused Hazards**
Agricultural Disease Outbreak	Cyber Attack/Threat
Avalanche	Dam/Levee Failure
Drought	Hazardous Materials Incident
Earthquake	Nuclear Release/Radiological Incident
Extreme Temperatures	Terrorism
Flood	
Landslides and other Geologic Hazards	
Public Health Emergency	
Severe Weather	
Severe Winter Storm	
Volcanic Eruption	
Wildfire	

It is impossible to predict exactly when these disasters will occur, or the extent to which they will affect the county. However, with careful planning and collaboration within the community, it is possible to minimize the losses that can result from disasters.

Yakima County is located in the south-central portion of Washington State. It is the second largest county in Washington State with a total land area of 4,273 square miles. The county's western boundary generally follows the crest of the Cascade Mountain range. The widest portion of the county measures approximately 80 miles from north to south. The most eastern boundary measures 48 miles from north to south and runs along the Columbia River for approximately 9 miles. From east to west the county measures approximately 75 miles.

The terrain of Yakima County varies from areas of irregular, densely timbered, mountainous terrain in the west to broad valleys and arid sagebrush-covered foothills in the east. The arable lands within the county are made up of basin lands, bottom lands, terraces, and lower uplands tributary to the Yakima River and are collectively called the Yakima Valley. The area north of Ahtanum and Rattlesnake Ridges is generally referred to as the Upper Yakima Valley while the area south of them is often referred to as the Lower Yakima Valley. The Upper Valley is more heavily populated while the Lower Valley is characterized by smaller towns and contains more productive farmland.

Much of the recent development in Washington State occurs in or near floodplains. This development increases the likelihood of flood damage in two ways. First, new developments near a floodplain add structures and people in flood areas. Secondly, new construction alters surface water flows by diverting water to new courses or increases the amount of water that runs off impermeable pavement and roof surfaces. This second effect diverts waters to places previously safe from flooding.

1.1. Structure of the Plan

Each section of the mitigation plan provides information and resources to assist people in understanding the county and the hazard-related issues facing residents, critical facilities and operations, businesses and the local economy, and natural and cultural resources. Combined, the sections of the plan work together to create a document that guides the mission to reduce risk and prevent loss from future hazard events.

The structure of the plan enables people to use a section of interest to them. It also allows county jurisdictions to review and update sections when new data becomes available. The ability to update individual sections of the mitigation plan places less of a staffing burden on jurisdictions. Decision-makers can allocate staff resources to selected pieces in need of review, thereby avoiding a full update, which can be time-consuming. New data can be easily incorporated, resulting in a hazards mitigation plan that remains current and relevant to Yakima County jurisdictions

The mitigation plan is organized in six sections, as described below.

Section 1: Introduction

The *Introduction* describes the background and purpose of developing the mitigation plan for Yakima County. This section also describes the process for engaging local stakeholders and the public in plan development and review.

This section addresses the following aspects of FEMA's Local Mitigation Plan requirements under 44 CFR §201.6:

- Al. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))
- A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))
- A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.G(b)(l))
- D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))

Section 2: Community Profile

Community Profile presents the history, geography, demographics, and socioeconomics of Yakima County and its jurisdictions. It serves as a tool to provide an historical perspective of hazards in the county.

This section addresses the following aspects of FEMA's Local Mitigation Plan requirements under 44 CFR §201.6:

- D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))

Section 3: Hazard Identification and Risk Assessment

Hazard Identification and Risk Assessment provides information on hazard identification, describes the methodology and results of the risk assessment, and summarizes the frequency, location, extent, and expected vulnerabilities or impacts from the 17 hazards identified in the HMP Update.

This section addresses the following aspects of FEMA's Local Mitigation Plan requirements under 44 CFR §201.6 for the entirety of Yakima County. Each **Jurisdiction Annex** addresses these aspects at the local level.

- BI. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))
- B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))
- B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))
- B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))

Section 4: Mitigation Strategy

Mitigation Strategy provides information on the process used to develop goals and action items that cut across the 17 hazards addressed in the mitigation plan. The plan action items are included in this section, and address both multi-hazard and hazard-specific activities that can be implemented to reduce risk and prevent loss from future hazard events.

This section also describes FEMA's requirements for benefit-cost analysis in hazard mitigation, as well as approach for conducting an analysis and prioritization for the proposed mitigation activities.

This section addresses the following aspects of FEMA's Local Mitigation Plan requirements under 44 CFR §201.6 for the entirety of Yakima County. Each **Jurisdiction Annex** addresses these aspects at the local level.

- C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))
- C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))
- C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))
- C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))
- D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))

Section 5: Mitigation Strategy Implementation & Plan Integration

Mitigation Strategy Implementation & Plan Integration describes Yakima County's capacity and capability to implement the mitigation strategy, including other plans that have been integrated in the HMP, or where the HMP can be integrated in the future.

This section addresses the following aspects of FEMA's Local Mitigation Plan requirements under 44 CFR §201.6 for the entirety of Yakima County. Each **Jurisdiction Annex** addresses these aspects at the local level.

- A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))
- CI. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))
- C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))

Section 6: Plan Maintenance

Plan Maintenance provides information on plan implementation, monitoring, and evaluation.

This section addresses the following aspects of FEMA's Local Mitigation Plan requirements under 44 CFR §201.6:

- A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))
- A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating, and updating the mitigation plan within a 5 -year cycle)? (Requirement §201.6(c)(4)(1))

Appendices

The HMP Appendices provide additional detail and resources on various aspects of the HMP.

- **Appendix A: Acronyms:** This appendix provides a list of acronyms for county, regional, state, and federal agencies and organizations, as well as industry terms that may be referred to within the HMP.
- **Appendix B: Planning Process and Public Involvement Documentation:** This appendix provides detailed documentation of stakeholder engagement in the planning process, as well as outreach efforts to involve the public throughout the planning period.
- **Appendix C: Community Survey Results:** This appendix includes the complete results of a Community Survey distributed as one strategy for public involvement.
- **Appendix D: Complete Hazard History for Yakima County:** This appendix includes a complete hazard history for Yakima County as recorded by in the NOAA Storm Events Database. This database is the most comprehensive public source for hazard history but does not include some natural hazards (such as wildfire) or technological or human-caused hazards. All hazard events during the HMP analysis period (2015-2021) are included in Section 3 of the base plan.

- **Appendix E: Detailed Mitigation Strategy with Revisions Notes:** This appendix provides the complete detail of the mitigation strategy. Given the amount of detail in the complete mitigation action matrix, a summarized version is included in Section 4 of the base plan for clarity and readability.
- **Appendix F: Hazard Maps:** This appendix includes full-size versions of hazard maps provided throughout the plan.

Participating Jurisdiction Annexes

Each jurisdiction participating in the 2022 HMP Update has an individual annex to be adopted by their respective governing bodies. Each annex details the unique hazard risks, vulnerabilities, capabilities, and mitigation strategy for the jurisdiction. Please note that the Yakima County Fire Districts are included together in one annex. Jurisdiction annexes include the following:

- **City of Granger Annex**
- **City of Grandview Annex**
- **City of Moxee Annex**
- **City of Selah Annex**
- **City of Sunnyside Annex**
- **City of Tieton Annex**
- **City of Toppenish Annex**
- **City of Union Gap Annex**
- **City of Yakima Annex**
- **Town of Harrah Annex**
- **Town of Naches Annex**
- **Yakima County Fire Districts Annex**
- **Yakima County-wide Flood Control Zone District Annex**

2022 Yakima County Community Wildfire Protection Plan Annex

In tandem with the 2022 HMP Update, a Planning Committee, made up of Yakima Valley Office of Emergency Management, Yakima Fire Department, Senator Murray's Office, Yakima County Fire Marshal's Office, Yakima County Commissioners, Washington Department of Natural Resources, and other agencies updated the Community Wildfire Protection Plan (CWPP) for Yakima County. The 2022 CWPP will be adopted by the Yakima County Commissioners as an Annex to the HMP. The CWPP identifies and prioritizes wildland-urban interface (WUI) areas within Yakima County (including state, county, federal and other lands) for hazardous fuels reduction treatments and recommends methods for achieving hazardous fuels reduction.

1.2. Planning Process

The 2022 Yakima County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) follows FEMA's Local Mitigation Plan requirements under 44 CFR §201.6 which specifically identify criteria that allow for multi-jurisdictional mitigation plans. Many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level. Although economy-of-scale efforts are apparent and encouraged with multi-jurisdictional plans, FEMA requires that all participating jurisdictions meet the requirements for mitigation plans identified in 44 CFR §201.6. While certain elements are common to all participating jurisdictions (e.g., planning process, hazards, goals, and maintenance), there are some elements that are unique to each participating jurisdiction, including:

- Risks – where they differ from the general planning area
- Mitigation Actions – actions must be identified for each jurisdiction
- Participation in the planning process
- Adoption – each jurisdiction must formally adopt the plan

The Yakima Valley Office of Emergency Management (YVEM) identified organizations consistent with federal guidance as to those which should be included in the mitigation process. YVEM recruited the following types of agencies to participate:

- **Local Government:** Section 201.2 of 44 CFR defines Local Government as any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government.
- **Public College or University:** Under 44 CFR 201, a public college or university may be an active participant in a FEMA approved State, Tribal or Local Mitigation Plan, or have an approved plan of their own that meets the requirements of 44 CFR §201.6 to be eligible for mitigation project grants.
- **Private Institutions:** Private institutions may opt to participate in local or regional multi-jurisdictional plans, or they may develop plans of their own. Either way, the key to success is to ensure that all of the requirements established by regulation are met. This includes coordinating the planning activities of each campus with those of the surrounding community and, in the case of a multi-institution plan, ensuring that each institution's unique risks are addressed in addition to those risks affecting the entire university system.
- **School Districts:** School districts or independent school districts, or other special districts are defined as local governments at 44 CFR Part 201.2, and are therefore required to have a FEMA-approved local mitigation plan to be eligible for project grants under FEMA hazard mitigation assistance programs. A school district may also demonstrate their participation as a separate government entity in another local government's approved mitigation plan to be eligible for project grants under FEMA hazard mitigation assistance programs.

The 2022 HMP Update focused primarily on local government agencies, but YVEM intends to prioritize adding other entities to the HMP over future iterations.

Table 1.2 lists those local government agencies targeted for 2022 MJHMP inclusion. **Table 1.3** represents the jurisdictions that are included in the 2022 MJHMP Update, tracking their participation in the planning process. **Section 6.5** outlines the procedures to add jurisdictions to the HMP that did not participate in 2022.

Table 1.2. Yakima County Local Government Agencies	
Cities and Towns	
City of Grandview	City of Sunnyside
City of Granger	City of Tieton
Town of Harrah	City of Toppenish
City of Mabton	City of Union Gap
City of Moxee	City of Wapato
Town of Naches	City of Yakima
City of Selah	City of Zillah
	Yakima County (unincorporated areas)
Fire Protection Districts	
Fire District #1 (Highland)	Fire District #6 (Gleed)
Fire District #2 (Selah)	Fire District #7 (Glade)
Fire District #3 (Naches)	Fire District #9 (Naches Heights)
Fire District #4 (East Valley)	Fire District #12 (West Valley)
Fire District #5 (Lower Valley)	Fire District #14 (Nile)
School Districts	
East Valley School District No. 90	Sunnyside School District No. 201
Grandview School District No. 200	Toppenish School District No. 202
Granger School District No. 204	Union Gap School District No. 2
Highland School District No. 203	Wapato School District No. 207
Mabton School District No. 120	West Valley School District No. 208
Mt. Adams School District No. 209	Yakima School District No. 7
Naches Valley School District Jt 3	Zillah School District No. 205
Selah School District No. 119	Education Service District 105
Irrigation Districts	
Ahtanum Irrigation District #11	Snipes Mountain Irrigation District #100
Buena Irrigation District #20	Sunnyside Valley Irrigation District
Grandview Irrigation District #30	South Naches Irrigation District #190
Granger Irrigation District #40	Terrace Heights Irrigation District #120
Selah-Moxee Irrigation District	Union Gap Irrigation District #130
Home Irrigation District #50	Wenas Irrigation District #140
Naches Union Irrigation District #180	Zillah Irrigation District #170
Naches-Selah Irrigation District #60	Yakima-Tieton Irrigation District
Outlook Irrigation District #70	Yakima Valley Canal Company—Congdon Canal
Roza Irrigation District #98	Fruitvale Canal (City of Yakima)
Selah-Moxee Irrigation District #90	

Plan Update Approach and Timeline

The 2022 Yakima County HMP update was organized into three distinct project phases, as described below. Detailed documentation of the planning process is available as **Appendix B**.

Phase 1: Risk Analysis (April – June 2022)

The 2022 HMP Committee engaged residents, government officials, and subject matter experts to understand the unique assets in the community that should be protected, the type of hazards they face, and the risks that posed impacts on the most vulnerable assets and community members. This process is illustrated in **Figure 1.1**, developed by the U.S. Geological Survey and Oregon Partnership for Disaster Resilience.

Figure 1.1. Risk Analysis

Phase 2: Mitigation Strategy (June – September 2022)

The HMP Committee developed a strategy that advances shared mitigation goals identified through public involvement efforts. The strategy leveraged the community's existing plans, policies, and programs, and addressed the top priority hazards and identified risks from Phase 1. This strategy included a clear action plan that prioritized the different projects, plans, and policies that mitigate property damage and loss of life from a disaster. Each action was evaluated based on cost benefit, time frame, existing partnerships, and more.

Phase 3: Implementation & Monitoring (October 2022 through 2027)

With an action plan in hand, the HMP Committee will work to identify local, state, and federal programs that can help advance priority actions. The plan will be submitted to WaEMD and FEMA for approval, and then adopted by the Yakima County Board of County Commissioners and the City Councils or other governing bodies of each participating jurisdiction. Every year, the HMP Committee will meet to monitor and report on progress on identified mitigation actions. In 2027, the plan will be completely updated and submitted to FEMA for approval, continuing on a five-year cycle. Continued implementation of mitigation actions will help with steadily reducing the risks posed by hazards to the community.

HMP Committee and Stakeholder Involvement

During the planning period (April – September 2022), the HMP Committee met monthly to assess plan development progress and provide feedback on key components. Two of these meetings served as "Mitigation Strategy Workshops" where additional stakeholders were invited to inform development of the mitigation strategy and action items. The goal of the virtual meetings was to find a clear action plan that prioritizes the different projects to mitigate property damage and loss of life from a disaster. **Table 1.3** represents the jurisdictions that are included in the 2022 HMP Update, tracking their participation in the planning process.

Table 1.3. 2022 HMP Update Committee Meeting Participation

Name	Organization	Mtg. #1 3/15/22	Mtg. #2 4/20/22	Mtg. #3 5/18/22	Mtg. #4 6/22/22	Mtg. #5 7/20/22	Mtg. #6 8/18/22	Mtg. #7 9/21/22
Jose Trevino	City of Granger	X	X					
Kimberly Grimm	City of Granger					X		
Jeff Burkett	City of Moxee		X					
Joe Henne	City of Selah	X	X					
Rocky Wallace	City of Selah			X			X	X
Mickey Gillie	City of Selah			X				
Ken Anderson	City of Sunnyside	X	X		X	X		X
Albert Escalera	City of Sunnyside							
Elizabeth Alba	City of Sunnyside			X		X		
Frank Brewer	City of Tieton		X		X	X		X
Holly Davis	City of Tieton						X	
Tim Smith	City of Toppenish		X	X		X		
Gregory Cobb	City of Union Gap	X	X			X	X	X
David Brown	City of Yakima	X		X	X		X	X
Randy Tabert	City of Yakima							X
Janice Deccio	City of Yakima	X				X	X	
John Simmons	City of Zillah	X	X					
Dale Hillie	East Valley Fire Department	X	X			X	X	X
Jim Johnston	Fire District #12 West Valley Fire						X	X

Table 1.3. 2022 HMP Update Committee Meeting Participation								
Name	**Organization**	**Mtg. #1 3/15/22**	**Mtg. #2 4/20/22**	**Mtg. #3 5/18/22**	**Mtg. #4 6/22/22**	**Mtg. #5 7/20/22**	**Mtg. #6 8/18/22**	**Mtg. #7 9/21/22**
Nate Craig	Fire District #12 West Valley Fire				X	X		
Ken Frazier	Gleed Fire District #6			X	X	X	X	X
Pat Mason	Grandview Fire Department (City of Grandview)	X	X	X	X	X		X
Deborah LaCombe	HLA Civil Engineering (City of Naches, City of Granger)	X	X	X	X	X		
Jim Lange	Selah Fire Department	X			X	X	X	X
Sarah Hovis	Town of Harrah	X	X	X		X	X	X
Barbara Harrer	Town of Harrah	X	X	X		X	X	X
Jeff Ranger	Town of Naches		X					
Michael Martian	Yakima County - GIS					X		
David Haws	Yakima County Environmental Services Division	X	X	X	X	X		
Chris Pedersen	Yakima County Fire Marshal's Office					X	X	X
Joel Freudenthal	Yakima County Flood Control Zone District	X	X		X	X	X	X
Troy Havens	Yakima County Flood Control Zone District	X	X	X		X	X	
Thomas Carroll	Yakima County Planning Division					X	X	
Aaron Markham	Yakima Fire Department	X			X			X
Andrew Bigelow	Yakima Valley Emergency Mgmt					X		X
Antone Miller	Yakima Valley Emergency Mgmt	X	X	X	X	X	X	X
Mike McMullen	Yakima Valley Emergency Mgmt		X	X				X
Nicole Parpart	Yakima Valley Emergency Mgmt	X	X	X	X	X	X	

Public Involvement

Public participation is a key component to strategic planning processes. Public participation offers residents the chance to voice their ideas, interests, and opinions. Washington State's land use planning goals (RCW 36.70A.020) address the need for public input. Goal 11 - Citizen Participation and Coordination "encourages the involvement of citizens in the planning process and ensures coordination between communities and jurisdictions to reconcile conflicts." FEMA also requires public input during the development of mitigation plans.

Through public involvement, the mitigation plan reflects community issues, concerns, and new ideas and perspectives on mitigation opportunities and plan action items.

Residents were regularly engaged in the hazard mitigation planning process. Key roles for members of the public included:

- Shaping the mitigation goals that guide the focus of the entire plan
- Informing priority community assets and vulnerable groups
- Prioritizing mitigation actions for the community to implement over the life of the plan

Neighboring communities and other community stakeholders were offered the opportunity for involvement and comment on the HMP. The HMP Committee invited representatives of Kittitas and Benton counties, as well as Yakama Nation to guide the development of the HMP and identify coordination efforts on the mitigation strategy. All stakeholders were also invited to a public meeting where the final HMP was presented. **Table 1.4** summarizes efforts to involve neighboring jurisdictions and key stakeholders.

Table 1.4. Additional Stakeholders and Neighboring Jurisdictions

Name	Organization	Participated	Participation Details	Contact Dates
Deanna Davis	Benton County Emergency Services	No	N/A	Invite to public meeting and update on plan review period (Email 9/9 and 9/19)
John Carney	City of Yakima Information Technology	Yes	Participated in an interview about cyber threats for the city	August 22 Meeting
Bill Preston	City of Yakima Engineer	Yes	Participated in final plan review	Contacted by Committee Member during plan review period (9/15 – 10/5)
Joan Davenport	City of Yakima Planning	Yes	Participated in final plan review	Contacted by Committee Member during plan review period (9/15 – 10/5)
Darren Higashiyama	Kittitas County Sheriff's Office	No	N/A	Invite to public meeting and update on plan review period (Email 9/9 and 9/19)
John Sinclair	Kittitas Valley Fire & Rescue	No	N/A	Invite to public meeting and update on plan review period (Email 9/9 and 9/19)

Table 1.4. Additional Stakeholders and Neighboring Jurisdictions				
Name	**Organization**	**Participated**	**Participation Details**	**Contact Dates**
Elizabeth Sanchey	Yakama Nation	No	N/A	Invite to public meeting and update on plan review period (Email 9/16 and 9/19)
Dale Panattoni	Yakima County Information Technology	Yes	Participated in an interview about cyber threats for the county	August 22 Meeting
Nathan Johnson	Yakima County Health District	Yes	Participated in final plan review	Contacted by Committee Member during plan review period (9/15 – 10/5)
	Yakima Valley Memorial Hospital	Yes	Participated in final plan review	Contacted by Committee Member during plan review period (9/15 – 10/5)

Public Meetings

The HMP Committee hosted two public meetings throughout the planning process. The goal of these hybrid virtual/in-person meetings was to establish public priorities and offer opportunities to inform plan development. The focus of the first public meeting included the planning process, priority hazards, and mitigation goals. The final public meeting goal is to review the draft version of the plan and provide feedback on the mitigation strategy, specifically the priority action items. As the COVID-19 global pandemic was ongoing at the time of plan development, all meetings and public engagement were available for both virtual and in-person participation.

- Public Meeting #1 – Monday, April 11 from 6:00 – 8:30pm
- Public Meeting #2 – Wednesday, October 5 from 4:00 – 5:00pm

Community Preparedness Survey

In addition to public meetings, members of the public completed the Community Preparedness Survey. This survey helped to understand risk, vulnerability, and preparedness of community members. This survey was made available on Monday, April 11 through August 31, 2022. The survey was posted on the YVEM, Yakima County, and City of Yakima websites and Facebook pages, shared online and in the Yakima Herald and YakTri newspapers, and via email through the Yakima County Commissioners newsletter and listserv. The survey was made available in both English and Spanish. A total of 287 people completed the online survey. A complete summary of results is available as **Appendix C**.

YVEM Hazard Mitigation Plan (HMP) Webpage

The YVEM website was used to advertise HMP progress and allow for public and stakeholder participation and feedback to be shared. The “County Emergency Plans” page hosted regular updates on the planning process and public meetings.

Plan Updates and Revisions

The 2022 HMP is an update to the 2015 HMP for Yakima County, and prior to that, a 2010 version. While the 2015 HMP Update maintained the structure and approach of the 2010 plan, the 2022 HMP Update includes major revisions and organization changes. A summary of the most pertinent changes between 2015 and 2022 is provided in **Table 1.5.**

Table 1.5. Summary of Changes

Section	2022 HMP Update Changes
Executive Summary	The 2022 HMP retains the same structure and integrity as the 2015 HMP.
Section 1. Introduction	The 2022 HMP combines 2015 HMP Sections 1 (Introduction) and 7 (Public Involvement) to provide a more holistic summary of the planning process. Other additions and refinements include: • Summary of planning process/phases • Alignment of FEMA HMP requirements by plan section • Condensed and clarified approach to recruiting stakeholder participation
Section 2. Community Profile	The 2022 HMP retains the same structure and integrity as the 2015 HMP. Additions and refinements include: • Updated Census/American Community Survey data for 2020 • Expanded description of land use and development trends and integration with the updated County Comprehensive Plan • Added assessment of critical transportation routes by sector in the county
Section 3. Hazard Identification and Risk Assessment	The 2022 HMP combines the hazard identification section from the 2015 HMP with the separate hazard profiles (including hazard history). Additions and refinements include: • Revisited the hazard identification to include 5 technological/human-caused hazards (two were previously included) • Revisited the hazard identification to update the natural hazards in alignment with the 2018 Washington State HMP • Added a more comprehensive description of hazard impacts and history • Refined the risk assessment methodology to full evaluate each hazard based on frequency/probability and impact criteria
Section 4. Mitigation Strategy	The 2022 HMP retains the same structure and integrity as the 2015 HMP. Mitigation actions were reviewed and updated, with new actions added and some actions noted as completed or removed. The 2022 HMP combines Section 6 from the 2015 HMP which described the process for evaluating and prioritizing mitigation actions.
Section 5. Mitigation Strategy Implementation & Plan Integration	This section is new to the 2022 HMP. A summary of implementation mechanisms, capability assessment, and plan integration strategy was included within the Mitigation Strategy in the 2015 HMP.
Section 6. Plan Maintenance	The 2022 HMP retains the same structure as the 2015 HMP.

SECTION 2. COMMUNITY PROFILE

Natural, human-caused, and technological hazards and threats impact community members, property, the environment, and the economy of Yakima County. These hazards have exposed Yakima County residents and businesses to the financial and emotional costs of recovering after disasters. The risk associated with hazards increases as more people move to areas affected by these incidents. The inevitability of natural and human-caused hazards, and the growing population and activity within the county create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future hazard events. Identifying risks posed by hazards and developing strategies to reduce the impact of a hazard event can assist in protecting life and property of people and communities. Residents and businesses can work together with the county to create a hazard mitigation plan that addresses the potential impacts of hazard events.

This Community Profile uses data tables provided as a part of the 2022 Yakima County Profile developed by the Washington State Employment Security Department.[1]

2.1. Location

Yakima County is located in south central Washington state. It is bounded to the north by Kittitas County, to the south by Klickitat County, on the west by Thurston, Lewis, and Skamania counties, and the east by Benton and Grant counties. The geography varies from densely timbered, mountainous terrain at the crest of the Cascade Mountain Range in the west to rolling foothills, broad valleys, and arid sagebrush covered regions to the east, to fertile valleys in the central and southern parts of the county that has made agriculture the staple of the economy over the last 100 years. The highest point in the county is Mount Adams at 12,277 feet (3,742 meters) above sea level. The city of Yakima sits at 1,068 feet. Yakima County is 4,296 square miles, or approximately 2.75 million acres, making it the second largest county in Washington.

Three entities own over 1.7 million of the total acres of Yakima County, or 63.4% of the total county area, including:

- Yakama Nation (1,074,174 acres)
- U.S. Forest Service (503,726 acres)
- Yakima Training Center (165,787 acres)

The city of Yakima, the tenth largest city in the state, contains over 37% of the county population. 90% of the state's population is within a 3-hour drive from Yakima. The County derives its names from the regional Yakama Indian tribes. There are several theories on the meaning of "Yakima," including a native legend about a Chief's daughter from Moxee who fled from her home after breaking tribal rules. The word Yakima in this legend means "runaway." Others believe "runaway" refers to the rivers that surround the valley. Yakima has also been interpreted to mean "well fed people."

[1] The complete profile is available here: https://media.esd.wa.gov/esdwa/Default/ESDWAGOV/labor-market-info/Libraries/Regional-reports/County-Profiles/Yakima-county-profile-2022-rev.pdf

2.2. Climate

Yakima has four distinct seasons. Sunshine is the norm in Yakima County at nearly 300 days per year. Average precipitation is 8 inches a year, of which 24 inches occurs as snowfall in the months of November, December, and January. The average temperature in the winter is 37, spring 63, summer 88, and fall 64. This favorable weather makes Yakima a leader in agricultural products (including hops, fruit, dairy, and many others), wine growing, outdoor recreation, and tourism.

2.3. Land Use and Future Development

Yakima County's development was shaped largely by the Northern Pacific Railroad and the Yakima River. Most of the county's population is concentrated along this river, largely because irrigation was critical to the success of the communities and the farmers who settled in this area.

The arable lands within the county are made up of basin lands, bottom lands, terraces, and lower uplands tributary to the Yakima River. Collectively, these lands are called the Yakima Valley. The area north of Ahtanum and Rattlesnake Ridges is generally referred to as the Upper Yakima Valley while the area south of them is known as the Lower Yakima Valley. The Upper Valley is more heavily populated while the Lower Valley is characterized by smaller cities and contains more productive farmland.

Land use and development priorities and policies are outlined in Horizon 2040, the Yakima County Comprehensive Plan adopted in 2017. Land use is organized into three categories identified in the Washington State Growth Management Act – 1) urban, 2) rural, and 3) resource. These categories are defined as:

- **Urban** lands are those included within the Urban Growth Area (UGA) of one of Yakima County's fourteen incorporated cities. They are typified by growth patterns that have made or will make an intensive use of land for buildings, structures, and impermeable surfaces. As a result, other uses, such as the production of food, become incompatible.
- **Rural** lands are those areas outside of both the UGA and the resource lands. Rural areas allow low to moderate densities that can be supported and sustained without urban services -- primarily water and sewer service. By state law, development in rural areas cannot occur if it is urban in nature.
- **Economic Resource** lands are those lands important and necessary for their ability to sustain the long-term commercial production of agricultural goods, forest products and mineral commodities.

While areas within UGAs are considered urban, many Yakima County communities are more traditionally considered rural areas. The U.S. Census Bureau defines urban as either: 1) Urbanized Areas (UAs) of 50,000 people or more; or 2) Urban Clusters (UCs) of 2,500-49,999 people. Most Yakima County cities fall into the UC category, while several including Harrah, Mabton, Naches, and Tieton, fall below this threshold. Additionally, many Yakima County UGAs are very small in area, surrounded by widespread rural and agricultural resource lands, giving the county a predominantly rural character.

The Yakima County Horizon 2040 Comprehensive Plan includes a Natural Hazards element that ensures that "when planning for natural hazards, the county must balance public safety with the protection of individual property rights." The plan element specifically addresses mitigation

capabilities in the county, and addresses flooding, wildfire, and drought as hazards of concern that may be directly influenced by land use and development patterns. Yakima County's existing Critical Area Ordinance and the Shoreline Master Plan protect streams, wetlands, and vegetative buffers from development.

The Horizon 2040 Comprehensive Plan also includes many policies that reduce or restrict development in hazard prone areas, including wildfire risk reduction strategies, restriction of subdevelopments in flooding areas, designated areas where development is not allowed due to landslide or other geological hazards, ensuring adequate stormwater infrastructure, and locating critical infrastructure outside of high hazard risk areas, among others.

2.4. Demographics

Yakima is the largest city in the county. In addition to its permanent resident base, the county has a large seasonal population related to the agricultural industry. This temporary population has been estimated at up to 50,000 during peak activity.

Table 2.1 below provides a summary of the area population, including the entire county, unincorporated areas, and each town in Yakima County. The county population has grown by 0.9% over the last thirty years and is projected to grow at the same rate over the next 10 years. This growth rate is slightly lower than that of Washington State (1.5% over the last 30 years).

Table 2.1. Area Population by Jurisdiction in Yakima County[2]

Jurisdiction	2010 Actual	2015 Actual	2022 Estimated
Yakima County	243,231	249,314	259,950
Unincorporated	83,755	85,618	88,955
Incorporated	159,476	163,696	170,995
Grandview	10,862	11,108	11,020
Granger	3,246	3,377	3,740
Harrah	630	603	580
Mabton	2,286	2,120	1,975
Moxee	3,308	3,830	4,665
Naches	795	927	1,125
Selah	7,147	7,638	8,365
Sunnyside	15,858	15,856	16,500
Tieton	1,191	1,295	1,505
Toppenish	8,949	8,814	8,870
Union Gap	6,047	6,254	6,640
Wapato	4,997	4,811	4,615
Yakima	91,196	93,927	98,200

[2] Estimates from Washington Office of Financial Management and U.S. Bureau of Economic Analysis as summarized by the Employment Security Department

Table 2.2 below shows the race and ethnicity of the Yakima County population compared to Washington State for 2010, while **Table 2.3** illustrates the same data for 2021. The percentage of the Yakima County population that is Hispanic or Latino has grown since 2010, now constituting 51% of the population, compared to just 14% for Washington as a whole.

Table 2.2. Race and Ethnicity in Yakima County (2010)

Jurisdiction	Non-Hispanic Population by Race						Hispanic or Latino
	White alone	Black or African American alone	American Indian and Alaska Native alone	Asian alone	Native Hawaiian and Other Pacific Islander alone	Two or More Races	
Washington	4,888,788	231,472	89,149	479,752	39,321	240,268	755,790
Yakima County	116,419	1,756	9,120	2,386	144	3,936	109,470
Washington	72.7%	3.4%	1.3%	7.1%	0.6%	3.6%	11.2%
Yakima County	47.9%	0.7%	3.7%	1.0%	0.1%	1.6%	45.0%

Table 2.3. Race and Ethnicity in Yakima County (2021)

Jurisdiction	Non-Hispanic Population by Race						Hispanic or Latino
	White alone	Black or African American alone	American Indian and Alaska Native alone	Asian alone	Native Hawaiian and Other Pacific Islander alone	Two or More Races	
Washington	4,943,852	304,625	91,991	748,230	64,664	509,296	1,085,366
Yakima County	103,322	1,758	9,399	2,884	228	7,916	132,593
Washington	63.7%	3.9%	1.2%	9.6%	0.8%	6.6%	14.0%
Yakima County	40.0%	0.7%	3.6%	1.1%	0.1%	3.1%	51.4%

Yakima County has a generally younger population than Washington state, with 49.5% of residents under 18 years old, and 14% over 65 years old in 2021. Additionally, Yakima County has slightly lower educational attainment than Washington state. Less than 75% of the county population 25 years and older has a high school diploma, and 17.6% of adults have a bachelor's degree or higher.

2.5. Local Economy

Agriculture is the bedrock of the Yakima County economy. The industry is the number one employment sector, followed by health services and local government. In 2020, agricultural employers provided over 30,000 jobs in Yakima County (about 28% of total employment). Health services provided 16,500 jobs (15%) and local government provided 13,000 jobs (12%). Together, these industries provide over 54% of total covered employment in the county.

Table 2.4 below summarizes the top five Yakima County industry sectors in 2020 in terms of employment.

Table 2.4. Top Industries in Yakima County by Employment (2020)

Sector	Number of Jobs	Share of Employment
Agriculture, forestry, and fishing	30,767	27.8%
Health services	16,543	14.9%
Local government	13,079	11.8%
Retail trade	10,623	9.6%
Manufacturing	8,010	7.2%
All other industries	31,778	28.7%
Total covered employment	**110,800**	**100%**

Agriculture

Yakima County has 558,000 irrigated acres of private land used for agriculture. The Yakima Project, operated by the U.S. Bureau of Reclamation, supplies irrigation water to approximately 464,000 acres across the Yakima Basin. Five reservoirs, the Keechelus, Kachess, Cle Elum, Rimrock, and Bumping lakes, serve as storage for water that is then released to supply irrigation diversions through the Basin.[3] As the state's leading agricultural county, Yakima has a large and highly varied farm base, complemented by diverse non-agricultural sectors. Yakima County is Washington State's number one producer of apples, hops, corn, spearmint, peppermint, and grapes and one of the top producers of sweet cherries. In 2015 and 2016, the Yakima Valley produced more hops than any other agricultural area in the world, edging out Germany, which had long held the title. Each year, about 75% of the nation's hop crop comes from the Yakima Valley. Yakima's wine industry has gained national awareness, producing award winning varieties of Cabernet Sauvignon, Chardonnay, Riesling, Merlot, and Syrah wines. Yakima produces 29% of the nation's cherries, 42% of the nation's pears, and 38% of the nation's concord grapes. Yakima County is one of the leaders in the state for its inventory of bee colonies, cattle, and sheep. Yakima County ranks eighth in the nation for milk production.

Health Services

This industry expanded by 27% between 2010 and 2020, adding more than 3,000 jobs in Yakima County. Health services moved from the third to the second largest sector in that same time. Jobs in the health services industry are relatively "good paying" compared to agriculture, making up 16% of total wage income in the county.

[3] Yakima Basin Fish & Wildlife Recovery Board. Yakima Basin Overview. Accessed from https://ybfwrb.org/yakima-basin-overview/

Government

Of the three levels of government (federal, state, and local) the largest numbers of employees are in the local level, specifically in the elementary and secondary school system. The Joint Base Lewis-McChord Yakima Training Center, located seven miles north of Yakima, is the Army's premier maneuver training area in the Northwest and has 325 permanent military/civilian personnel. The government sector also includes jobs and wages at tribal organizations.

Retail Trade

Retail trade added the fourth-largest number of jobs across Yakima County between 2010 and 2020, with 50% of the growth in building material and garden supply stores. This sector provides a smaller percentage of total wage income compared to total employment in the county, as a higher percentage of jobs are part time.

Manufacturing

Closely tied with Washington's agricultural tradition is value added manufacturing processes with specific focus on food processing. These activities include milling, blending, packaging, canning, freezing, processing, manufacturing, and refining end products for industrial, business and consumer production. Food processing represents about 41% of the manufacturing sector in Yakima County. A significant share of manufacturing employment stems from the agricultural sector but lumber and wood products, non-electrical machinery, paper and allied products, transportation equipment, metals, plastics, and fabricated metal products all have a significant impact. Biofuel is an emergent industry with a bright future in Yakima County, and includes bio-diesel, bio-gas, and ethanol products.

2.6. Government

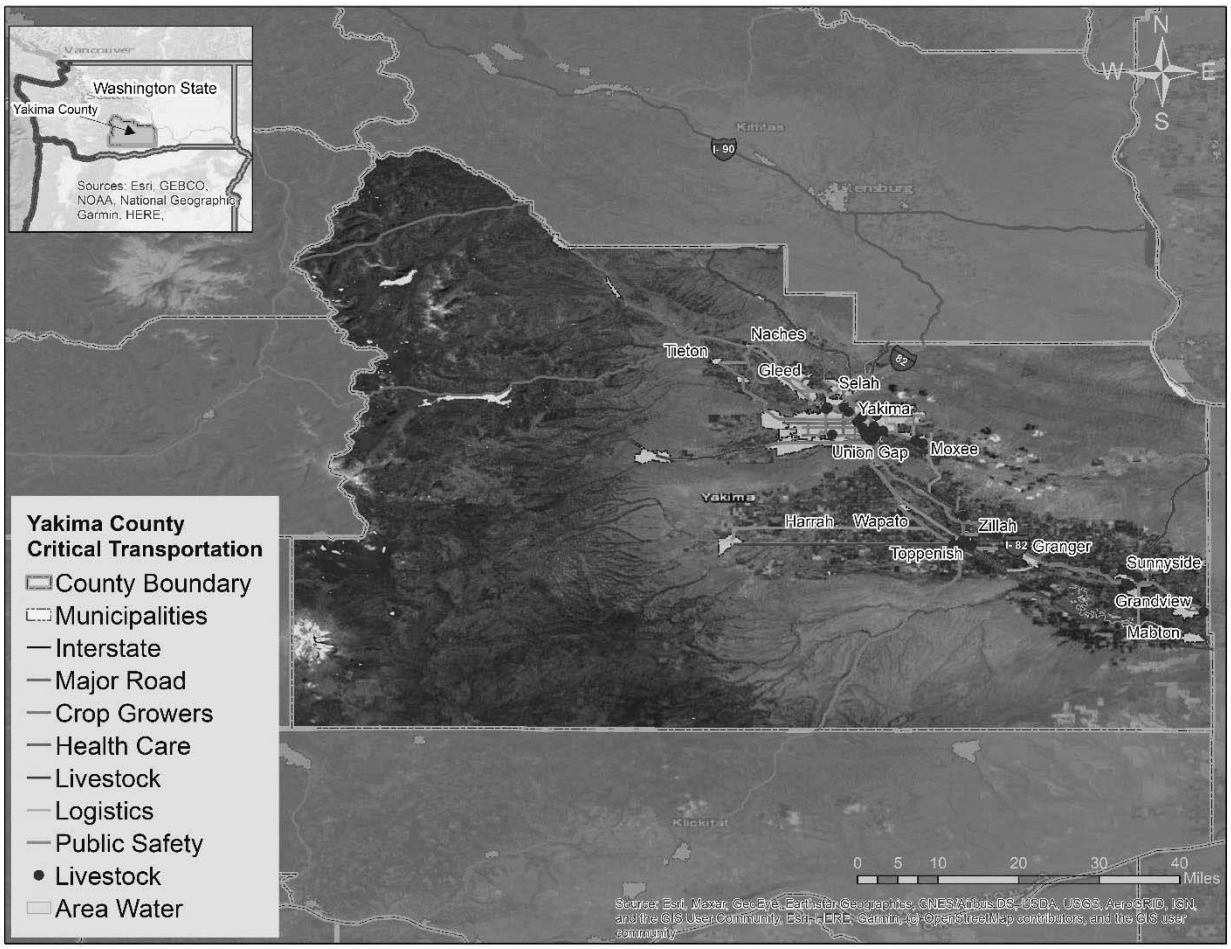
Yakima County has a County Commission with three elected commissioners. The city of Yakima has a City Manager, a seven-member City Council and serves as the county seat. There are 14 incorporated towns within the county that are governed by city/town councils. Yakima County maintains 1,655 miles of roads, a large majority of which are oiled or gravel. There are 9 County Fire Districts that operate outside the Valley's major towns or cities. Approximately 600 paid and volunteer firefighters help run these rural fire stations. Yakima County maintains a jail facility with an average daily inmate population of 326.

Washington State uses sales and use taxes, business and occupation (B&O) taxes, gas taxes and property taxes to generate a predominate share of overall state revenue. The state's tax structure is relatively stable when tracked against changes in personal income. Washington State has no corporate income, unitary, or inventory tax. There is also no tax on interest, dividends, or capital gains. The business and occupation tax is based on gross receipts generated within the state. Local governments work within the state tax collection system. A portion of local property taxes and sales taxes is also retained by Yakima County.

2.7. Transportation

Figure 2.1 illustrates the critical transportation corridors in Yakima County based on several primary functions, including crop growers, healthcare, livestock, logistics, and public safety.

Figure 2.1. Critical Transportation in Yakima County



- **Major Highways:** Interstate 82 runs through the heart of Yakima County. The modern freeway links with Interstate 90 at Ellensburg, just 30 miles north of Yakima and Interstate 84 to the south. I-90 connects Seattle with New York City. Major highways include US Routes 12 and 97, and State Routes 22, 24, 241, and 410.
- **Transit:** Yakima Transit buses connect Yakima, Selah, and Union Gap with all downtown services. Buses run every 20 minutes. Greyhound Bus Lines serve daily routes from Grandview, Sunnyside, Granger, Toppenish, Wapato, and Yakima to Seattle, Pasco, and Portland.
- **Airport:** General aviation service is available at Yakima Air Terminal, Sunnyside Airport, and Buena Field. Yakima is served by Alaska Airlines with three flights daily to Seattle. There are two full service fixed base operators on the airfield. Airfreight service is available from Federal Express and UPS.

- **Motor Freight Carriers:** Within Yakima County there are 10 trucking firms for heavy hauling, one for liquid or dry bulk, two for local cartage, and 38 for motor freight.
- **Railroads:** Rail shipment to and from Yakima County is available via Burlington Northern Santa Fe and Central Washington railroad lines with 292 active spurs throughout the county.
- **Ports:** Puget Sound is three hours from Yakima County and provides major international ports on the Pacific Ocean. Inland ports are available within two hours on the Columbia River.

2.8. Utilities

- **Electric:** Hydroelectric dams on the Columbia and Snake Rivers provide Washington State with the lowest rates in the nation. Yakima County is served by three electric utilities, Pacific Power, an investor-owned utility, Yakama Power, owned by Yakama Nation, and the Benton County Rural Electric Association.
- **Natural Gas:** Cascade Natural Gas Corporation distributes natural gas throughout Yakima County with service available for all types of installations.
- **Solid Waste Disposal:** Solid waste collection service is available throughout the county either by municipal systems or private companies. There are three solid waste landfills and two transfer stations within Yakima County. The area has recycling centers for some items.
- **Water:** The Utilities Division of Yakima County operates 27 water systems throughout the county. Most cities in the county also operate their own water systems, typically sourced from groundwater. Many homes in Yakima County use private domestic wells, and as documented in the Lower Valley Groundwater Management Area reports, are subject to higher concentrations of nitrates that exceed drinking water standards.
- **Wastewater:** Each city operates its own wastewater collection system, while Yakima County operates three wastewater systems. The Port of Sunnyside operates a system dedicated to the treatment of industrial waste. The regional treatment plant operated by the City of Yakima has a delegated industrial pretreatment monitoring program in place.
- **Telecommunications:** Advanced telecommunication services are available in most major communities in Yakima County. Competition between local providers has helped improve telecommunications infrastructure dramatically. Extensive fiber optic cables are in place in most of the major communities in the region, including Yakima.

SECTION 3. HAZARD IDENTIFICATION AND RISK ASSESSMENT

Hazard events happen somewhere in the world every day. Whether such events become a disaster depends on whether there are injuries, deaths, or significant property, natural resource, or cultural damage. Conducting a risk assessment can provide information on the location of hazards, the value of existing land and property in hazard locations, and an analysis of risk to life, property, and the environment. At the most fundamental level, both DHS and FEMA recognize that:

Risk = Frequency of a Hazard X Consequence from that Hazard

To reach a certain level of **risk**, there must be a probability or likelihood for that event to occur (**frequency**). Likewise, if the event does happen, but there is no **impact or consequence**, the level of risk is negated or substantially reduced. To determine the risk for each hazard, this assessment considers frequency of the hazard based on historic occurrence and future climate conditions, as well as potential consequences. The risk assessment includes three elements:

- **Hazard Identification** selects 17 hazards that consistently affect this geographic area. These hazards were identified based on input from the HMP Committee as well as review of the 2018 Washington State HMP. A summary of the identified hazards is available as **Section 3.2**.
- **Hazard Profiles** describes its geographic impact area, extent or intensity of the hazard, probability of its occurrence, causes and characteristics of each hazard, how it has affected Yakima County in the past, and how Yakima County's population, critical facilities, built infrastructure, economy, emergency and critical operations, and natural and cultural resources might be vulnerable. Using the best available data, the HMP estimates potential losses from the hazards. For each hazard where data was available, quantitative estimates for potential losses are included in the hazard assessment. Hazard profiles are available as **Section 3.5 – 3.21.**
- **Critical Facilities Exposure** combines hazard identification with an inventory of the existing critical facilities that may be exposed to a hazard. Critical facilities are of particular concern because these entities provide essential services to the public that are necessary to preserve the welfare and quality of life in the county and fulfill important public safety, emergency response, and/or disaster recovery functions. The critical facilities have been identified, plotted in GIS, and overlayed with hazard mapping. The summary of critical facilities is available as **Section 3.3.**

3.1. Risk Assessment Methodology

Some hazards can be expected in Yakima County given regular climate and weather conditions. These types of hazards are "chronic" hazards as they occur with some regularity and can sometimes be predicted through historic evidence and scientific methods. Other disasters are "catastrophic" as they do not occur with the frequency of chronic hazards and can have devastating impacts on life, property, and the environment when they do occur.

The HMP Risk Assessment used the criteria in **Table 3.1** to evaluate the future probability and historic frequency of hazard events.

Table 3.1. Risk Assessment Methodology – Frequency and Probability

	Very Unlikely	Unlikely	Somewhat Likely	Likely	Very Likely
Historical Occurrence (Frequency)	Extremely Rare or No Documented History	51-100 years	11-50 years	5-10 years	1-4 years
Future Probability	100+ years	51-100 years	11-50 years	5-10 years	1-4 years
Score	**1**	**2**	**3**	**4**	**5**

Anticipated consequences or impacts to Yakima County communities from various hazards are determined using the impact criteria described in **Table 3.2**. By using these criteria, a comparison of each hazard can be made to determine which pose the greatest risk. The determination of which hazards present the greatest risk is based on the combined score of impacts.

The impact score is then combined with the frequency score to generate a risk level of **High**, **Medium**, or **Low** for each hazard. A summary of hazard risk rankings is included in **Section 3.4** and in detail within each hazard profile.

Table 3.2. Risk Assessment Methodology – Impact Criteria

	Very Low	Low	Medium	High	Very High
Human Health	0-1 death	2-3 deaths	4-5 deaths	6-9 deaths	10+ deaths
	0-3 injuries	4-7 injuries	8-10 injuries	11-19 injuries	20+ injuries
Property Damage	Minimal	Localized repairable	Widespread repairable; OR localized substantial	Widespread substantial damages	Widespread non-repairable
Economic Disruption	Minimal	Localized temporary	Widespread temporary	Up to 6 months	Long-term disruption
Environmental Resource Damages/ Degradation*	Minimal	Localized minor	Widespread minor	Localized severe	Widespread severe and/or long-term
Emergency Services Burden	Minimal	Localized and temporary burden	Widespread and temporary burden; OR localized and medium-term	Widespread and medium-term burden (<14 days)	Widespread and long-term burden (>14 days)
Critical Facilities Exposure	<10% exposed	10-20% exposed	20-30% exposed	30-50% exposed	>50% exposed
Score	**1**	**2**	**3**	**4**	**5**

**Environmental Resource Damages/Degradation includes impacts to agriculture such as livestock deaths, crop damages, and soil degradation.*

3.2. Hazard Identification

Yakima County is vulnerable to approximately 54 threats and hazards, listed in **Table 3.3.** They range from natural to technological or human-caused events. The HMP Committee reviewed the list of threats and hazards, the hazards included in the 2015 Yakima County HMP, and the 2018 Washington State HMP to determine the hazards to include in the 2022 plan update.

Table 3.3. Yakima County Types of Threats and Hazards

Natural Hazards	Technological and Human-caused Hazards
Avalanche	Air Pollution
Cold, Extreme	Attack, Conventional
Cold, Freeze	Building/Structure Collapse
Dam/Levee Failure	Business Interruption
Drought	Chemical Stockpiles
Epidemic/Pandemic, Animal	Civil Unrest
Epidemic/Pandemic, Human	Ecological Terrorism
Fire, Brush	Economic Emergency
Fire, Forest	Energy Emergency
Fire, Range	Financial Collapse
Fire, Rural/Urban	Fire/Explosion
Flood, Flash	Fuel Shortage
Flood, Riverine/Stream	Hazardous Materials Incident, Fixed Facility
Flood, Urban	Hazardous Materials Incident, Transportation
Heat, Extreme	Hostage Situation
Landshift, Earthquake	Power Outage
Landshift, Earthslide/Rock Slide	Radiological, CGS or DOE
Landshift, Erosion	Radiological, Transportation
Landslide	Riot/Demonstrations/Violent Protest/Illegal Assembly
Storm, Blizzard	Sabotage
Storm, Dust/Sand	Strike
Storm, Ice/Hail	Transportation Accident, Aircraft
Storm, Lightning	Transportation Accident, Railroad
Storm, Snow	Water Shortage
Storm, Windstorm	Weapons of Mass Destruction: biological, chemical,
Tornado	explosive, incendiary, nuclear incidents
Volcano	Workplace Violence: business/industry and schools

Table 3.4 describes the identified hazards included in the 2022 HMP Update, as well a description of changes from the 2015 HMP.

Table 3.4. Hazard Identification Summary		
Hazard Type	**Changes from 2015**	**Explanation**
	Natural Hazards	
Agricultural Disease Outbreak	New hazard in 2022.	Agricultural disease is included in the 2018 Washington State HMP. As a predominantly agricultural community, Yakima County is reliant on healthy and consistent crop returns. Yakima County has been impacted by agricultural diseases including Mad Cow disease, avian influenza, cherry disease, and invasive pests including stinkbugs, apple maggots, and the Japanese Beetle.
Avalanche	Avalanche was included as a hazard in 2015.	Based on the location of key transportation routes and recreational areas threatened by avalanche, parts of Yakima County would be vulnerable. Yakima County Planning Division uses policies and ordinances to mitigate for avalanches and other geologic hazards through the Critical Areas Ordinance, as described in Section 5.1, which has also been adopted by most municipalities.
Drought	Drought was included as a hazard in 2015.	From the State Hazard Mitigation Plan, a county is most vulnerable to drought if it meets at least five of seven criteria. Yakima County meets those criteria. Yakima County Comprehensive Plan was updated in 2017 to include a Hazard Mitigation element addressing drought among other natural hazards.
Earthquake	Earthquake was included as a hazard in 2015.	Factors including the size of potentially vulnerable populations, the age of the housing stock, and building materials such as unreinforced masonry, play a part in determining which counties are most vulnerable. Yakima County is at risk to both a localized earthquake as well as the impacts of a Cascadia Subduction Zone earthquake impacting Seattle and the greater Pacific Northwest. Yakima County Planning Division uses policies and ordinances to mitigate for earthquakes and other geologic hazards through the Critical Areas Ordinance, as described in Section 5.1, which has also been adopted by most municipalities.
Erosion	Erosion was combined with Landslides and other geologic hazards in the 2022 HMP.	Long-term erosion is a result of multi-year impacts such as repetitive flooding. Death and injury are not typically associated with erosion; however, it can destroy buildings and infrastructure.
Extreme Temperatures	Extreme Temperatures was included as a hazard in 2015.	Extreme heat is typically recognized as the condition where temperatures consistently stay ten degrees or more above a region's average high temperature for an extended period. Fatalities can result from extreme temperatures, as they can push the human body beyond its limits (hyperthermia and hypothermia).
Flood	Flooding was included as a hazard in 2015.	Yakima County regularly experiences flooding events that damage homes, property, and critical infrastructure, as well as disrupting critical operations and the local economy.

Table 3.4. Hazard Identification Summary		
Hazard Type	**Changes from 2015**	**Explanation**
		Since the 2015 HMP, several communities in the county experienced damaging flood events in 2016 and 2017. Yakima County Planning Division uses policies and ordinances to mitigate flooding impacts. Yakima County Critical Areas Ordinance (Titles 16A and 16C) and Yakima County Shoreline Master Program (Title 16D) implement policies that restrict development in the floodplain and floodway and protect hydrologically related critical areas. These critical areas include flood hazard areas and wetlands, which provide flood flow attenuation and other flood mitigation functions. Most municipalities in Yakima County have adopted the Critical Areas Ordinance and Shoreline Master Program. Yakima County Comprehensive Plan was updated in 2017 to include a Hazard Mitigation element addressing flooding among other natural hazards.
Hail	Hail was combined with other severe weather events for the 2022 HMP.	Hailstorms frequently accompany thunderstorms, so their locations and spatial extents overlap. Hail can cause substantial damage to vehicles, roofs, landscaping, and other areas of the built environment. U.S. agriculture is typically the area most affected by hail storms, which cause severe crop damage even during minor events.
Landslide	Landslide was included as a hazard in 2015. This hazard now includes Erosion.	On October 11, 2009, a landslide occurred at approximately RM 22.3 (T 15N, R15E, Sec. 2) on the Naches River in Yakima County. The landslide was a rotational slump, approximately 16 million cubic yards in size. State Route 410 was obliterated in the slide area for a quarter mile, and the Naches River was completed blocked by landslide debris on the western side of the slide. Yakima County Planning Division uses policies and ordinances to mitigate for Landslides and other geologic hazards.
Lightning	Lightning was combined with other severe weather events for the 2022 HMP.	Lightning can strike communications equipment (e.g., radio or cell towers, antennae, satellite dishes, etc.) and hamper communication and emergency response. Lightning strikes can also cause significant damage to buildings, critical facilities, and infrastructure, largely by igniting a fire. Lightning can also ignite a wildfire.
Public Health Emergency (Communicable Disease)	New hazard in 2022.	Yakima County, along with the rest of the world, was heavily impacted by COVID-19 in 2020-2022. The global pandemic interrupted daily life, critical operations, global and local supply chains, and led to the death of over 800 people in Yakima County. Other communicable diseases, including vector-borne, are an annual concern.
Severe Wind Storm	Wind Storm was combined with other severe weather events for the 2022 HMP.	All areas of Washington State are vulnerable to severe weather. Typically, a severe storm can cause major impacts to transportation, infrastructure and services, and loss of utilities. Most storms move into Washington from the

Table 3.4. Hazard Identification Summary		
Hazard Type	**Changes from 2015**	**Explanation**
		Pacific Ocean. A severe storm is defined as an atmospheric disturbance that results in one or more of the following phenomena: high winds, large hail, thunderstorms, lightning, or tornadoes.
Severe Winter Storm	Severe Winter Storms was included as a hazard in 2015.	All areas of Washington State are vulnerable to severe weather. Typically, a severe storm can cause major impacts to transportation, infrastructure and services, and loss of utilities. Most storms move into Washington from the Pacific Ocean. Severe winter storm is profiled separately from other severe weather, given the impacts of heavy snow, ice, and long duration power outages.
Tornado	Tornado was combined with other severe weather events for the 2022 HMP.	All areas of Washington State are vulnerable to severe weather. Typically, a severe storm can cause major impacts to transportation, infrastructure and services, and loss of utilities. Most storms move into Washington from the Pacific Ocean. A severe storm is defined as an atmospheric disturbance that results in one or more of the following phenomena: high winds, large hail, thunderstorms, lightning, or tornadoes.
Volcanic Eruption	Volcanic Eruption was included as a hazard in 2015.	Scientists define a volcano as active if it has erupted in historic time or is seismically or geothermally active. By this definition Mount Rainier, Mount Baker, and Mount St. Helens are active volcanoes. Mount Adams is also capable of renewed activity. On May 18, 1980, at 8:32 a.m., Mount St. Helens erupted killing 57 people. After a 5.1 magnitude earthquake, the volcano's summit slid away in a huge landslide, the largest in earth's recorded history, at that time. The landslide depressurized the volcano's magma system, triggering a powerful explosion that ripped through the sliding debris. Rock, ash, volcanic gas, and steam were blasted upwards and outward to the north. Over the course of the day, prevailing winds blew 520 million tons of ash eastward across the United States and caused complete darkness in across Yakima County. The ash fall required millions of dollars in clean-up and ash removal, and impacted local businesses and agriculture for several years. Yakima County Planning Division uses policies and ordinances to mitigate for Volcanic Eruptions and other geologic hazards, which have been adopted by most municipalities in the county.
Wildfire	Wildland Fire was included as a hazard in 2015. This hazard is slightly modified to reflect concern for	Residents of Yakima County have experienced repeated cycles of wildland fires. A series of major wildfires between the 2010 Cowiche Mill Fire and the 2021 Schneider Springs Fire have prompted residents, government officials, a local recreation nonprofit land owner, and local

Table 3.4. Hazard Identification Summary		
Hazard Type	**Changes from 2015**	**Explanation**
	WUI as well as wildland fires.	fire district leaders to come together and act to reduce the future risk of damaging wildfires. Yakima County Comprehensive Plan was updated in 2017 to include a Hazard Mitigation element addressing wildfire among other natural hazards. The Yakima County Community Wildfire Protection plan was updated in 2022 and adopted as an annex to the 2022 HMP.
Technological and Human-caused Hazards		
Cyber Threat/Attack	New hazard in 2022.	Cyber attacks are considered the fastest growing threat to communities. Cyber threats are rapidly increasing in frequency and expanding in size, scope, and style. Local governments are considered very underprepared for cyber threats, and many communities within Washington have been impacted in recent years.
Dam/Levee Failure	Dam/Levee failure was partially included in 2015 as an aspect of Flooding. It is included as a distinct hazard in 2022.	Nearly every Yakima County community is located in a dam inundation area. There are at least six High Hazard Potential Dams in the area that require monitoring and maintenance, as well as public education to understand the potential threat and protective actions. Levee failure, while potentially less severe, may be more likely to occur given the extensive system throughout Yakima County resulting in more levee miles than dam miles. Levee failure results in dynamic erosive forces, and different stage and volume characteristics of flood events.
Hazardous Materials	Hazardous Materials Incident was included as a hazard in the 2015 HMP.	There are three types of hazardous materials threats in Yakima County – fixed facilities, transport, and pipelines. Interstate 82 runs through the heart of Yakima County. The modern freeway links with Interstate 90 at Ellensburg, just 35 miles north of Yakima and Interstate 84 to the south. I-90 connects Seattle with New York City. Major highways include US Routes 12 and 97, and State Routes 22, 24, 241 and 410. Rail shipment to and from Yakima County is available via Burlington Northern Santa Fe railroad with 292 active spurs throughout the county. Yakima County has over 2,350 fixed facilities subject to Tier II Extremely Hazardous Substances reporting, as defined by the Environmental Protection Agency.
Nuclear Release/ Radiological Incident	New hazard in 2022.	Yakima County is within the 50-mile radius of Hanford Site in southeastern Washington. While a well-regulated site, there is some risk that a spill or release could impact the wider region, including embargoes on Yakima Valley agricultural products. A radiological incident is included in the 2018 Washington State HMP.
Terrorism	New hazard in 2022.	Terrorism is included in the 2018 Washington State HMP. While there is no recent history of terrorism in Yakima County, domestic violent extremism is of growing concern in many communities.

3.3. Critical Facilities Exposure

After determining which hazard events can impact Yakima County, the HMP Committee considered the critical facilities that are vulnerable to the identified hazards. Location data for 1,277 assets were collected using Yakima County GIS, City of Yakima GIS, national and state GIS databases, and through the collection of physical addresses. Each facility was then plotted within a GIS shapefile and overlayed with available hazard geographic layers. The assessment only includes point data (location data) rather than line data such as roads and railways.

The result of this overlay serves as an exposure analysis of critical facilities to certain hazards. Hazards that impact the entirety of Yakima County, such as winter storms, are not included in the exposure analysis. It is assumed that all critical facilities are at risk of these more chronic hazards, and their vulnerability is more related to building age and maintenance needs than location.

The following hazards were included in the critical facilities exposure analysis:

- **Flood:** Facilities located in the 100-year floodplain (Special Flood Hazard Area)
- **Landslide:** Facilities with a medium landslide risk or higher
- **Wildfire:** Facilities with high or extreme wildfire risk
- **Dam/Levee Failure:** Facilities located in a mapped dam or levee inundation area
- **Hazardous Materials:** Facilities located within a one-mile buffer zone of major transportation routes

Table 3.5 identifies the categories of critical facilities identified for the exposure analysis. In addition to the critical assets included in the Risk Assessment, each hazard profile includes expected impacts to critical assets.

Table 3.5. Yakima County Critical Facilities Exposure

Facility Type	Landslide	Flood	Wildfire	Dam/Levee Failure	HazMat	Total by Facility Type
Communications *(Cell and Radio Towers)*	3	0	6	7	14	30
Education *(Childcare and Schools)*	2	11	2	63	122	200
Emergency Services *(Fire Stations, Police Stations, EMS, and Emergency Management)*	4	5	4	18	40	71
Hospitals	0	0	0	1	0	1
Mass Care *(Food Distribution, Emergency Shelters)*	0	6	0	26	43	75
Transportation *(Air, Bridges, Rail Stations, Public Transit Stations, EV Charging Stations)*	32	137	25	147	233	574
Utilities *(Dams, Levees, Irrigation Districts, Water and Wastewater, Power)*	3	4	7	30	37	81
Total Facilities Exposed by Hazard *Percent Exposed*	**44** *3.4%*	**163** *12.8%*	**44** *3.4%*	**292** *22.9%*	**489** *38.3%*	**1032**

3.4. Risk Assessment Results

The Planning Committee analyzed each of the hazards using the Probability/Frequency and Impact Criteria described in **Section 3.1.** The total scores for each hazard event were further refined into three categories to better illustrate which hazards present the greatest threat to Yakima County. The three categories are as follows:

- **High = more than 22 points**
- **Medium = 18-22 points**
- **Low = less than 18 points**

Table 3.6 provides a summary of the risk assessment results, as well as a comparison to the 2015 HMP risk assessment. It is important to note that the methodology has changed between the 2015 and 2022 HMPs, so a direct comparison of scores is not applicable. Each hazard profile provides more detailed scoring using the previously described Probability/Frequency and Impact Criteria. Major changes between 2015 and 2022 include:

- **Complete Rankings:** Some hazards, including Drought, Extreme Temperatures, and Avalanche did not receive a complete ranking in the 2015 HMP.
- **Risk Increases:** Many hazards have a higher risk ranking than in the 2015 HMP, including Wildfire, Severe Winter Weather, Dam/Levee Failure, and Hazardous Materials. Only Earthquake has a slightly lower hazard ranking.

Table 3.6. Risk Assessment Summary

Natural Hazards	2022 Risk Ranking and Score	2015 Risk Ranking
Wildfire	25 - High	Medium
Flooding	24 - High	High
Public Health Emergency	24 - High	N/A
Severe Winter Weather	24 - High	Medium
Drought	22 - Medium	Not Ranked
Agriculture Disease Outbreak	21 - Medium	N/A
Landslide and Geologic Hazards	20 - Medium	Medium
Severe Weather	20 - Medium	Medium-Low
Extreme Temperatures	19 - Medium	Not Ranked
Earthquake	18 - Medium	Medium-Low
Avalanche	14 - Low	Not Ranked
Volcanic Eruption	12 - Low	Low
Technological and Human-caused Hazards	**2022 Risk Ranking and Score**	**2015 Risk Ranking**
Dam/Levee Failure	24 - High	Medium
Hazardous Materials Incident	23 - High	Medium-Low
Cyber Incident	18 - Medium	N/A
Nuclear/Radiological Incident	16 - Low	N/A
Terrorism	16 - Low	N/A

3.5. Agricultural Disease Outbreak

The agriculture sector in Yakima County is significant – the 12th largest agricultural producing county in the nation, according to the Yakima County Development Association. The area grows various consumable products and manages one of the largest concentrations of farm animals in the Pacific Northwest.[4] In 2020, agriculture, forestry, and fishing accounted for 27.8% of employment.[5] According to the University of Washington, the annual value for animal agriculture is approximately $600 million and irrigated land including 140,000 acres and a total of acres managed being 2.2 million acres.[6] The health of a county's agriculture sector can be negatively affected by disease. The introduction of invasive pests and agricultural disease to plants and animals in Yakima County may impact the population, built environment, critical infrastructure, government and emergency operations, economy, and natural resources.

Livestock, including birds, cattle, equine, rabbits, sheep, goats, and swine, as well as crops and plants are all susceptible to disease. Tree fruit crops, vegetable crop, fruit & berry crop, and nut crops are cultivated in Yakima County can be affected.[7]

Some of the agricultural diseases and invasive pests of note in Yakima County include:

- **Mad Cow Disease** or Bovine Spongiform Encephalopathy is a neurological disease of cows that damages the cow's central nervous system and progressively becomes worse over time. [8]
- **Avian influenza** or bird flu is a disease caused by infection with avian influence Type A viruses. These viruses naturally spread among wild birds worldwide and can infect domestic poultry and other animal species.[9]
- **Cherry Diseases** include Brown Rot, Black Knot, and Cherry Leaf Spot.[10] Proper ventilation, direct sunlight, and proper maintenance of leaf debris is needed to ward off these diseases.
- **Invasive Pests** are intrusive non-native pest species that severely impact both natural and managed lands.[11] A common pest is the brown marmorated stink bug that feeds successfully on numerous fruit, vegetable, and field crops including apples, apricots, Asian pears, cherries, corn, grapes, lima beans, nectarines and peaches, peppers, tomatoes, and soybeans.[12]

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[4] Yakima Development Association. Food Processing. Accessed from: https://chooseyakimavalley.com/key-industries/food-processing/

[5] Employment Security Department. Yakima County profile. Accessed from: https://esd.wa.gov/labormarketinfo/county-profiles/yakima

[6] Washington State University. Irrigated pastures and grazed forages. Accessed from: https://extension.wsu.edu/yakima/agriculture/irrigated-pastures-and-grazed-forages/

[7] Washington State University. Crop Production. Accessed from: https://extension.wsu.edu/yakima/crop-production/

[8] U.S. Food & Drug Administration. All About BSE (Mad Cow Disease). Accessed from: https://www.fda.gov/animal-veterinary/animal-health-literacy/all-about-bse-mad-cow-disease

[9] Center for Disease Control and Prevention. Information on Bird Flu. Accessed from: https://www.cdc.gov/flu/avianflu/index.htm.

[10] Ohio State University. Diseases of Cherries. Accessed from: https://u.osu.edu/cfaescapstone/tree-fruits/cherries/diseases/

[11] United States Department of Agriculture. Invasive Pests and Diseases. Accessed from: https://www.nifa.usda.gov/topics/invasive-pests-diseases

[12] United States Environmental Protection Agency. Brown Marmorated Stink Bug. Accessed from: https://www.epa.gov/safepestcontrol/brown-marmorated-stink-bug

Strength/Magnitude

An agricultural disease and pest outbreak may have severe impact on the county's food supply; causing production loss, starvation, environmental degradation, and financial ramifications. Agricultural disease can affect not only plants and animals but may even cause health issues to humans. Agricultural diseases have the potential to impact the local economy, through lost revenue or loss of real property through crop failure, livestock death, or lowered production.

Location

An agricultural disease can occur anywhere in Yakima County where crops and livestock are cultivated and managed. According to the 2018 Washington State HMP, central and eastern counties in the state are at higher risk to a disease due to the large numbers of farmlands and larger feedlots. In Yakima County alone there were 2,952 farms operating on about 1,781,463 acres.[13]

Past Occurrences

Yakima County has a historic record of facing agricultural diseases and pests. The county was the first to experience mad cow disease in 2003 in a dairy herd in Mabton, a small dairy farm in southeast Yakima County.[14] At the time, multiple businesses reliant on beef consumption and sale were hit heavily with their stocks falling about 5 to 7%.[15] 1,000 slaughterhouses and meat-packing employees lost their jobs and $319 million was lost in revenue per month.[16] Humans may become infected by eating infected animal parts.

During the HMP analysis period (2015-2021), Washington has experienced numerous agricultural diseases, some of which have affected Yakima County. In 2015 and 2016, the state killed hundreds of poultry birds to prevent the spread of the contagious avian influenza which was introduced by wild birds. According to the Washington State Department of Agriculture, Yakima County continues to discover cases of avian influenza in backyard flocks.[17] This is of concern, since bird flu outbreaks can cause insurance burdens to farmers and property owners.

Specifically looking at plants, from 2015 to 2020, the prevalent Cherry Disease and X-Disease has affected the county's orchards, reaching approximately 238,856 trees.[18]

Pests such as stink bugs have also been prevalent in Yakima County; affecting crops and plants even today.[19] Invasive pests such as the Spotted Winged Drosophila, Apple Maggots, and Coddling Moths have a history in Yakima County and continue to wreak havoc on Yakima County's crops and fruit yields. As a result of outbreak of Apple Maggots, the county

[13] United States Department of Agriculture. Yakima County Washington, 2017. Accessed from: www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Washington/cp53077.pdf
[14] HistoryLink. First U.S. case of mad cow disease is reported in a Mabton Dairy cow on December 23, 2003.
[15] The Seattle Times. Mad-cow disease hits state; feds say beef absolutely safe. Accessed from: https://archive.seattletimes.com/archive/
[16] Seattle Met. Washington's Mad Cow Scare, 10 years Later. Accessed from: https://www.seattlemet.com/news-and-city-life/2014/01/washington-s-mad-cow-scare-10-years-later-december-2013
[17] Washington State Department of Agriculture. 2022 Washington bird flu detections. Accessed from: https://agr.wa.gov/departments/animals-livestock-and-pets/avian-health/avian-influenza/bird-flu-2022
[18] Yakima Herald-Republic. Little cherry disease, pests, record heat battered Yakima Valley growers in 2021. Accessed from: https://www.yakimaherald.com/news/local/little-cherry-disease-pests-record-heat-battered-yakima-valley-growers-in-2021/article
[19] Inlander. Invasion! Washington state under siege from the stink bug menace! Accessed from: https://www.inlander.com/Bloglander/archives/2018/04/23/invasion-washington-state-under-siege-from-the-stinkbug-menace

implemented quarantine actions in 2021.[20] At the time of plan development, Grandview was in quarantine for the Japanese Beetle.

Future Probability

The future probability of a pest, plant, and crop disease in Yakima County is **Very Likely** (expected to occur every 1-4 years), given the number of farming operations and acres of land in the county.

Climate Change Impacts

Climate change has a clear connection to agricultural disease. As a result of climate change, researchers estimate the frequency of damaging agricultural diseases to increase, potentially undermining the growth of crop yields.[21] Colder locations will be able to sustain crops but will also be more conducive to pathogens.[22] The Yakama Nation Climate Adaptation Plan notes that longer or shorter seasons for pest reproduction could impact forests and other plant species, as well as leave them more vulnerable to insect attacks and plant diseases.

Yakima County Vulnerabilities

The local economy and businesses linked to farming and agriculture are most vulnerable to agricultural disease and pest infestations. While this hazard poses little risk to the built environment or property, a significant outbreak could lead to major economic losses, business and food supply chain disruption, and impacts on natural resources.

Loss Estimates

Calculating losses from an agricultural disease is difficult and rare. Pests and pathogens are reported to cost global agriculture approximately $540 billion a year. [23]Locally, agriculture contributes $1.2 billion dollars to the local economy.[24]

Impacts on the Yakima County Population and Vulnerable Populations

An agricultural disease can have a significant impact on the population in Yakima County. Plant disease is known to reduce the food available to humans by interfering with crop yields. As a leading employment sector in the county, many families operate and manage farms, and livelihoods are linked to farming through equipment and supply sales or labor. Invasive pests and disease can negatively hurt families and workers that depend on this industry.

Impacts on Built Environment and Critical Infrastructure

There is no significant impact to the built environment or critical infrastructure from an agricultural disease.

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[20] Yakima Herald-Republic. County pest board seeks public's help to contain apple maggots. Accessed from: https://www.yakimaherald.com/news/local/county-pest-board-seeks-publics-help-to-contain-apple-maggots/article

[21] Smithsonian Magazine. New study shows climate change may increase the spread of plant pathogens. Accessed from: https://www.smithsonianmag.com/science-nature/new-study-shows-climate-change-may-increase-spread-plant-pathogens-180978377/

[22] Smithsonian Magazine. New study shows climate change may increase the spread of plant pathogens. Accessed from: https://www.smithsonianmag.com/science-nature/new-study-shows-climate-change-may-increase-spread-plant-pathogens-180978377/

[23] Reuters. Pests and pathogens could cost agriculture billions: report. Accessed from: https://www.reuters.com/article/us-environment-plants-idUSKCN18E005

[24] Washington State University. Agriculture. Accessed from: https://extension.wsu.edu/yakima/agriculture/

Impacts on Government and Emergency Operations
There is no significant impact to government and emergency operations from an agricultural disease. However, the government may need to intervene to provide safety and inspection services, and alleviate and stabilize costs and prices, and policies.

Impacts on the Economy and Businesses
An outbreak of a plant and animal disease can be costly and have a serious impact on Yakima County's economy and businesses. The agricultural sector is one of the largest employment sectors in Yakima County. In 2020 alone, employers in the agricultural sector provided approximately 30,767 jobs, or 27.8% percent of the total employment in the county.[25] Agricultural disease has the potential to result in production losses, a decline in local markets, increased unemployment, and disruption of regional and local supply chains. A small outbreak of an animal disease can influence trading partners to impose heavy embargoes on imports of products that could be infected with the disease.

Impacts on Natural and Cultural Resources
An outbreak of an agricultural disease and introduction of invasive pests can severely impact the surrounding natural resources. All species of plants, both wild and domesticated, are susceptible to disease. An outbreak can affect approximately 10-20% of a species or habitat. Plant pathogens and diseases can lead to plant and crop mortality, loss of animal ecosystem, and lower the health of the host population. Invasive pests can similarly ruin the environment eliminating yields and potentially harming humans.

Overall Risk Ranking

Yakima County has a **Medium Risk** to agricultural disease. While agricultural disease is included in the 2018 Washington State HMP, no hazard ranking is available for comparison. FEMA does not include agricultural disease in the National Risk Index. **Table 3.7** below summarizes the risk assessment results for the agricultural disease hazard for Yakima County.

Table 3.7. Risk Assessment Results – Agricultural Disease Outbreak

Criteria	Score	Description
Human Health	1	Minimal
Property Damage	1	Minimal
Economic Disruption	3	Medium; widespread, temporary
Environmental Resource Damages/Degradation	4	High; localized, severe
Emergency Services Burden	1	Minimal
Critical Facilities Exposure	1	Minimal
Probability Score	5	Very High; expected to occur every 1-4 years
Frequency Score	5	Very High; has occurred every 1-4 years
Total Impact Score	**19**	**Medium Risk**

[25] Employment Security Department. Yakima County profile. Accessed from: https://esd.wa.gov/labormarketinfo/county-profiles/yakima

3.6. Avalanche

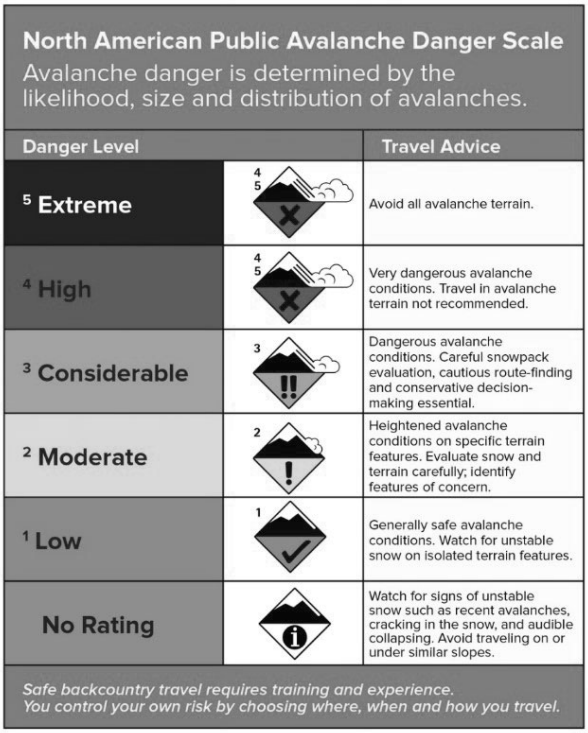
An avalanche is an often-rapid downhill motion of the snowpack or portion of the snowpack. This motion may be natural or artificially induced, and controlled or uncontrolled in terms of time, place, and severity. The amount of damage that occurs is dependent on the type of material moving with the snow, which could include soil, rock, and trees. When there are slabs of snow that dislodge from a mountainside, it gathers more snow on its way down and grows wider and larger. The more dangerous slab avalanche occurs when a cohesive mass of snow breaks free and moves downward, either as a single unit or breaking into smaller pieces traveling together. Velocity, the force of the flow, the path of the avalanche, and its pressure are other variables that influence the damage. Most avalanches occur on slopes between 30 and 40 degrees, but they can occur on slopes averaging between 25 to 50 degrees. Triggers include natural seismic or climatic factors such as earthquakes, thermal changes, blizzards, or human activities. Most avalanches occur in the backcountry.

Avalanches are comprised of three zones – the release zone where the mass breaks free and accelerates, the track where the mass travels downward at a relatively constant speed (often approaching 80 mph), and the runout zone where the mass slows and comes to rest. Although the exact moment of an avalanche cannot be predicted, avalanche conditions are readily recognizable, and avalanches tend to recur in the same areas.

Strength/Magnitude

The North American Avalanche Danger Scale, illustrated in **Figure 3.1**, is a tool used by avalanche forecasters to communicate the potential for avalanches that may cause harm or injury to backcountry travelers. The higher the level on the danger scale, the stronger the magnitude of the avalanche.

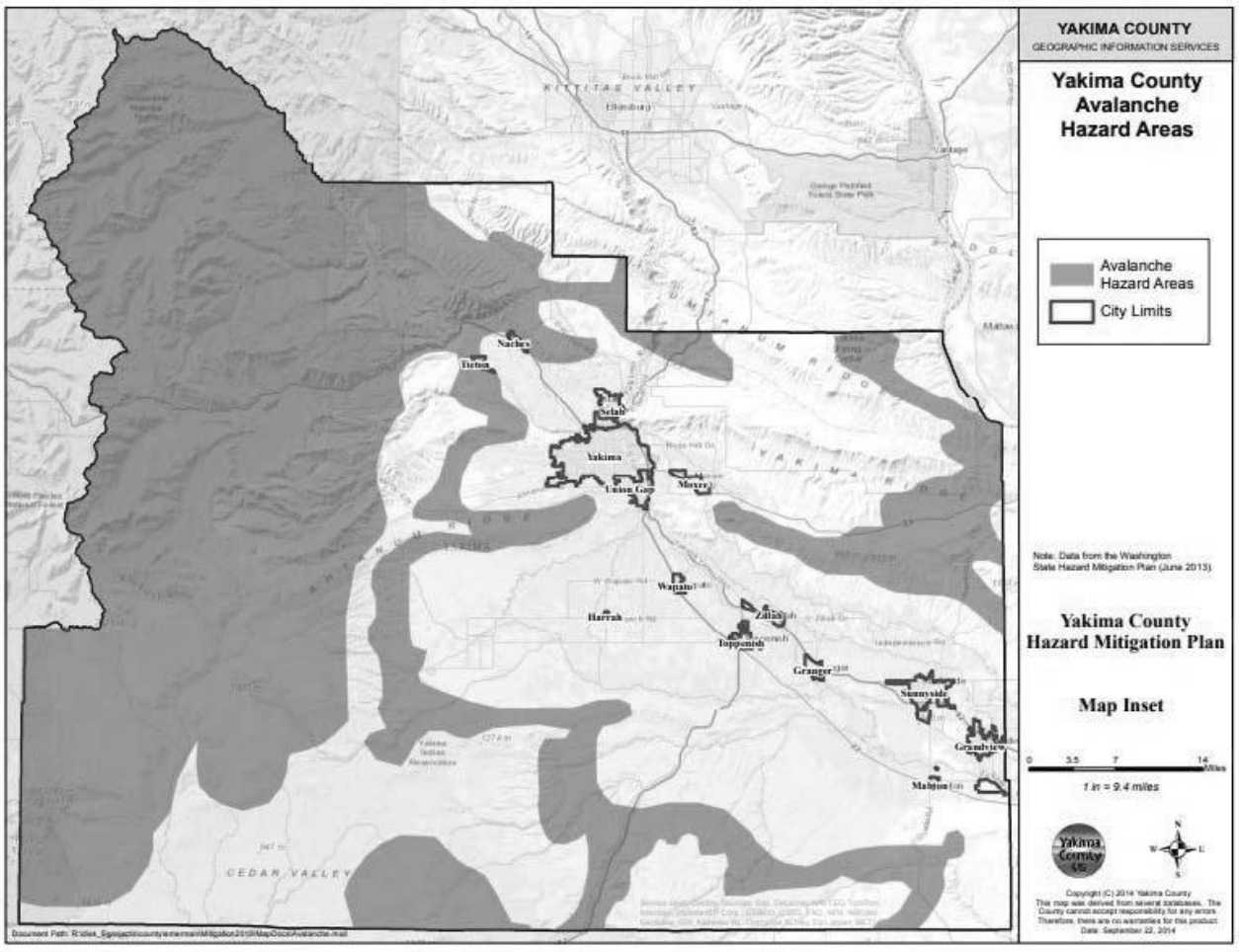
Figure 3.1. North American Avalanche Danger Scale



Location

Figure 3.2 illustrates where avalanches are most likely to occur in Yakima County. According to the 2018 Washington State HMP, approximately 50% of Yakima County land area is exposed to avalanches, but the vast majority of that is in unpopulated areas of the eastern slope of the Cascades. Avalanche hazard areas are typically outside city limits, however, the rural areas of the county near the Ahtanum Ridge (to the west) and Yakima Ridge (to the east) could experience avalanches. The greatest areas of concern for avalanche hazards are along critical transportation routes through rural and mountainous terrain, including along US-12 and US-97 through the Yakama Reservation. Intermittent winter avalanche control is used by Washington Dept. of Transportation (WSDOT) along US-12 at White Pass, on the very western edge of Yakima County, when conditions warrant, but a formal avalanche control program does not currently exist for this area.[26]

Figure 3.2. Avalanche Hazard Areas in Washington



[26] Washington Emergency Management Division. 2018 Washington State Enhanced Hazard Mitigation Plan. Accessed from: https://mil.wa.gov/asset/5f233441409d0

Past Occurrences

On average, avalanches kill one to two people each year in Washington. The worst recorded avalanche in the state occurred in 1910 when massive avalanches hit two trains stopped on the west side of Stevens Pass; at least 96 people were killed. According to the 2018 Washington State HMP, there have been two avalanches in Yakima County since 1960, incurring $575,512.96 in property damages. There have been no reported injuries or fatalities from avalanches in Yakima County.

Future Probability

Historically, Yakima County has experienced a major avalanche every 31 years since 1960, with no recorded events during the HMP analysis period (2015-2021). The future probability of a major avalanche is **Somewhat Likely** (expected to occur every 11-50 years).

Climate Change Impacts

In the short-term, mountain and terrain roughness is expected to rise and snow cover to become thinner, which will likely increase blunt trauma and secondary injuries. The survival rate of avalanches is expected to decline because wetter and warmer snow climate makes it more difficult to find someone buried.[27] In the distant future, avalanches will become less frequent as there will be less snowpack at lower elevations.

Yakima County Vulnerabilities

Yakima County is located between mountain ranges, increasing the chances of an avalanche. Mountainous parts of the county have a very low concentration of people or critical infrastructure, but the majority of the Yakama Reservation is in a vulnerable area. The hazard exposure for people and property is low, therefore the risk of damage is low.

Loss Estimates

Table 3.8 summarizes the 2022 Expected Annual Loss for avalanches in Yakima County, as provided by the FEMA National Risk Index. Expected annual loss is a likelihood and consequence component of risk that measures the expected loss of building value, population, and agricultural value each year.

Table 3.8. 2022 Expected Annual Loss - Avalanche[28]

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Avalanche	$110,802	$500	$110,302	0.01	n/a

Based on the recorded hazard history, each of the past two occurrences averaged $287,756.48 in property damage. That is an average of $9,282.47 in expected losses each year.

Impacts on the Yakima County Population and Vulnerable Populations

Avalanches are more common in the backcountry away from populated areas. As a result, there is a low impact on the population. According to the 2018 Washington State HMP, less than 1%

[27] Frontiers. Effects of climate change on avalanche accidents and survival. https://www.frontiersin.org/articles/10.3389/fphys.2021.639433/full

[28] FEMA. National Risk Index for Natural Hazards. Accessed from https://www.fema.gov/flood-maps/products-tools/national-risk-index

of the population in Yakima County is vulnerable to avalanches. The most vulnerable groups to avalanches are recreationalists.

Impacts on Built Environment and Critical Infrastructure
There is no significant impact on Yakima County's built environment and critical infrastructure from avalanches. The 2018 Washington State HMP assessment indicated there were 601 critical infrastructure facilities in the County, 60 of which are in avalanche exposure areas. Similarly, the assessment found that less than 1% of the building stock is in an avalanche risk area. Avalanche risk areas are not included in the 2022 HMP critical facilities exposure analysis.

Impacts on Government and Emergency Operations
Emergency operations and traffic operations could be affected by debris from an avalanche. Depending on volume, an avalanche could block roadways, with closures lasting anywhere from a couple of hours to days. These roadblocks can affect emergency access and prolong response times. Avalanches could also lead to power outages that impact communications, transportation, and other daily operations for government and first responders.

Impacts on the Economy and Businesses
There is no significant impact on the Yakima County economy or businesses from avalanches. Avalanches mostly occur in the backcountry. When avalanches do occur, they restrict normal traffic movement and can reduce access to ski resorts or other recreational areas.

Impacts on Natural and Cultural Resources
As a naturally occurring phenomenon in mountainous areas, avalanches do not cause significant environmental damage. Avalanches may down trees and spread debris along their spillways. Historic and cultural resources in very mountainous areas may be at risk to avalanches, including those within the Yakama Reservation. There are no historic or cultural properties of note in the Yakima County avalanche risk area.

Overall Risk Ranking

Yakima County has a **Low Risk** to avalanches. FEMA has rated Yakima County **Relatively Low Risk** to avalanches, with a risk score is 25.44. According to the 2018 Washington State HMP, Yakima County has a **Medium-Low Risk** to avalanches. **Table 3.9** below summarizes the risk assessment results for the avalanche hazard for Yakima County.

Table 3.9. Risk Assessment Results – Avalanche

Criteria	Score	Description
Human Health	1	Very Low; 0-1 deaths and few injuries expected
Property Damage	1	Minimal
Economic Disruption	1	Minimal
Environmental Resource Damages/Degradation	2	Localized, minor
Emergency Services Burden	2	Low; localized and temporary
Critical Facilities Exposure	1	Very Low; less than 10% of critical facilities exposed
Probability Score	3	Medium; expected every 11-50 years
Frequency Score	3	Medium; experienced every 31 years
Total Impact Score	**14**	**Low Risk**

3.7. Drought

According to the National Integrated Drought Information System, drought "originates from a deficiency of precipitation over an extended period, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector."[29] It can be difficult to identify a drought and may take weeks or even months to determine and can be ongoing for several years. The statutory definition of drought in Washington (RCW 43.83B.400) is when the water supply for the area is below 75% of normal. Water uses and users in the area will likely incur undue hardships because of the water shortage.

There have been more than 150 definitions of drought that reflect the differences in region, needs, and disciplinary approach. The four basic approaches include:

- **Meteorological Drought** is dependent on the region because it is defined by the degree of dryness and the duration of the dry period.
- **Agricultural Drought** is the drought phase after meteorological drought and before hydrological drought. It occurs when there is not enough moisture in the soil to meet the needs of the crops.
- **Hydrological Drought** is defined as deficiencies in water surfaces and sub-surfaces.
- **Socioeconomic Drought** is the economic relationship between supply and demand of some economic good with elements of meteorological, hydrological, and agricultural drought. Goods such as water, forage, food grains, fish, and hydroelectric power depend on weather. When the demand for the goods exceeds the supply, a socioeconomic drought occurs.

Strength/Magnitude

The severity of a drought depends on many factors, including the moisture deficiency, duration of drought, and the size of the affected area. The United States Drought Monitor (USDM) classifies drought by intensity, with D1 as the least intense level, and D4 the most intense. **Table 3.10** below illustrates the Palmer Drought Severity Index, including the key indicators behind these classifications.

Table 3.10. Palmer Drought Severity Index

Alert	Criteria	Palmer Drought Index
D0 Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.	-1.0 to -1.9
D1 Moderate Drought	Some damage to crops, pastures, streams, reservoirs, or wells low, some water shortages developing or imminent, and voluntary water-use restrictions requested.	-2.0 to -2.9
D2 Severe Drought	Crop or pasture losses are likely, water shortages common and water restrictions imposed.	-3.0 to -3.9
D3 Extreme Drought	Major crop and pasture losses with widespread water shortages or restrictions.	-4.0 to -4.9

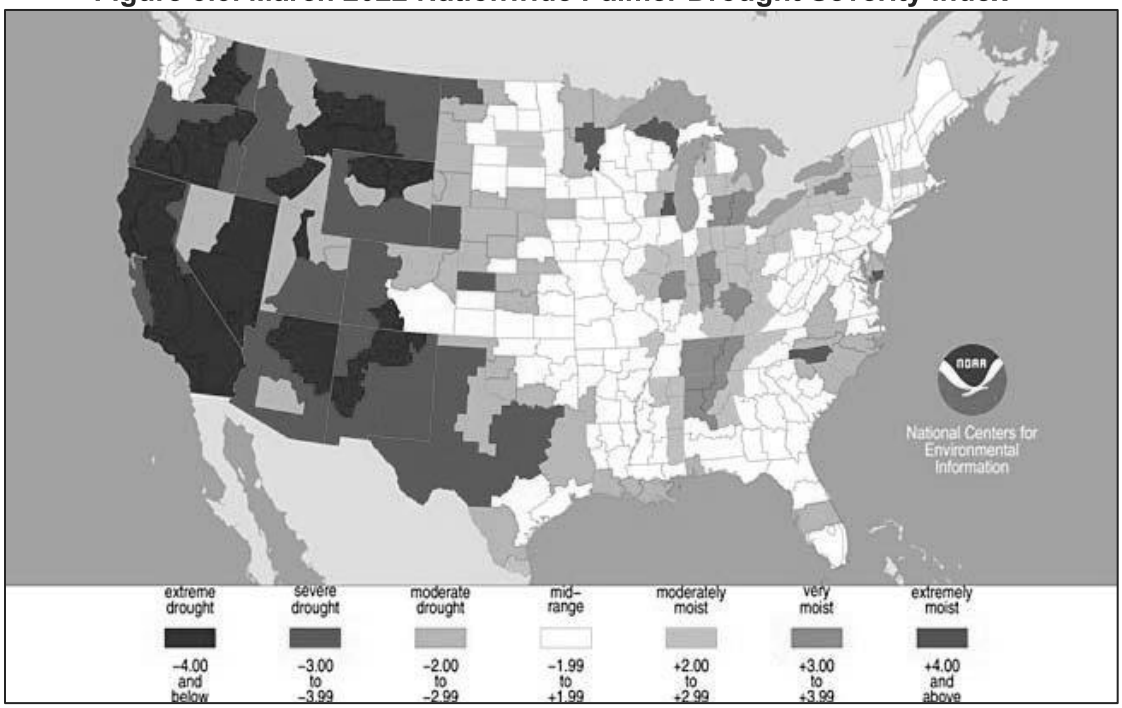
[29] National Integrated Drought Information System. Drought Basics. https://www.drought.gov/what-is-drought/drought-basics

Table 3.10. Palmer Drought Severity Index		
Alert	**Criteria**	**Palmer Drought Index**
D4 Exceptional Drought	Exceptional and widespread crop and pasture loss, shortages of water in reservoirs, streams, and wells creating water emergencies.	-5.0 or less

Location

Figure 3.3 illustrates drought severity throughout the United States as of March 2022 as characterized by the Palmer Severity Drought Index. As is evident, most of the West has been impacted by prolonged drought conditions.

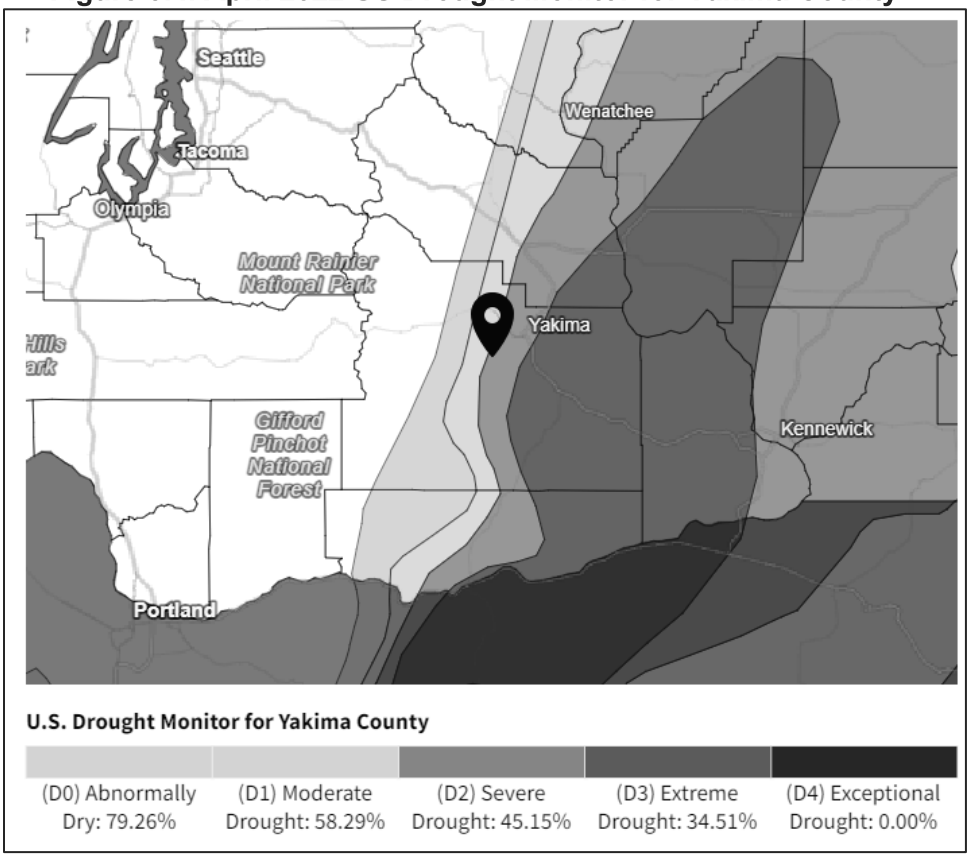
Figure 3.3. March 2022 Nationwide Palmer Drought Severity Index[30]



[30] United States Drought Monitor, accessed from https://droughtmonitor.unl.edu/

Figure 3.4 is a drought map of Yakima County showing USDM drought alert levels. This map represents a snapshot in time. All of Yakima County and the West Coast can and do experience severe to extreme drought. In Yakima County, areas within the Yakima Valley River Basin, east of the Cascades, experience the most severe and recurring drought conditions.

Figure 3.4. April 2022 US Drought Monitor for Yakima County[31]

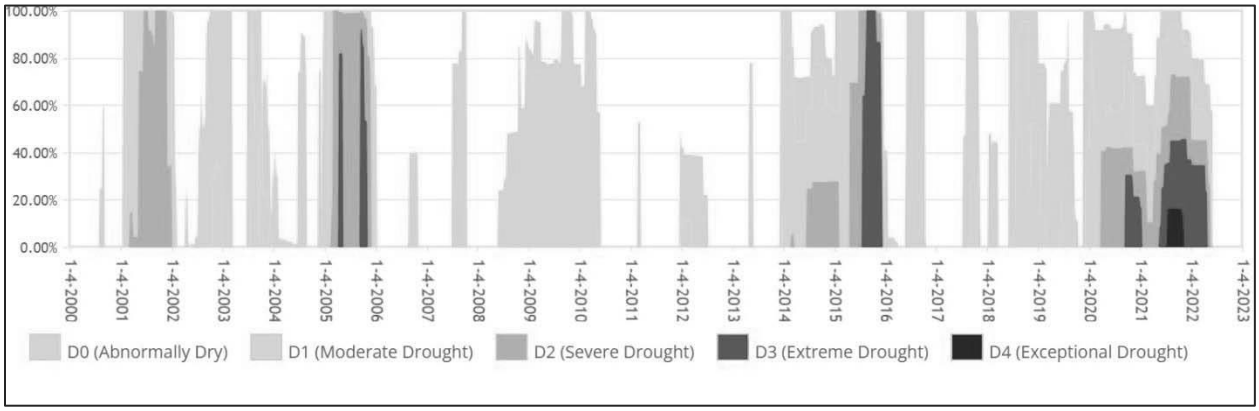


[31] U.S. Drought Monitor, accessed from https://droughtmonitor.unl.edu/

Past Occurrences

Washington experienced 19 droughts between 1900 and 2015. In March 2001 and March 2005, there were statewide emergency declarations for drought; in both cases, water levels were less than 75% of the normal water supply and expected to cause undue hardship. In July 2021, Washington declared an emergency drought declaration again, covering 96% of the state. The drought declaration was lifted in July 2022. **Figure 3.5** illustrates drought occurrences between 2000-2022 in Yakima County using the Palmer Severity Drought Index. Yakima County reached D2 (Severe Drought) four times in that period, including in 2001, 2005, 2014-2015, and 2020-2022.

Figure 3.5. Yakima County Drought History[32]



Future Probability

Historically, Yakima County has experienced severe to exceptional droughts approximately every five years, including two prolonged periods during the HMP analysis period (2015-2021). Given the warming climate in the Pacific Northwest due to human-caused climate change, more droughts and extreme heat is expected in the future. The future probability of a significant drought in Yakima County is **Very Likely** (expected to occur every 1-4 years).

Climate Change Impacts

Climate change is increasing the occurrence of drought. Warmer temperatures enhance evaporation, which dries out soils and vegetation. Warmer winter temperatures reduce the amount of snowfall and decreased snowpack is a critical issue. Water management systems and ecosystems rely on the melted snow. According to the Washington Climate Change Impacts Assessment, the Yakima River Basin will likely be less able to supply water to all users, especially those with junior water rights, given significant decreases in snowpack and shifts in snowmelt over the spring.

[32] United States Drought Monitor. Accessed from: https://droughtmonitor.unl.edu/

Yakima County Vulnerabilities

All of Yakima County is vulnerable to prolonged and severe drought as is an especially critical hazard for agricultural producers. Drought poses minimal impacts to critical facilities and built infrastructure, but can create significant economic distress for Yakima County, which is highly dependent on various agricultural industries. Expected annual losses stem from the loss of agricultural values. Drought can also influence other, more damaging hazards, including wildfire.

Loss Estimates

Table 3.11 summarizes the 2022 Expected Annual Loss for drought in Yakima County, as provided by the FEMA National Risk Index. Expected annual loss is a likelihood and consequence component of risk that measures the expected loss of building value, population, and agricultural value each year. The expected agricultural losses from a drought are significant across the county, reaching nearly $2 million.

Table 3.11. 2022 Expected Annual Loss - Drought[33]

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Drought	$1,984,854	n/a	n/a	n/a	$1,984,854

In 2015, during the “extreme” drought, the Washington Department of Agriculture estimated statewide economic damage at approximately $639 million to $780 million.[34] The figure is not comprehensive and does not include agriculture producers, secondary, or indirect impacts, therefore alluding to the grave impact of droughts.

Impacts on the Yakima County Population and Vulnerable Populations

Given that drought can impact the entire county, all Yakima County residents, workers, and visitors can be vulnerable. According to the 2018 Washington State HMP, “almost 50% of the population with medium or higher drought exposure is also ranked medium or higher on social vulnerability.”[35] This number fluctuates depending on the severity of drought in the County. The greatest impacts from drought on Yakima County residents are reduced community water supplies and the potential for required water conservation measures during an extreme drought. While the region employs careful irrigation systems, groundwater supplies may suffer during extreme drought in some communities.

Impacts on Built Environment and Critical Infrastructure

Yakima County is a transportation hub that connects suppliers to key markets. Less than three hours away, goods travel overseas through Port Pasco. Port Pasco is located on the Columbia River and during drought lower water levels could reduce the number of available routes and cargo-carrying capacity.

In addition to water transportation, ground transportation can be impacted as well. High temperatures and drought can cause roads and airport runways to crack, requiring increased

[33] FEMA. National Risk Index for Natural Hazards. Accessed from https://www.fema.gov/flood-maps/products-tools/national-risk-index

[34] Yakima Basin Water Enhancement Project Workgroup. Water security for the Yakima River basin’s economy, communities, and watersheds. Accessed from: https://apps.ecology.wa.gov/publications/SummaryPages/1712009.html

[35] Washington Emergency Management Division. Washington State Enhanced Hazard Mitigation Plan. Accessed from: https://mil.wa.gov/asset/5d1626c2229c8

maintenance. Additionally, secondary hazards related to drought can pose a risk to Yakima County infrastructure, including wildfires and sinkholes. All the infrastructure in Yakima County could be impacted as groundwater and water supplies are depleted during a drought.

Impacts on Government and Emergency Operations

Government and emergency operations are not expected to be significantly impacted during a drought, apart from water utilities that may need to identify water conservation methods and tap into back-up water supplies to support critical facilities.

Impacts on the Economy and Businesses

The Yakima Basin extends 214 miles, making it the longest river in Washington, and is home to a diversity of plants and wildlife. Of its 6,100 square miles, 40% of the Basin is forested, 40% is rangeland, and 15% is cropland.[36] The region produces apples, cherries and pears, wine and juice grapes, hay, beef cattle and dairies, and 75% of the nation's hops. Reduced snowpack due to drought could lead to reduced irrigation supply, requiring increased spending on irrigation and wells. Additionally, drought conditions may reduce crop and livestock returns, impacting a significant economic sector within the county and state.

For the community, region, and states that rely on crops from Yakima County, food prices can increase during a drought, which may last for several years. A consequence of rising food prices is a reduction in discretionary spending which can cause a crippling effect on many businesses, especially those that provide entertainment. The Yakama Nation Climate Adaptation plan notes that drought can exacerbate existing irrigation water shortages and irrigation distribution inequalities. These problems were apparent during the 2015 drought, when the Wapato Irrigation Project had just 70% of its water supply.

Impacts on Natural and Cultural Resources

Drought has an adverse effect on natural and cultural resources. Some impacts include loss of plant life, an increase in wildfires, and a reduction in the population of local species. Surface and groundwater declines can directly impact fisheries, the aquatic environment, economic development, and long-term rural and urban economic security.

[36] Yakima Basin Fish & Wildlife Recovery Board. Yakima Basin Overview. Accessed from https://ybfwrb.org/yakima-basin-overview/

Overall Risk Ranking

Yakima County has a **High Risk** to drought. FEMA has rated Yakima County **Relatively High Risk** for drought, with a risk score of 26.71. According to the 2018 Washington State HMP, Yakima County has a **High Risk** to drought. **Table 3.12** below summarizes the risk assessment results for the drought hazard for Yakima County.

Table 3.12. Risk Assessment Results – Drought

Criteria	Score	Description
Human Health	1	Very Low; 0-1 deaths and few injuries expected
Property Damage	1	Minimal
Economic Disruption	4	High; up to 6 months
Environmental Resource Damages/Degradation	5	High; Widespread, severe
Emergency Services Burden	1	Minimal
Critical Facilities Exposure	1	Very Low; less than 10% of critical facilities exposed
Probability Score	5	Very High; expected every 1-4 years
Frequency Score	4	High; has occurred every 5-10 years
Total Impact Score	**22**	**Medium Risk**

3.8. Earthquake

An earthquake is the result of a sudden release of stored energy in the Earth's crust. The U.S. Geological Survey (USGS) defines an earthquake as “ground shaking caused by the sudden release of accumulated strain by an abrupt shift of rock along a fracture in the Earth or by volcanic or magmatic activity, or other sudden stress changes in the Earth.”[37] Earthquakes cause both vertical and horizontal ground shaking which varies both in amplitude (the amount of displacement of the seismic waves) and frequency (the number of seismic waves per unit time), usually lasting less than thirty seconds.

Strength/Magnitude

There are several ways to measure the severity of an earthquake, including magnitude, energy release, and shaking intensity.

Magnitude (M) is the physical size of an earthquake, and is expressed on a logarithmic scale, meaning each number increase in magnitude is a tenfold increase (i.e., an M 6.3 earthquake has a 10x greater magnitude than an M 5.3 earthquake). The Richter Scale is a commonly referenced scale for measuring magnitude but is not actually used by seismologists today.

Energy Release is the amount of energy radiated by an earthquake and creating potential damage to buildings and structures, averaged over the entire event.

Intensity is the measurement of shaking from an earthquake event at a particular geographic location. The intensity is dependent on the distance from the fault rupture area, as well as geologic factors of the ground beneath you. Intensity is generally measured using the Modified Mercalli Intensity (MMI) Scale in the United States. The MMI Scale, included as **Table 3.13**, assigns a numerical value for intensity based on observed effects on people, objects, and buildings from historical occurrences.

Table 3.13. Modified Mercalli Intensity (MMI) Scale[38]

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations like the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.

[37] USGS Thesaurus. Earthquakes. Accessed from: https://www.vocabularyserver.com/usgs/index.php?tema=456&/earthquakes.
[38] USGS. The modified Mercalli Intensity (MMI) Scale assigns intensities as... Assessed from: https://www.usgs.gov/media/images/modified-mercalli-intensity-mmi-scale-assigns-intensities

Table 3.13. Modified Mercalli Intensity (MMI) Scale[38]		
Intensity	**Shaking**	**Description/Damage**
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Location

The severity of an earthquake is based on site-specific factors, including distance from the epicenter, soil type, and more. Buildings in low probability earthquake regions are often not designed to withstand a moderate or significant earthquake event. There are many fault lines that exist in Yakima County, leading to a higher risk of liquefaction and shaking during an earthquake. The cities of Toppenish and Union Gap have active faults crossing through or near the city, increasing local seismic risk. According to the 2018 Washington State HMP, about 10% of Yakima County's land area has a Medium or Medium-High exposure to earthquakes, mostly concentrated along the fault lines.

Figure 3.6 is a map illustrating the peak ground acceleration, which is measured in percentage of gravity (%g), showing the acceleration of gravity both horizontally and vertically. This acceleration assesses the intensity and frequency of seismic events. All of Yakima County has a consistent and relatively high seismic hazard rating.

Figure 3.6. Yakima County Seismic Risk Map

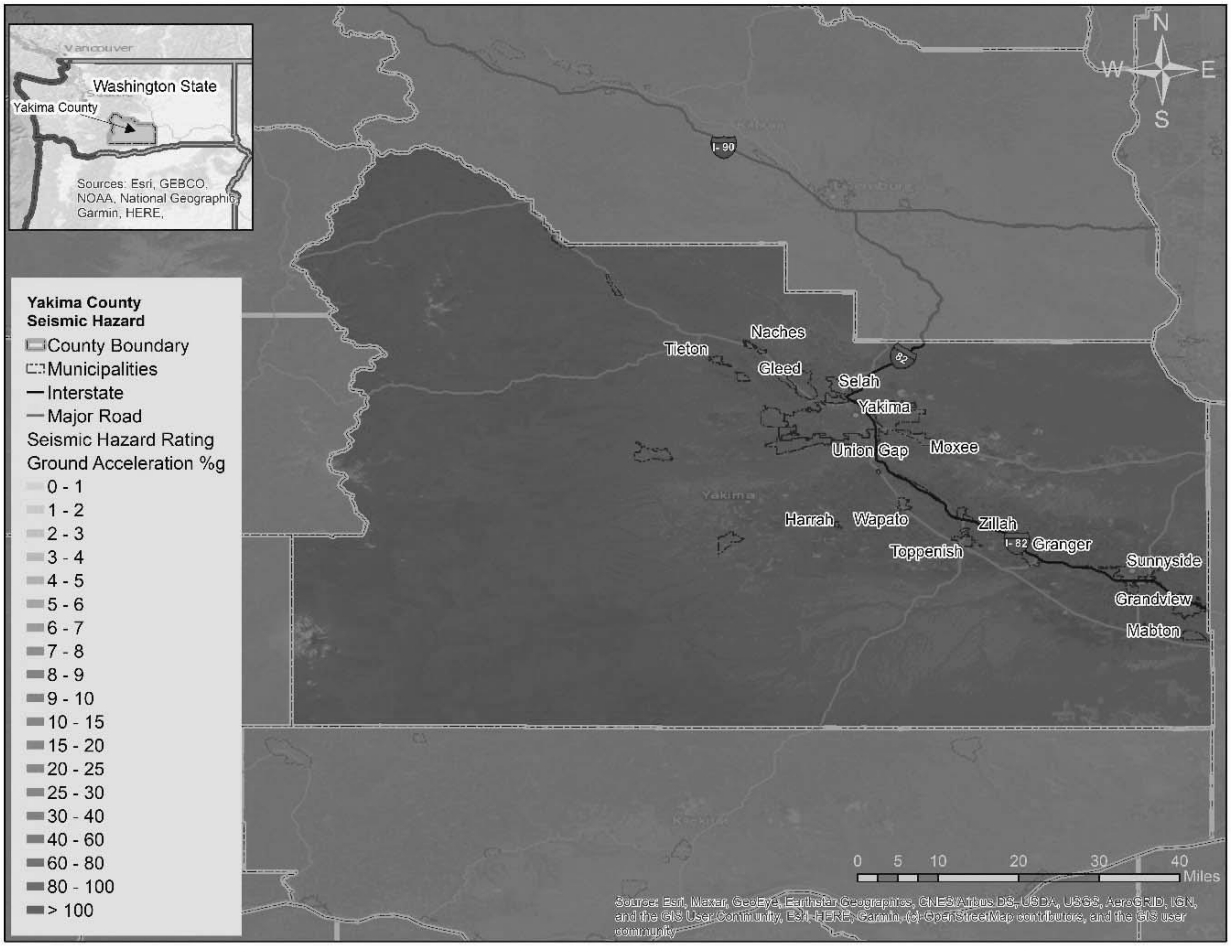
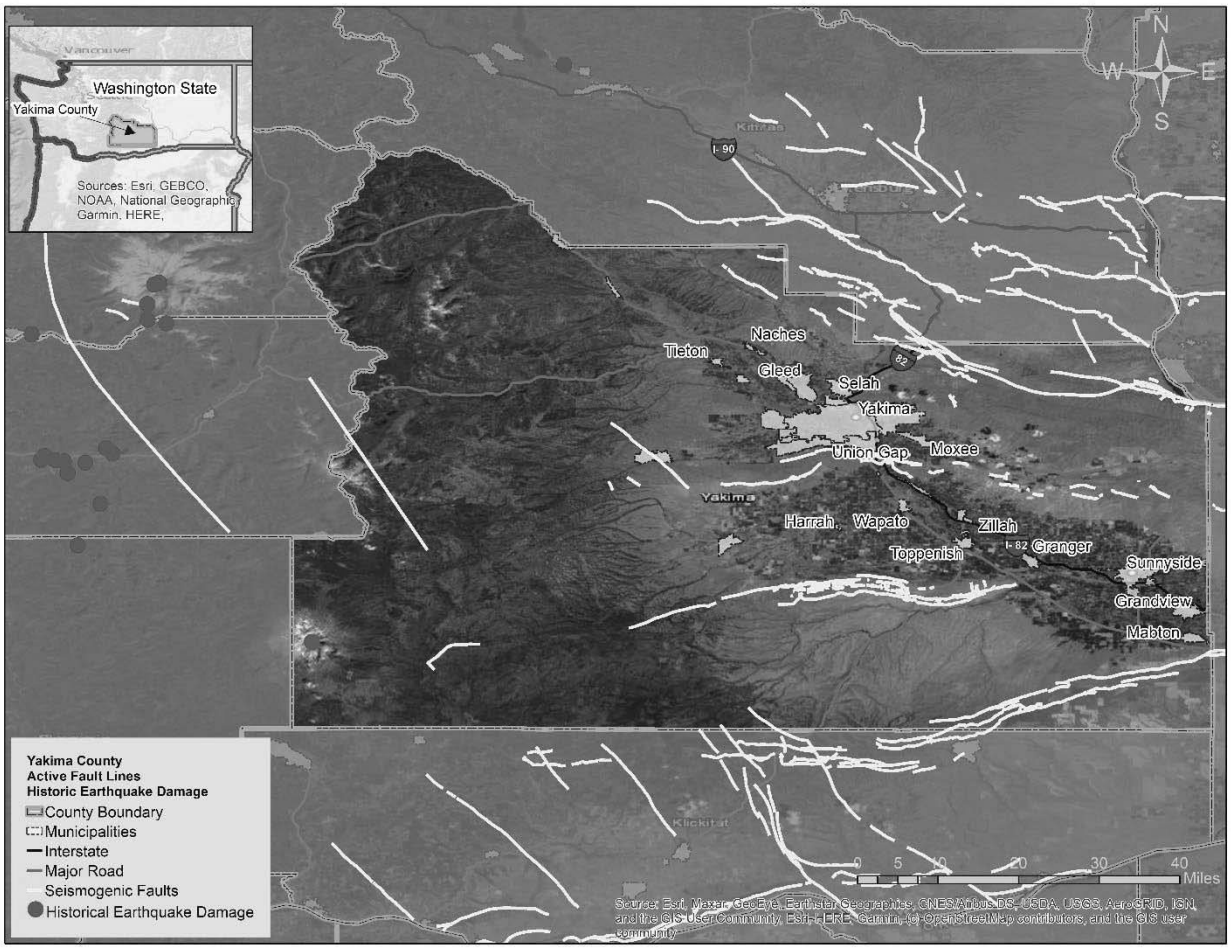


Figure 3.7 is a map of the known fault lines in and around Yakima County, as well as reported damage from Washington's three largest historical earthquakes (above M 6.0). There are several fault lines making up the Toppenish Ridge, south of Toppenish and crossing US-97. Additionally, active fault lines are present along the Ahtanum Ridge and Rattlesnake Hills, south of the more densely populated communities along US-24 and crossing I-82. There are also many active faults in the areas surrounding Yakima County.

Figure 3.7. Yakima County Active Fault Lines and Historical Earthquake Damage[39]



[39] Data illustrated is from Washington State Department of Natural Resources

Past Occurrences

Earthquakes occur regularly in Yakima County, given the presence of many small faults. **Table 3.14** includes a list of earthquakes in Washington over M 5.0 since 1900, according to the 2018 Washington State HMP The 2001 Nisqually earthquake created the most damage, leading to one fatality, many injuries, and an estimated $1-4 billion in property damages across the state. Unreinforced masonry (URM) buildings were most impacted by the Nisqually earthquake. Most earthquakes over M 5.0 have occurred west of the Cascades, but smaller earthquakes that cannot be felt frequently occur in the region. Since 2001, no earthquakes have caused extensive damage or injuries in Yakima County.

Table 3.14. Earthquake History (M5.0+) in Washington (1900 - 2022)

Year	Magnitude	Nearest City
2001	5.0	Satsop, Washington
2001	6.8	Longbranch, Washington
1999	5.8	Elma, Washington
1996	5.4	Puget Sound Region, Washington
1995	5.0	Tacoma, Washington
1981	5.5	Morton, Washington
1980	5.7	Mt. St. Helens, Washington
1965	6.7	Tacoma, Washington
1949	6.8	North Yelm, Washington
1946	5.8	Olympia, Washington
1945	5.7	North Bend, Washington
1939	6.2	Bremerton, Washington
1936	6.1	Walla Walla, Washington
1932	5.7	Granite Falls, Washington
1909	6.0	Friday Harbor, Washington

Future Probability

Given several active fault lines that run through Yakima County and a history of regular, small earthquakes, it is highly likely an earthquake will occur. One earthquake has caused damage in Yakima County since 1900, and a large earthquake can be expected in Washington once every 8 years, given the hazard history. According to the 2018 Washington State HMP, the annual likelihood of a major earthquake event is 17%. The Pacific Northwest Seismic Network found that, there's a 10-20% chance of a Cascadia Subduction Zone (CSZ) earthquake in the next 50 years, although areas east of the Cascades will experience far fewer immediate impacts. The future probability of a significant earthquake causing damage in Yakima County is **Unlikely** (expected to occur every 51-100 years).

Climate Change Impacts

Climate change is not known to impact the frequency or intensity of earthquakes.

Yakima County Vulnerabilities

The Saddle Mountain Fault is located on the northeastern side of the Yakima County border with neighboring Kittitas County. The area experiences smaller earthquakes regularly that do not lead to noticeable shaking or damage. However, a strong earthquake will impact people, property, critical infrastructure, and natural resources.

Loss Estimates

Table 3.15 below summarizes the 2022 Expected Annual Loss for earthquakes in Yakima County, as provided by the FEMA National Risk Index. Expected annual loss is a likelihood and consequence component of risk that measures the expected loss of building value, population, and agricultural value each year. The FEMA National Risk Index assumes that 21% of the county population would be impacted during a significant earthquake.

Table 3.15. 2020 Expected Annual Loss – Earthquake[40]

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Earthquake	$6,687,506	$5,106,688	$1,580,818	0.21	n/a

WaEMD conducted modeling of an M7.4 scenario shallow or crustal earthquake for the Saddle Mountain fault zone. The modeling results included dozens of injuries in Yakima County, as well as at least 250 people impacted.

Impacts on the Yakima County Population and Vulnerable Populations

Earthquakes can threaten the health and safety of residents, as well as create enormous economic and social losses. Injuries and fatalities may result from collapsed buildings and falling objects. Yakima County would experience minimal ground shaking from a CSZ event, but there would be significant impacts on the state and region, including in-migration of western Washington and disruptions in the local, regional, and national supply chain.

Impacts on Built Environment and Critical Infrastructure

Violent earthquakes may cause full or partial collapse of buildings, bridges, overpasses, and other critical infrastructure. The level of impact is dependent on the strength of the earthquake. Historic buildings, specifically URM buildings, are the most vulnerable in the built environment. The 2018 Washington State HMP found that Yakima County does not have a significant amount of general building stock situated in areas at medium or higher exposure from earthquakes.

Impacts on Government and Emergency Operations

Communications system disruptions may limit or delay emergency response capabilities. A major earthquake event, even one west of the Cascades, could lead to a disruption in emergency response services. A severe statewide event would place significant stress on state and regional emergency operations, requiring most police, fire, and emergency medical personnel, overwhelming or potentially disabling disaster services.

Impacts on the Economy and Businesses

Depending on the magnitude, there may be no impact to the economy, catastrophic impact, or somewhere in the middle. In the worst-case scenario, including a CSZ event, the economy and businesses could be impacted for several months or even years. Yakima County could

[40] FEMA. National Risk Index for Natural Hazards. Accessed from https://www.fema.gov/flood-maps/products-tools/national-risk-index

experience loss of revenues if people move away and there is a cost to rebuild and return to a new normal. A major earthquake in Washington could lead to supply chain disruptions, critical supply shortages, and rippling economic impacts. Damage to shipping channels and facilities along the Columbia River could contribute to long-term supply chain impacts in the region.

Impacts on Natural and Cultural Resources

The Yakima River Basin and other water sources can be indirectly impacted by an earthquake if objects fall in and cause contamination. Landslides and debris flows associated with ground shaking from an earthquake could block rivers and shifts in channelization. Most environmental impacts would stem from secondary hazards such as hazardous materials spills or broken utility lines. Major earthquakes can cause significant land and vegetation deformation, but a mild earthquake will cause minimal environmental damage. Historic buildings and cultural resources are very vulnerable to earthquake events and damage due to shaking.

Overall Risk Ranking

Yakima County has a **Medium Risk** to earthquakes. FEMA has rated Yakima County **Relatively Moderate Risk** for earthquakes, with a risk score is 18.36. According to the 2018 Washington State HMP, Yakima County has a **Medium Risk** to earthquakes. **Table 3.16** below summarizes the risk assessment results for the earthquake hazard for Yakima County.

Table X. Risk Assessment Results – Earthquake

Criteria	Score	Description
Human Health	1	Very Low; 0-1 deaths and few injuries expected
Property Damage	3	Medium; widespread, repairable
Economic Disruption	3	Widespread, temporary
Environmental Resource Damages/Degradation	1	Minimal
Emergency Services Burden	3	Widespread, temporary
Critical Facilities Exposure	3	Medium; 20-30% of critical facilities exposed
Probability Score	2	Unlikely; expected to occur every 51-100 years
Frequency Score	2	Unlikely; has occurred every 51-100 years
Total Impact Score	**18**	**Medium Risk**

3.9. Extreme Temperatures

Extreme temperatures are associated with extreme heat and extreme cold weather events. Extreme heat events occur when temperatures remain at least ten degrees or more above the region's average temperature for that period. Extreme cold events are associated with freezing temperatures that are below normal cold temperatures for the region. Both types of extreme temperatures can result in serious injuries or death given the human body cannot regulate outside normal weather temperatures. Common serious health conditions related to extreme temperatures include hyperthermia when a body is exposed to temperatures too hot and hypothermia with temperatures are too cold for a body to withstand.

Strength/Magnitude

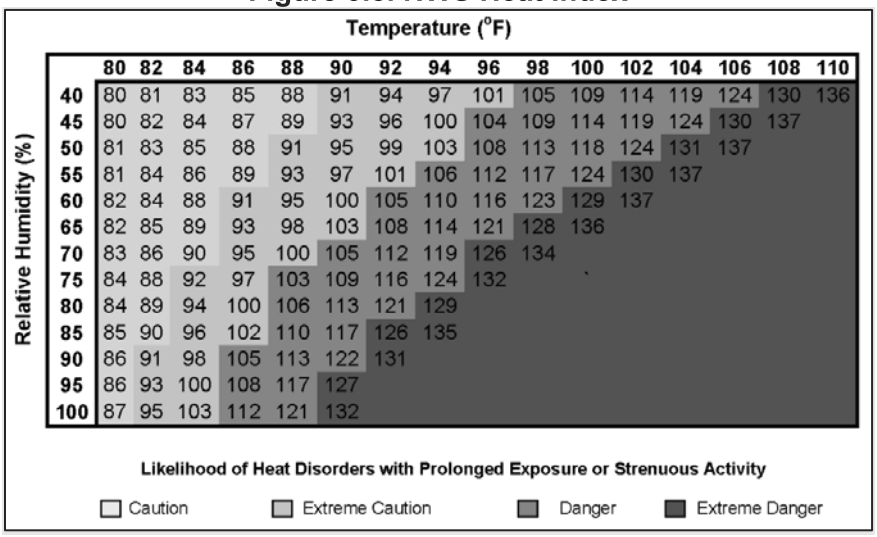
The National Weather Service (NWS) Heat Index, included as **Table 3.17,** can be used to determine the health risks associated with different heat classifications.

Table 3.17. NWS Heat Index[41]

Classification	Heat Index	Effects on the Human Body
Caution	80 - 90°F	Persistent exposure or physical activity resulting in fatigue
Extreme Caution	90-103°F	Possible heat stroke, heat cramps or heat exhaustion after persistent exposure or physical activity.
Danger	103-124°F	Possible heat cramps or exhaustion likely to cause heat stroke after persistent exposure or physical activity
Extreme Danger	125°F or above	Most likely to cause heat stroke

The Heat Index provides a threshold to measure the subjective experience of how hot it feels to the human body by combining temperature and relative humidity. Eastern Washington does not often experience very high temperatures in combination with high humidity, resulting in very infrequent extreme heat conditions.

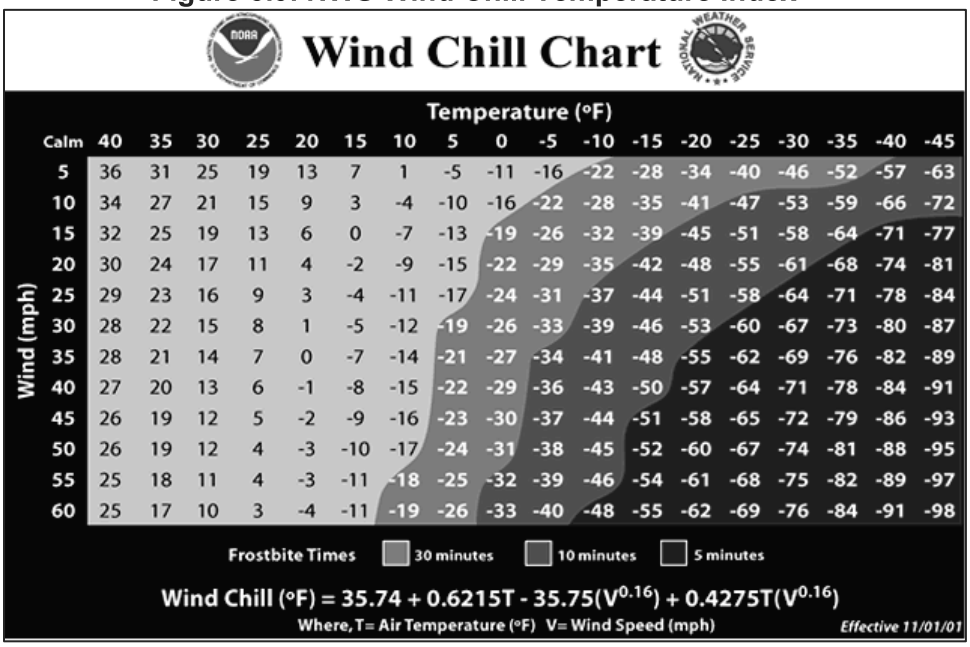
Figure 3.8. NWS Heat Index



[41] National Weather Service. Accessed from: https://www.weather.gov/ama/heatindex

The NWS Wind Chill Temperature Index calculates the dangers to the human body through frost bites caused by winter winds and freezing temperatures.

Figure 3.9. NWS Wind Chill Temperature Index[42]



Wind Chill Chart

Wind (mph) \ Temperature (°F)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Location

Extreme temperatures can impact the entire county simultaneously. Mountainous areas are more likely to experience extreme cold temperatures, but the landscape and built environment is more ready for these events. Similarly, valley areas of the county are more susceptible to extreme heat events. When either trend is switched – the valley experiencing extreme, unseasonable cold, or the mountain region experiencing extreme heat – the associated impacts are expected to be greater.

Past Occurrences

Yakima County experiences 300 days of sunshine each year and receives approximately 8 inches of precipitation annually. The lowest temperatures tend to occur between November and January. This period is also when the region experiences the most precipitation as snowfall. The average annual high temperature for Yakima County is 63°F, while the average annual low is 36°F, although the average by month ranges from 39°F (January) to 88°F (July).[43]

[42] National Weather Service. Wind Chill Chart. Accessed from: https://www.weather.gov/safety/cold-wind-chill-chart
[43] U.S. Climate Data. Climate Yakima - Washington. Accessed from: https://www.usclimatedata.com/climate/yakima/washington/united-states/uswa0502

Table 3.18 details extreme temperature events reported in the NOAA Storm Events Database for Yakima County during the HMP analysis period (2015-2021). **Appendix D** contains a list of historical extreme temperature events reported prior to 2015, as well as a more detailed description of each occurrence.

Table 3.18. Past Extreme Temperatures Occurrences, Yakima County (2015-2021)

Date	Event Type	Property Damage	Fatalities/ Injuries	Narrative
6/26 – 7/1/21	Excessive Heat	0	4	A strong upper-level ridge of high pressure and a surface thermal trough brought several days of record high temperatures across the Pacific NW, with many locations in the lower and higher elevations experiencing extreme heat risk during this event. Calculated heat risk values recorded consecutive days between June 26 through July 1 of temperatures that met or exceeded excessive heat warning criteria. The Yakima County Coroner's Office reported 4 fatalities that heat was a contributing factor to during the heat wave, however, no additional details were provided regarding age, sex, actual date, or location.

Future Probability

During the HMP analysis period (2015-2021), there was one heat-related extreme temperature event. However, extreme heat events are expected to increase in the future for the entire state. Given much of the land area is susceptible to extreme temperatures, a high frequency of occurrences in recent years, and the impact of the changing climate, extreme temperature events are considered **Likely** (occurs every 5-10 years) for Yakima County. Extreme temperatures are not included in the 2018 Washington HMP for comparison.

Climate Change Impacts

The Pacific Northwest is predicted to see increased temperatures year-round, resulting in more warm days in the summer time.[44] According to the Washington Climate Change Impacts Assessment, this increase will average .5°F per decade. A consistent increase in temperatures due to the changing climate will likely result in more extreme heat events across Yakima County and eastern Washington.

[44] University of Washington. How is pacific northwest climate projected to change? Accessed from: https://cig.uw.edu/wp-content/uploads/sites/2/2020/12/snoveretalsok2013sec5.pdf

Yakima County Vulnerabilities

Yakima County may experience a variety of negative impacts due to the expected increase in occurrences of extreme temperatures. Annual economic losses are expected in the millions dollars, specifically from extreme cold temperatures. Extreme weather can also impact the most vulnerable community members, degrade natural resources, and disrupt normal operations.

Loss Estimates

Extreme temperature events have the potential to create major economic losses in Yakima County. Most of these losses will stem from impacts to agricultural production in the region, such as the loss of livestock and damaged crops.

Drawing from the EPA, heatwaves are likely to increase because of climate change and directly affect livestock causing billions in dollars. In 2011, exposure to high temperature events caused over $1 billion in heat-related losses to agricultural producers.[45] Exposure to extreme temperatures can also severely impact crops and fisheries. Weeds, fungi, and other pests thrive during extreme temperatures, therefore the cost of weed prevention may increase. Currently, the cost of fighting weeds is $11 billion annually.[46] As of 2012, fisheries contribute more than $1.55 billion to the economy annually, thus impact to fisheries from extreme temperatures can be costly.[47]

Table 3.19 below summarizes the 2022 Expected Annual Loss for extreme cold in Yakima County, as provided by the FEMA National Risk Index. There is no expected annual loss from extreme heat or heat wave events reported by the FEMA National Risk Index. This is due to the difficulty calculating and quantifying how global temperature increases will affect economies. Expected annual loss is a likelihood and consequence component of risk that measures the expected loss of building value, population, and agricultural value each year.

Table 3.19. 2020 Expected Annual Loss – Extreme Cold[48]

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Cold Wave	$3,626,183	$1,294	$1,064,746	0.14	$2,560,143

Impacts on the Yakima County Population and Vulnerable Populations

As hotter days ranging over 100 degrees Fahrenheit increase in the future, there is an expected increase of heat related illness. Yakima County's agricultural workers and anyone who works or lives outside are especially vulnerable to this threat, given their high exposure to the sun. Heat exposure can lead to heat exhaustion or heat stroke, characterized by dizziness, fatigue, headache, nausea, and lightheadedness. Dehydration is common particularly where extreme heat and high humidity combine. Small increases in temperatures can lead to heat-related deaths, especially for vulnerable community members with underlying medical conditions.

[45] U.S. Environmental Protection Agency. Climates impacts on agriculture and food supply. Accessed from: https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-agriculture-and-food-supply_.html#livestock
[46] Ibid.
[47] Ibid.
[48] FEMA. National Risk Index for Natural Hazards. Accessed from https://www.fema.gov/flood-maps/products-tools/national-risk-index

Change in temperature can promote outbreaks of disease from environmental pathogens that are influenced by the weather patterns or climate. This phenomenon includes early activity of rodents, insects such as mosquitos or ticks, and other animals that can increase human and livestock exposure to vector borne diseases. These diseases include deadly viruses such as West Nile virus, Zika, Lyme disease, and Hantavirus, which all have the potential to create a public health emergency or disease outbreak among livestock.

Impacts on Built Environment and Critical Infrastructure
Extreme temperatures, whether high or low, can be highly disruptive to critical infrastructure, including an increase in electric cooling demand which may reduce or compromise energy supply grid reliability. Extreme heat can also damage road systems by causing road buckling, while frequent freezing and thawing cycles on pavement cause cracking and potholes.

Impacts on Government and Emergency Operations
Yakima County recognizes that extreme temperatures disrupt local health and medical facilities' operations, as well as emergency response services. This disruption may cause a delay in urgent medical care and make it difficult to ensure hospital readiness.

Impacts on the Economy and Businesses
Rising temperatures will have a direct impact on dairy production in Washington State, specifically in Yakima River Basin where it is predicted by the year 2075, milk farming will significantly decrease in production. Higher temperatures increase the rate of evaporation in agricultural soil, which decreases plant production during the growing season. Crop and agricultural productions account for most exports from the Yakima River Basin. Given insects thrive in warmer temperatures, their populations can increase to a point that become a greater problem for agricultural economies.

Impacts on Natural and Cultural Resources
Prolonged warm temperatures and extreme heat can increase tree mortality and deteriorating forest conditions, leading to fire danger in forest and grassland areas. More intense summer heat will also contribute to warmer water temperatures, affecting aquatic systems and fish populations.

Overall Risk Ranking

Yakima County has a **Medium Risk** to extreme temperature events. FEMA has rated Yakima County as **Very High Risk** for extreme cold, with a risk score of 100.There is no data available for extreme heat events, and the 2018 Washington State HMP does not include extreme temperatures as a hazard. **Table 3.20** below summarizes the risk assessment results for the extreme temperatures hazard for Yakima County.

Table 3.20. Risk Assessment Results – Extreme Temperatures

Criteria	Score	Description
Human Health	3	Moderate; 4-5 deaths and several injuries expected
Property Damage	1	Minimal
Economic Disruption	3	Widespread, temporary
Environmental Resource Damages/Degradation	3	Widespread, minor
Emergency Services Burden	1	Minimal
Critical Facilities Exposure	1	Very Low; less than 10% of critical facilities exposed
Probability Score	4	Likely; expected to occur every 5-10 years
Frequency Score	3	Somewhat Likely; has occurred every 11-50 years
Total Impact Score	**19**	**Medium Risk**

3.10. Flooding

Flooding is the inundation of normally dry areas from any form of surface water or accumulation of water. Floods are the most common natural hazard occurrence in Washington. In a natural setting, floods tend to follow heavy precipitation events such as heavy rainfall, snow melt, winter storms, or major thunderstorms. Several types of flooding events can impact Yakima County and are considered in this plan:

- **Riverine or Stream Flooding:** Riverine flooding occurs when a channel receives more water than it can hold, and the excess water flows over its banks and inundates low-lying areas, causing a flood. Riverine flooding can occur due to rapid snowmelt or prolonged or heavy rainfall, which is also a cause of flash flooding.
- **Flash Flooding:** Flash floods result from a large amount of rain in a short period of time, typically within six hours of an event. This type of event is particularly hazardous in mountainous areas or other places with restricted floodplain storage. More urbanized areas may see flash flooding due to a lack of permeable surfaces.
- **Ice Jam Flooding:** Flooding caused by ice jams is similar to flash flooding. Ice jam formation causes a rapid rise of water at the jam and extends upstream. Failure or release of the jam causes sudden flooding downstream. The formation of ice jams depends on the weather and physical conditions in river channels. Ice jams are most likely to occur where the channel slope naturally decreases, where culverts freeze solid, at headwaters of reservoirs, at natural channel constrictions such as bends and bridges, and along shallows where channels may freeze solid.

Flooding may also occur because of other hazard events, including earthquakes, volcanoes, wildfires, and landslides. Flooding can be natural, human-caused, or a combination of both. Human-caused flooding includes dam failure, levee failure, and activities that increase the rate and amount of runoff, such as paving, reducing ground cover, and clearing forested areas. The amount of damage caused by a flood is influenced by the speed and volume of the water flow, the length of time the impacted area is inundated, the amount of sediment and debris carried and deposited, and the amount of erosion that may take place.

Although floods can happen at any time during the year, there are typical seasonal patterns for flooding in Washington. In Eastern Washington, floods generally occur in the foothills of the Cascade Range during spring snowmelt. Winter floods, which are more frequent and of larger magnitude, occur when rain or unseasonably warm weather melts accumulations of snow. Flash flooding may also occur as a result of severe storms in the summer.

Flood Terminology

Several flood-related terms are frequently used in this plan and are defined below.

- **Flood Insurance Rate Map (FIRM):** FIRMs are the official maps on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.
- **Floodplain:** A floodplain is an area adjacent to a lake, river, stream, estuary, or another water body that is subject to flooding. If left undisturbed, the floodplain serves to store and discharge excess floodwater. In riverine systems, the floodplain includes the floodway.

- **Regulatory Floodway:** a Regulatory Floodway is a FEMA prescribed term which means the channel of a river or other watercourse and the adjacent areas that must be reserved to discharge the base flood without cumulatively increasing the water surface elevation more than one foot. Communities must regulate development in floodways to ensure that there are no increases in upstream flood elevations. For streams and other watercourses where FEMA has provided Base Flood Elevations (BFEs), but no floodway has been designated, the community must review floodplain development on a case-by-case basis to ensure that increases in water surface elevations do not occur or identify the need to adopt a floodway if adequate information is available.

Strength/Magnitude

Under the National Flood Insurance Program (NFIP), the Federal standard for floodplain management is the **100-year floodplain.** This area is chosen using historical data such that in any given year, there is a 1% chance of a Base Flood (also known as 100-year Flood, 1% annual flood, Special Flood Hazard Area, or Regulatory Flood). A 100-year flood has a 26% chance of occurring in a thirty-year period.

A **500-year floodplain** has a 0.2% of being equaled each year. The nomenclature can be confusing and does not mean this flood will only happen every 500 years. This type of flood has at least a 6% chance of occurring in a 30-year time period with the 100-year flood.

FIRMs identify flood zones through hydrologic and hydraulic studies. These zones represent the areas susceptible to the 1% annual chance flood, or 100-year flood. Where possible, FEMA also determines a Base Flood Elevation (BFE) for the 100-year floodplain, which is the calculated elevation of flooding during this event and a commonly used standard for determining flood risk and managing potential floodplain development. These maps provide a more definitive representation of the highest flood risks in the communities.

Since the 100-year flood level is statistically computed using existing data, as more data is available the flows, heights, and extent of the 100-year flood may change. As more data are collected, or when a river basin is altered in a way that affects the flow of water in the floodplain, re-evaluation is needed (and sometimes required) to keep the maps as representative of current conditions as possible. Alterations can include dams and urban development, and other human-made changes in a basin that affect floods.

The extensive system of reservoirs/dams in Washington and Yakima County has generally reduced the crest heights of floods and lengthened their duration. Longer duration flows at sediment transport level wear away at revetments, levee armor, natural bank, bridge abutments, and other flood control infrastructure over a longer period above sediment transport thresholds. Some flooding events can have a higher volume of flow and lower crest over time. Some can have high peak and low volume. Both can be hazardous in their own ways. Longer duration floods require longer monitoring and patrol as erosion continues over time.

The NWS Advanced Hydrologic Prediction Service publishes forecast hydrographs when flooding is expected based on river and stream gauge data. **Table 3.21** details the terminology used to describe flooding based on this data.

Table 3.21. NWS Advanced Hydrologic Prediction Service Flood Terminology[49]

Term	Description
Action Stage	The stage which, when reached by a rising stream, lake, or reservoir represents the level where the NWS or a partner/user needs to take some type of mitigation action in preparation for possible significant hydrologic activity.
Minor Flooding	Minimal or no property damage, but possibly some public threat
Moderate Flooding	Some inundation of structures and roads near stream. Some evacuations of people and/or transfer of property to higher elevations.
Major Flooding	Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.
Record Flooding	Flooding which equals or exceeds the highest stage or discharge at a given site during the period of record keeping.

Location

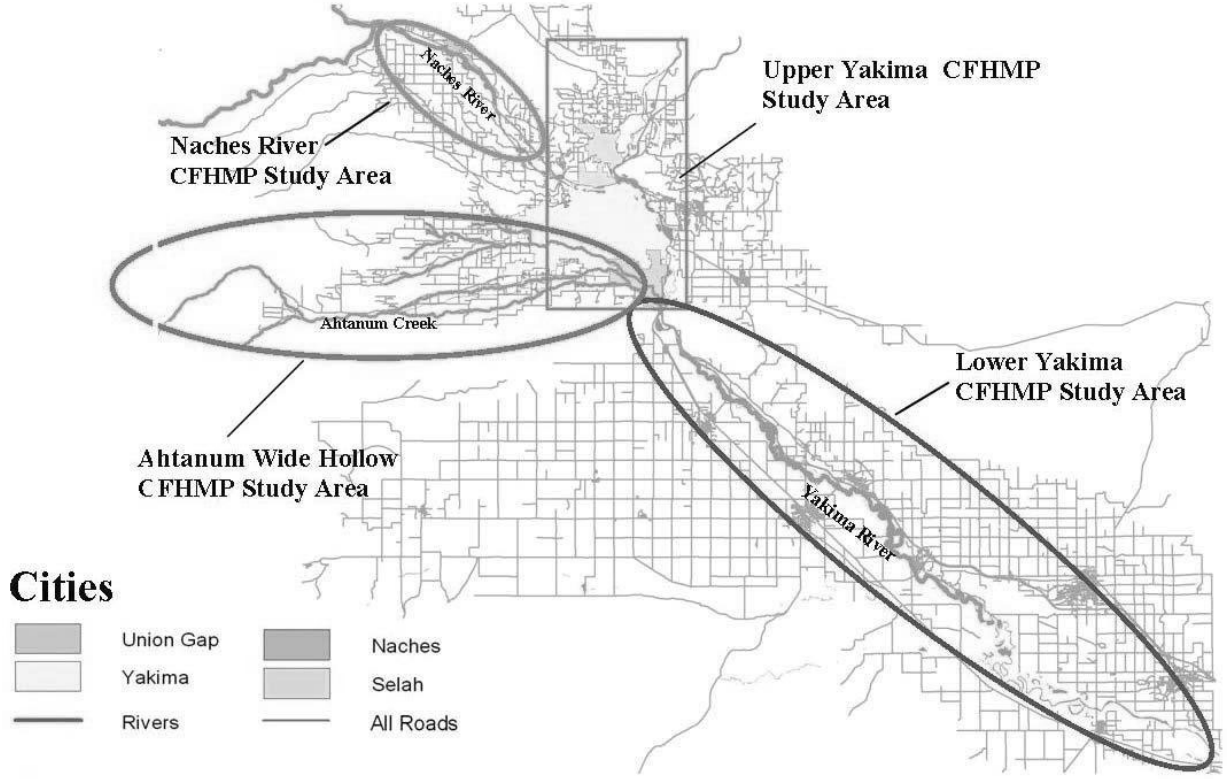
The Yakima County Flood Control Zone District (FCZD) is responsible for flood hazard management across the county. FCZD divides Yakima County into four distinct study areas that experience flooding, each of which includes various municipalities. The study areas include:

- **Naches River:** Covers the Naches River from the confluence of the Naches and Tieton Rivers to the Twin Bridges northwest of Yakima. Agriculture makes up 41% of the current land use in the study area, there are also residential and commercial developments in the floodplain that have been subject to repeated flood damage. Includes the municipalities of Naches, Tieton, and Gleed.
- **Lower Yakima:** Yakima River south of Union Gap along the boundary with Yakama Nation. Includes the municipalities of Granger, Grandview, Toppenish, Sunnyside, Zillah
- **Upper Yakima:** Yakima River from the Yakima County northern boundary to Union Gap and along the Naches River from Twin Bridges on State Route 12 to its mouth. Includes the municipalities of Yakima, Union Gap, and Selah.
- **Ahtanum-Wide Hollow:** The Ahtanum and Wide Hollow watersheds extend east from the Cascade Mountains to include the cities of Yakima and Union Gap, ending where the creeks flow into the Yakima River. The northern boundary for the two adjoining basins is formed by Cowiche Mountain, and the southern boundary by Ahtanum Ridge.

[49] National Weather Service Advanced Hydrologic Prediction Service. Hydrograph Terminology. Accessed from https://water.weather.gov/ahps2/pdf/hydrograph_terminology.pdf

Figure 3.10 illustrates the four CHFMP study areas as determined by FCZD.

Figure 3.10. Yakima County CFHMP Study Areas



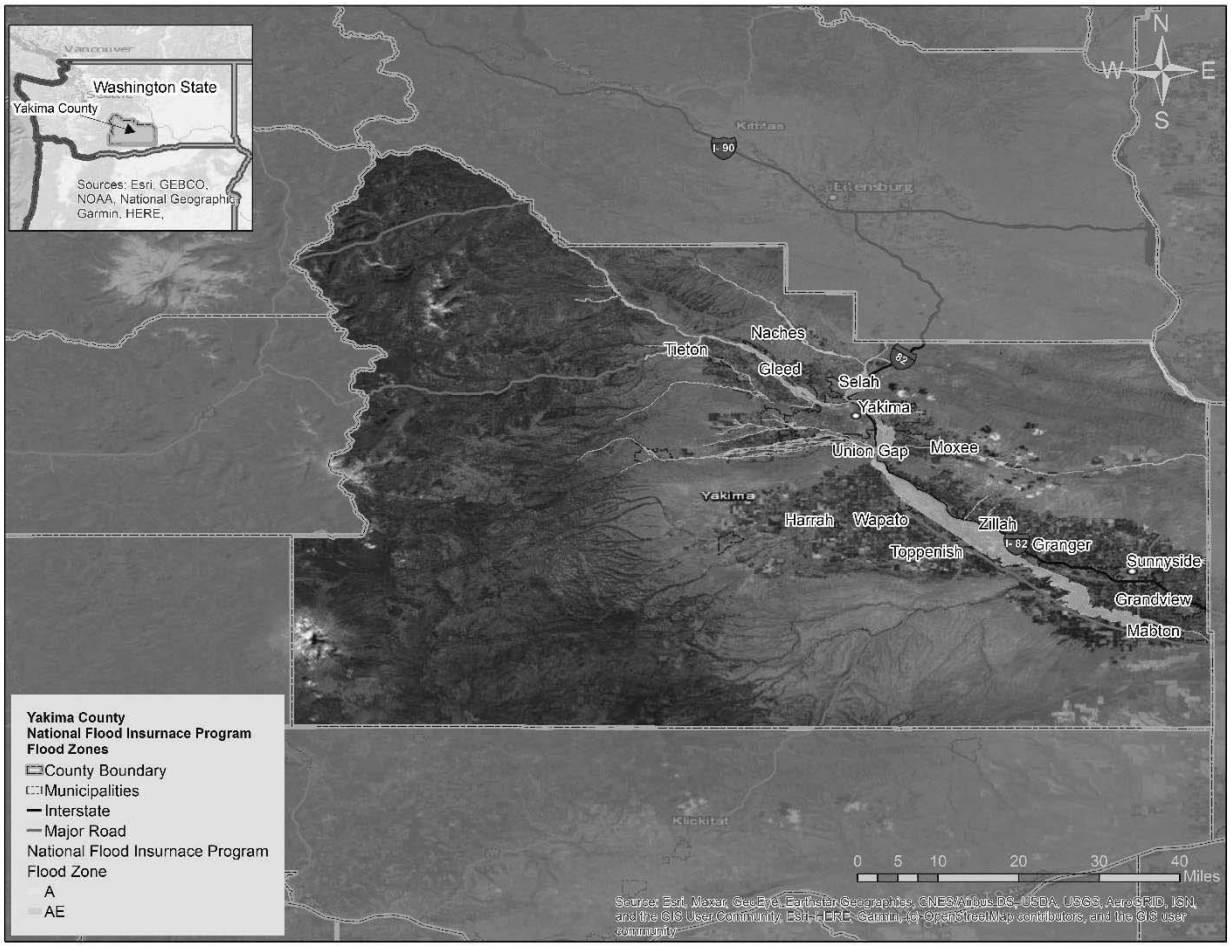
Much of the recent infrastructure development in Washington State has occurred in or near floodplains which leads to a high susceptibility to flooding. This type of development also changes the course of natural water flows, increasing runoff from pavement and roof surfaces. Diverting waters to new surface areas results in places previously safe from flooding become susceptible to the damages of flooding.

Figure 3.11 illustrates the NFIP Special Flood Hazard Area, or 100-year floodplain, which has a 1% annual chance of flooding. As depicted, many communities along the Lower Yakima River are within the 100-year floodplain. According to the 2018 Washington State HMP, approximately 2% of Yakima County's land area is susceptible to 100-year flood conditions.

The following participating communities have land within the floodplain, described in more detail in each Jurisdiction Annex.

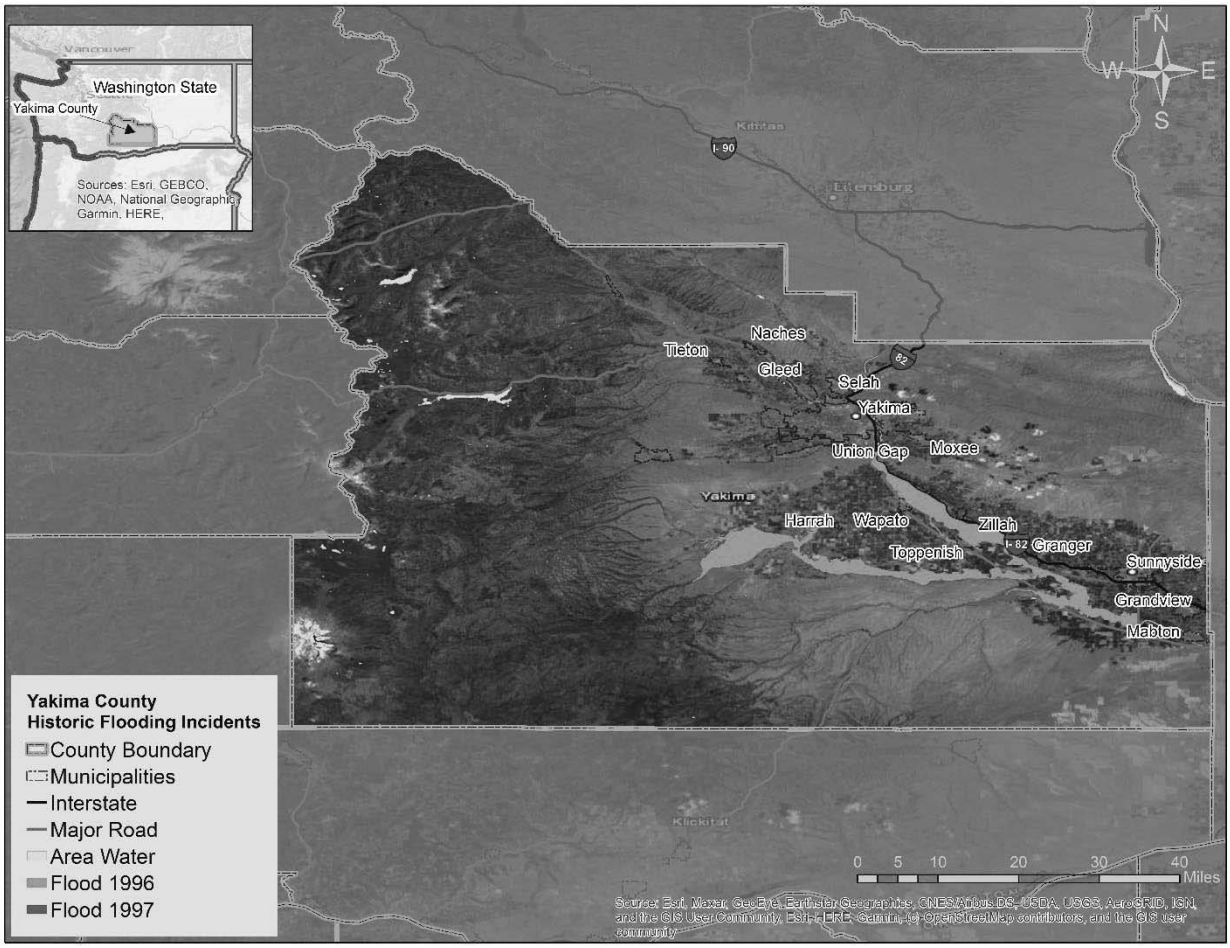
- City of Granger
- City of Selah
- City of Tieton
- City of Toppenish
- City of Union Gap
- City of Wapato
- City of Yakima
- City of Zillah
- Town of Naches
- Unincorporated Yakima County

Figure 3.12. NFIP Flood Zone (100-year floodplain), Yakima County



Additionally, Yakima County has tracked the incidence of historic flooding outside of the 100-year floodplain. Major flooding in 1996 and 1997 exceeded the mapped floodplain, as illustrated in **Figure 3.13**. As depicted, flooding reached far outside of the 100-year floodplain, west past the Town of Harrah along the established levee system.

Figure 3.13. Historic Flooding Incidents, Yakima County



Past Occurrences

The most significant flood, in terms of property damage, on the Yakima River in Yakima County occurred on February 9, 1996, with damage amounting to over $17.7 million in Yakima County. During the 1996 flood, the following communities experienced significant damage: Selah, Wapato, and Toppenish on the Yakima River; Rock Creek, The Nile, Town of Naches, Gleed, and Ramblers Park on the Naches River; Wiley City, Ahtanum, and Emma Lane on Ahtanum Creek, and White Swan on Toppenish Creek within Yakama Nation. Flood damages are not well represented in Yakima County by insurance claims due to the relative absence of flood insurance for older flood prone homes. Of the above locations, Rock Creek, the Town of Naches, and Ramblers Park were behind PL84-99 levees that were overcome and resulted in more significant damage. These three levees were reinforced following 1996 and subsequent flood events. The Ramblers Park levee has been fully setback, and the Town of Naches levee has been partially setback to reduce future damages and allow for more flood conveyance. In addition, bridges severely damaged on the mainstem during the 1996 flood have been replaced with structures with opening widths that are multiples of the original; at SR-24 and Donald-Wapato highway on the Yakima River and Powerhouse Road on the Naches River.

Including the 1996 event, Yakima County has experienced 9 declared disasters for flooding since 1953, including the following:

- **DR-185:** 1964, Heavy Rains and Flooding
- **DR-300:** 1971, Heavy Rains, Melting Snow, and Flooding
- **DR-414:** 1974, Severe Storms, Snowmelt, and Flooding
- **DR-482:** 1975, Severe Storms and Flooding
- **DR-545:** 1977, Severe Storms, Mudslides, and Flooding
- **DR-883:** 1990, Severe Storms and Flooding
- **DR-1100:** 1996, High Winds, Severe Storms, and Flooding
- **DR-1079:** 1996, Severe Storms, High Wind, and Flooding
- **DR-1159:** 1997, Severe Winter Storms, Land and Mud Slides, and Flooding
- **DR-1817:** 2009, Severe Winter Storms, Landslides, Mudslides, and Flooding

FCZD has produced CFHMPs for the Upper Yakima River, Cowiche Creek, Naches River, and Ahtanum-Wide Hollow, and plans to develop a CFHMP for the Lower Yakima River. Each CFHMP details the flood and damage history in the distinct study areas.

There have been no declared disasters for flooding during the HMP analysis period. **Table 3.22** outlines 8 flood events reported on the NOAA Storm Events Database in Yakima County during the HMP analysis period (2015-2021). **Appendix D** contains a list of all flood events prior to 2015, as well as a more detailed description of each occurrence.

Table 3.22. Past Flood Occurrences, Yakima County (2015-2021)

Location	Date	Event Type	Property Damages	Narrative
Rimrock, Selah	5/21/2015	Flash Flood	None reported	Debris flow just east of Rimrock Lake, reported by the Yakima Herald. Flooding in streets, 911 had some people evacuate buildings in fear of roof collapse. Police set up barricades to help divert drivers from flooded roadways,

Table 3.22. Past Flood Occurrences, Yakima County (2015-2021)				
Location	**Date**	**Event Type**	**Property Damages**	**Narrative**
				flooding in some homes. A few places lost power.
Harwood	3/6/2016	Flood	$300,000	Heavy Rain and snowmelt resulted in higher waters along some of the rivers, which also resulted in minor flooding along some river banks.
Tampico	2/10/2017	Flood	None reported	After a brief warm up, an ice jam formed and broke loose on the North Fork of the Ahtanum Creek in central Yakima County. The ice moved downstream damaging five homes with water and structural damage. One family was displaced.
Yakima	3/10/2017	Flood	$20,000	Substantial snow pack remained in the foothills and lower elevations of the Washington Cascades at the beginning of March. Temperatures started to moderate during the first week of the month with several nights of temperatures above freezing occurring on the 8th and 9th. Flooding was reported along Wide Hollow and Cottonwood creeks from about 9 miles west of Yakima through the city of Yakima as rapid snow melt was occurring in the foothills west of Yakima. Water flowed through the Meadowbrook Mobile Home Park, and there were numerous reports of damaged driveways as culverts were overwhelmed with mud and other debris. Along Ahtanum Creek, there was standing water in fields, with water from roadside ditches spilling over the road in places.
Tieton, Brace	3/14-16/2017	Flood	None reported	More flooding was reported along Wide Hollow and Cottonwood creeks, as well as Cowiche and Ahtanum creeks, through the city of Yakima, then southeast into the lower Yakima Valley. Rapid snow melt occurred in the foothills west of Yakima. Water from roadside ditches spilled over various road in places. Along Toppenish and Satus Creeks, in the lower valley, water over

Table 3.22. Past Flood Occurrences, Yakima County (2015-2021)				
Location	**Date**	**Event Type**	**Property Damages**	**Narrative**
				roads and field flooding were reported along the main branches of the creeks as well as the numerous tributaries to these creeks. A few roads remained closed due to high water through the rest of March. On March 15, high flows on Cowiche Creek caused a section of a levee that had previously been damaged to breech, opening a 20-foot-wide gap. The water followed along Highway 12 with the bulk of the water flowing into an irrigation canal. On March 16, water inundated the intersection of North 40th and Fruitvale Boulevard, flooding a few businesses and parking lots and the Riverview Mobile Home Park. Public Works tried to divert the water into Myron Lake, with a channel expected to take the water back from the lake to the Naches River. Instead, the water overflowed from Myron Lake into Willow Lake and then Aspen Lake, where it overflowed into neighborhoods surrounding the lakes.
Naches	5/5/2017	Flood	None reported	Increased snow melt resulted in minor flooding of the Naches River near Naches. On May 5th the river crested at 18.25 feet, flood stage is 17.8 feet.
Naches	5/30/2017	Flood	None reported	On May 30th, warm temperatures lead to increased snow melt with the Naches River rising briefly to the flood stage of 17.8 feet.
Naches	2/7/2020	Flood	None reported	Naches near Naches – Flood stage is 17.8 feet. The river rose above flood stage on February 7, 4 am, crested at 18.6 feet on February 7th at 130 pm, then fell below flood stage on February 8th at 430 am. Minor flooding was observed in low areas along river. Naches near Clifdell – Flood stage is 31.0 feet. The river rose above flood stage on February 7 at 4am, crested at

Table 3.22. Past Flood Occurrences, Yakima County (2015-2021)				
Location	**Date**	**Event Type**	**Property Damages**	**Narrative**
				31.4 feet on by 1145am, then fell below flood stage on by 1130pm. Minor flooding was observed in low areas along river. Yakima near Parker – Flood stage is 10.0 feet. The river rose above flood stage on February 7th, 8 pm, crested at 10.4 feet on February 8th, 245 am, then fell below flood stage on February 8th, 6pm. Minor flooding was observed in low areas along river.

In addition to recorded damages, Yakima County also monitors streamflow values measured at stream gauges along the Yakima River, Ahtanum River, and Naches River. **Tables 3.23 – 3.26** below summarize the historic crests on the Yakima River at Umtanum and Parker, as well as on the Naches River at Naches and Cliffdell. Stream gauges on the Ahtanum, Cowiche, and Toppenish do not include records of historic crests, but are used for active flood monitoring.

As summarized in **Table 3.23**, flood stage on the Yakima River at Umtanum is 35.5 feet which has been exceeded 11 times, with two occurrences in the HMP analysis period (2015-2021).

Table 3.23. Historic Crests on the Yakima River at Umtanum		
Flood Categories	**Historic Crest Height (feet)**	**Date**
Major Flood Stage (39 feet)	41.10	11/15/1906
Moderate Flood Stage (38 feet)	38.98 38.77	05/29/1948 02/09/1996
Flood Stage (35.5 feet)	37.93 37.84 37.63 37.08 36.69 36.50 35.70 35.67	11/25/1990 01/08/2009 12/03/1977 11/23/1959 01/17/2011 05/16/2011 12/10/2015 02/16/2016
Action Stage (33.5 feet)	35.22 34.44	01/31/1965 2/30/1999

As summarized in **Table 3.24**, flood stage on the Yakima River at Parker is 10 feet which has been exceeded 25 times, with three occurrences in the HMP analysis period (2015-2021).

Table 3.24. Historic Crests on the Yakima River at Parker		
Flood Categories	**Historic Crest Height (feet)**	**Date**
Major Flood Stage (14 feet)	16.21 15.00 14.61 14.50	02/09/1996 12/23/1933 11/30/1995 11/26/1990
Moderate Flood Stage (12 feet)	13.97 13.44 13.35 13.20 13.14 13.03 (P) 12.20 12.15	12/03/1977 12/27/1980 01/16/1974 05/16/2011 12/04/1975 01/09/2009 (P) 01/18/2011 12/10/2015
Flood Stage (10 feet)	11.65 11.65 11.61 11.41 11.30 11.28 10.93 10.75 10.61 10.40 10.22 10.19 10.11	01/31/1965 03/14/1972 02/21/1982 01/25/1984 04/01/2011 02/21/1995 02/16/2016 02/01/1995 02/19/1981 02/08/2020 02/26/1986 04/25/2012 03/10/1983

As summarized in **Table 3.25**, flood stage on the Naches River at Naches is 17.8 feet which has been exceeded 14 times, with two occurrences in the HMP analysis period (2015-2021).

Table 3.25. Historic Crests on the Naches River at Naches		
Flood Categories	**Historic Crest Height (feet)**	**Date**
Major Flood Stage (21 feet)	22.90 22.36	12/23/1933 02/08/1996
Moderate Flood Stage (19 feet)	20.40 20.19 20.07 19.00 19.00	05/16/2011 12/09/2015 12/02/1977 11/30/1995 (05/16/2011
Flood Stage (17.8 feet)	18.60 18.40 18.27 18.25 18.02 17.95	02/07/2020 12/04/1975 04/25/2012 05/18/2008 12/27/1980 06/17/1974

Table 3.25. Historic Crests on the Naches River at Naches		
Flood Categories	**Historic Crest Height (feet)**	**Date**
	17.81	05/18/2006
Action Stage (16 feet)	17.60	11/25/1990
	17.50	05/26/1999
	17.38	06/08/2011
	17.11	06/10/1972
	16.82	05/12/2013
	16.05	05/24/1969

As summarized in **Table 3.26**, flood stage on the Naches River at Cliffdell is 31 feet which has been exceeded 6 times, with two occurrences in the HMP analysis period (2015-2021).

Table 3.26. Historic Crests on the Naches River at Cliffdell		
Flood Categories	**Historic Crest Height (feet)**	**Date**
Flood Stage (31 feet)	32.97	02/09/1996
	32.20	05/15/2011
	32.17	11/30/1995
	31.47	11/25/1990
	31.47	12/10/2015
	31.40	02/04/2020

Future Probability

Yakima County has experienced flood and flash flood events at least 42 times since 1950, including 8 recorded events during the HMP analysis period (2015-2021) and 9 declared disasters. According to the 2018 Washington State HMP, the Yakima River is expected to flood once every 2-5 years, and based on the historical record, the county will experience flooding at least once every other year. Given the consistent history of flooding impacting community members, property, and infrastructure in the county, the future probability of a significant flooding events is **Very Likely** (expected to occur every 1-4 years).

Climate Change Impacts

Climate change will influence seasonal patterns. Cascade drainage systems will soon be rain dominate rather than both snow and rain dominate. This change will result in drainages that carry reduced annual flows of water and distribute them over winter months instead of the usual two-week period. Furthermore, summer storage of water will be reduced greatly as summer flows will be reduced due to rain precipitation becoming the dominate source of water.[50] Changes in precipitation and streamflow may lead to flood of roads and increased erosion, as well as more winter flooding given changes to snowpack accumulation and melt rates. Flooding

[50] Climate Impacts Group. 2009. The Washington Climate Change Impacts Assessment. M. McGuire Elsner, J. Littell, and L. Whitely Binder (eds). Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington, Seattle, Washington. https://doi.org/10.6069/GWSP-MB82

may occur more frequently over the winter and spring, resulting in two distinct peaks that impact already degraded aquatic habitats and destabilize channels.[51]

Yakima County Vulnerabilities

In 2016, the Washington Department of Ecology completed flood risk ranking for every watershed, including the Yakima River Basin. The risk assessment considered population density (weighted 60%), NFIP policies and claims (30%), and the floodplain area (10%). Based on this ranking, the Lower Yakima is the 7th highest risk watershed, mostly driven by floodplain area (4th in the state). The Upper Yakima ranks 19th in the state.[52]

Flooding can threaten life, safety, and health and often results in substantial damage to homes, vehicles, land, crops, or livestock. Annual economic losses from flooding are expected in the thousands of dollars for the region, as well as impacts on vulnerable community members, potential destruction of critical infrastructure and the built environment, disruption of normal operations, and the potential loss of natural and cultural resources.

Loss Estimates

Flooding can lead to devastating property damages to homes in and near the floodplain. Additionally, flooding can lead to other economic losses, such as closures of critical transportation routes due to inundation, damage to agricultural resources due to heavy rainfall, and the potential to cause fatalities and injuries. According to the FEMA National Risk Index, Yakima County is expected to lose $1,598,546 in 2022 from riverine flooding. According to the 2018 Washington State HMP, between 1960 and 2017, flooding in Yakima County has led to $106,597,198 in property damages.

Table 3.27 summarizes the 2022 Expected Annual Loss for riverine flooding in Yakima County, as provided by the FEMA National Risk Index. Expected annual loss is a likelihood and consequence component of risk that measures the expected loss of building value, population, and agricultural value each year.

Table 3.27. 2022 Expected Annual Loss – Flooding[53]

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Riverine Flooding	$1,598,546	$94,977	$1,281,301	0.17	$222,267

Yakima County participates in the National Flood Insurance Program (CID #530217D) and the last FIRM for the area was issued on 10/21/2021. Yakima County also participates in the Community Rating System (CRS) program and is in Class 10.

Only about 25 to 35 percent of homes in floodplains have insurance for flood losses. Uninsured homeowners face greater financial liability than they realize. Yakima County had 235 NFIP claim counts between 1978-2018, amounting to $1,748,992.97.

[51] Yakama Nation. Climate Adaptation Plan for the Territories of the Yakama Nation. Accessed from https://cig.uw.edu/projects/yakama-nation-climate-adaptation-plan/

[52] 2018 Washington State Enhanced Hazard Mitigation Plan, Hazard Inventory and Vulnerability Assessment. Top 20 At-Risk Watershed in Washington State. Accessed from https://mil.wa.gov/enhanced-hazard-mitigation-plan

[53] FEMA. National Risk Index for Natural Hazards. Accessed from https://www.fema.gov/flood-maps/products-tools/national-risk-index

As a part of the NFIP, FEMA identifies Repetitive Loss and Severe Repetitive Loss properties, as classified below.

Repetitive Loss Properties: A repetitive loss property is one for which two or more losses of at least $1,000 each have been paid by the National Flood Insurance Program (NFIP) over a rolling 10-year period.

Severe Repetitive Loss Properties: A Severe Repetitive Loss property is a residential property that is covered under an NFIP flood insurance policy and:

- That has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or,
- For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.
- For both points above, at least two of the referenced claims must have occurred within any 10-year period and must be greater than 10 days apart.

Based on data provided by the Washington State Emergency Management Department as of September 2021, there are 27 Repetitive Loss properties in Yakima County, including four Severe Repetitive Loss Properties (both NFIP and Flood Mitigation Assistance programs). Of those 27, 12 are NFIP insured. These properties are summarized in **Table 3.28**, with ***SRL properties in bold***.

Table 3.28. Repetitive Loss/Severe Repetitive Loss Properties in Yakima County

Community Name	Mitigated	NFIP Insured	Address City	Most Recent Date of Loss	Occupancy
SELAH, CITY OF	***NO***	***NO***	***Selah***	***11/28/1995 2/7/1996***	***Single Family***
YAKIMA COUNTY *	NO	NO	Yakima	1/31/2003	Single Family
YAKIMA COUNTY *	***YES***	***NO***	***Yakima***	***1/8/1983***	***Single Family***
SELAH, CITY OF	NO	NO	Selah	2/7/1996	Other Non-residential
YAKIMA COUNTY *	***NO***	***YES***	***Yakima***	***2/7/1996***	***Single Family***
YAKIMA COUNTY *	NO	YES	Yakima	1/2/1997	Single Family
YAKIMA COUNTY *	NO	NO	Wapato	2/9/1996	Single Family
SELAH, CITY OF	NO	NO	Selah	2/7/1996	Other Non-residential
YAKIMA COUNTY *	NO	NO	Yakima	2/9/1996	Single Family
YAKIMA COUNTY *	NO	YES	Yakima	2/9/1996	Single Family
YAKIMA COUNTY *	NO	NO	Yakima	1/2/1997	Single Family
YAKIMA COUNTY *	NO	NO	Naches	7/1/1999	Single Family
YAKIMA COUNTY *	NO	YES	Yakima	1/31/2003	Single Family
YAKIMA COUNTY *	NO	YES	Selah	1/9/2009	Single Family
SELAH, CITY OF	NO	YES	Selah	5/15/2011	Business
YAKIMA COUNTY *	NO	NO	Tieton	3/31/2011	Single Family

Table 3.28. Repetitive Loss/Severe Repetitive Loss Properties in Yakima County					
Community Name	**Mitigated**	**NFIP Insured**	**Address City**	**Most Recent Date of Loss**	**Occupancy**
YAKIMA COUNTY *	NO	NO	Naches	5/14/2011	Single Family
YAKIMA COUNTY *	NO	NO	Naches	5/22/2011	Single Family
YAKIMA COUNTY *	NO	YES	Naches	5/15/2011	Single Family
YAKIMA COUNTY *	NO	NO	Yakima	3/14/2017	Single Family
YAKIMA COUNTY *	NO	NO	Yakima	3/16/2017	Single Family
YAKIMA, CITY OF	NO	YES	Yakima	3/10/2017	Single Family
YAKIMA COUNTY *	NO	YES	Yakima	3/10/2017	Single Family
YAKIMA COUNTY *	NO	YES	Yakima	4/12/2017	Single Family
YAKIMA COUNTY *	NO	YES	Yakima	1/8/2009	Single Family
YAKIMA COUNTY *	NO	YES	Yakima	3/11/2017	Single Family
YAKIMA COUNTY *	***NO***	***NO***	***Naches***	***5/15/2011***	***Single Family***

Impacts on the Yakima County Population and Vulnerable Populations

Just over 15% of Yakima County's total population is exposed to a 100-year flood event, and approximately 2.7% are exposed to a 500-year flood event. However, more than 5% of the county's most vulnerable population (based on a social vulnerability index) resides in the 100-year floodplain, the highest percentage in the state, according to the 2018 Washington State HMP. Flooding sometimes leads to deaths if floodwaters become deep and swift enough to sweep away people or vehicles. It is possible that the sick, disabled, or elderly may not be mobile enough to escape rising floodwaters and may become trapped in their houses. During flooding events, residents may also be at an increased risk of waterborne diseases. For many, the psychological impact of major floods can be intense. Loss of loved ones, homes, and livelihoods can obviously create intense psychological and social disruption. Flooding in Yakima County has caused two reported injuries since 1960.

Impacts on Built Environment and Critical Infrastructure

According to the 2018 Washington State HMP, roughly 15.5% of Yakima County's total built environment is exposed in areas with 1% annual risk of flooding, expanding to almost 3% exposed to areas with 0.2% annual risk of flooding. Likewise, 6.3% of Yakima County's critical infrastructure is exposed to areas with 1% annual risk of flooding. Flooding poses a risk to the county's transportation infrastructure, as well as health and medical facilities and utility services. Bank erosion and channel migration are also of concern. In 2022, a municipal water line was exposed and required repair due to erosion in the City of Yakima.

The 2022 exposure analysis considered critical facilities in Yakima County located in the 100-year floodplain (Special Flood Hazard Area). The results are summarized in **Table 3.29**. Facilities of note include five fire stations (Toppenish Station 9, Gleed Sheriff's Office/Fire Department, West Valley Station 2, and Nile/Cliffdell Station 11), 11 childcare facilities and school buildings, and 6 mass care sites (American Red Cross shelters and food banks).

Table 3.29. Yakima County Critical Facilities Exposure to Flooding

Facility Type	Number of Exposed Facilities
Communications	0
Education	11
Emergency Services	5
Hospitals	0
Mass Care	6
Transportation	137
Utilities	4
Total Facilities Exposed by Hazard	**163**

Impacts on Government and Emergency Operations

Flooding may lead to a disruption of Yakima County's emergency response services, such as police, fire, and ambulance services, including delayed response due to blocked roads and an increase in calls for assistance. The local government also experiences long-term burdens on operational and emergency funds as resources are directed to response, repair, and mitigation projects. The 1996 flood resulted in an extended impact on Yakima County's general fund as staff worked to document losses and claim reimbursement from FEMA.

Impacts on the Economy and Businesses

Flooding events have significant impact on the economy. Yakima County is one of the many counties ranked as medium on the state flood risk index that is accredited for 83% of the entire state's Gross Domestic Product value. The local agricultural community is reliant on surface water diversions for irrigation, which are typically located in the floodway/floodplain or directly connected to a river or stream. These diversions are highly vulnerable to damage during flood events.

Impacts on Natural and Cultural Resources

There are limited impacts that directly affect the environment due to flooding events. Flooding provides ecological enrichment to floodplains by ensuring continued biological productivity and diversity. However, pollution from flooding may disrupt aquatic habitats. Additionally, improvements and repairs to levees and flood control structures generally require in-water work which stresses fish and other aquatic species. It is essential that mitigation strategies consider levee or flood control structure setbacks where feasible to reduce stress caused by nuisance in-water work and future repairs.

Overall Risk Ranking

Yakima County has a **High Risk** to flooding. FEMA has rated Yakima County **Relatively High Risk** for riverine flooding, with a risk score is 18.69. According to the 2018 Washington State HMP, Yakima County has a **Medium Risk** to flooding. **Table 3.30** below summarizes the risk assessment results for flooding for Yakima County.

Table 3.30. Risk Assessment Results – Flooding

Criteria	Score	Description
Human Health	1	Very Low; 0-1 deaths and few injuries expected
Property Damage	4	High; widespread and substantial
Economic Disruption	3	Medium; widespread and temporary
Environmental Resource Damages/Degradation	3	Medium; widespread and minor
Emergency Services Burden	2	Low; widespread and temporary burden
Critical Facilities Exposure	2	Low; 10-20% of critical facilities exposed
Probability Score	5	Very Likely; expected every 1-4 years
Frequency Score	4	Likely; major events have occurred every 5-10 years
Total Impact Score	**24**	**High Risk**

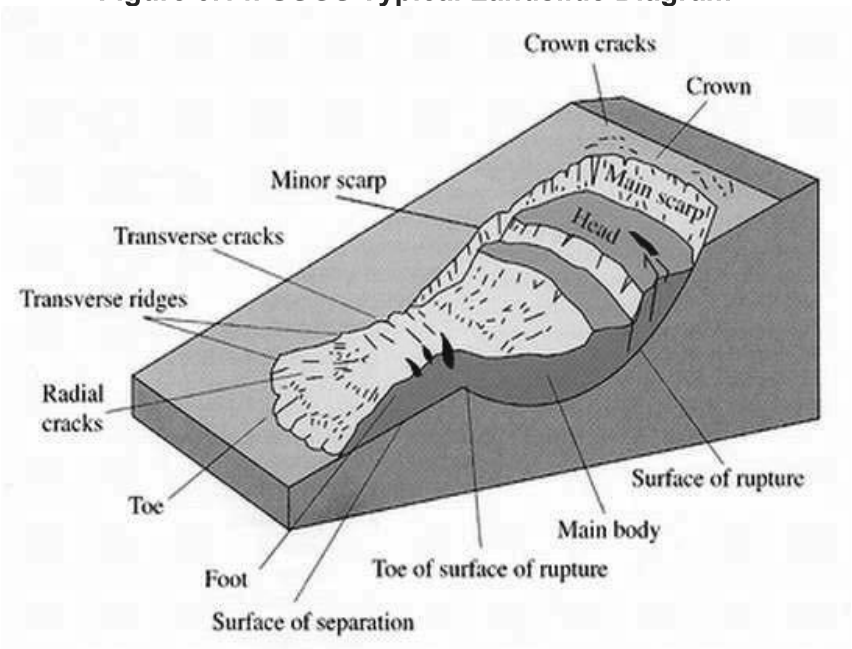
3.11. Landslides and Other Geologic Hazards

Yakima County is vulnerable to several types of geologic hazards, including landslides, mudslides, debris flows, rockfalls, and erosion. This hazard profile includes consideration of all these hazards but recognizes that landslides pose the most significant risk.

Landslides are generally defined as the unprovoked downhill movement of rocks, soil, and anything constructed. Fall, topple, slide, spread, or flow are movements by which landslides could be identified. The cause of the movement is a disturbance in the natural stability of the slope. Earthquakes, heavy rains, volcanic eruptions, and erosion are events that can initiate landslides. Landslides, mudslides, and other debris flows are also a significant secondary hazard in wildfire burn areas.

The characteristics of a landslide are depicted in the following diagram from USGS:

Figure 3.14. USGS Typical Landslide Diagram[54]



Erosion is the process of the earth being worn away by natural elements such as wind and water. Water erosion is the exposure of rock to rain or other movements of water which breaks down the solid structure of rock or loosens the soil making it easier for it to crumble and increasing slippery conditions. Glacial erosion is the friction between the ice and the ground which causes abrasion. Wind erosion the turbulent flow of sand particles that sandblast land forms, this is more common in deserts, but is a documented issue along ridgelines in Yakima County.

Strength/Magnitude

Soil type, steepness, and previous disturbance or movement of the earth in a specific area are factors that influence landslides. Soil type is a key indicator for landslide potential and is used by

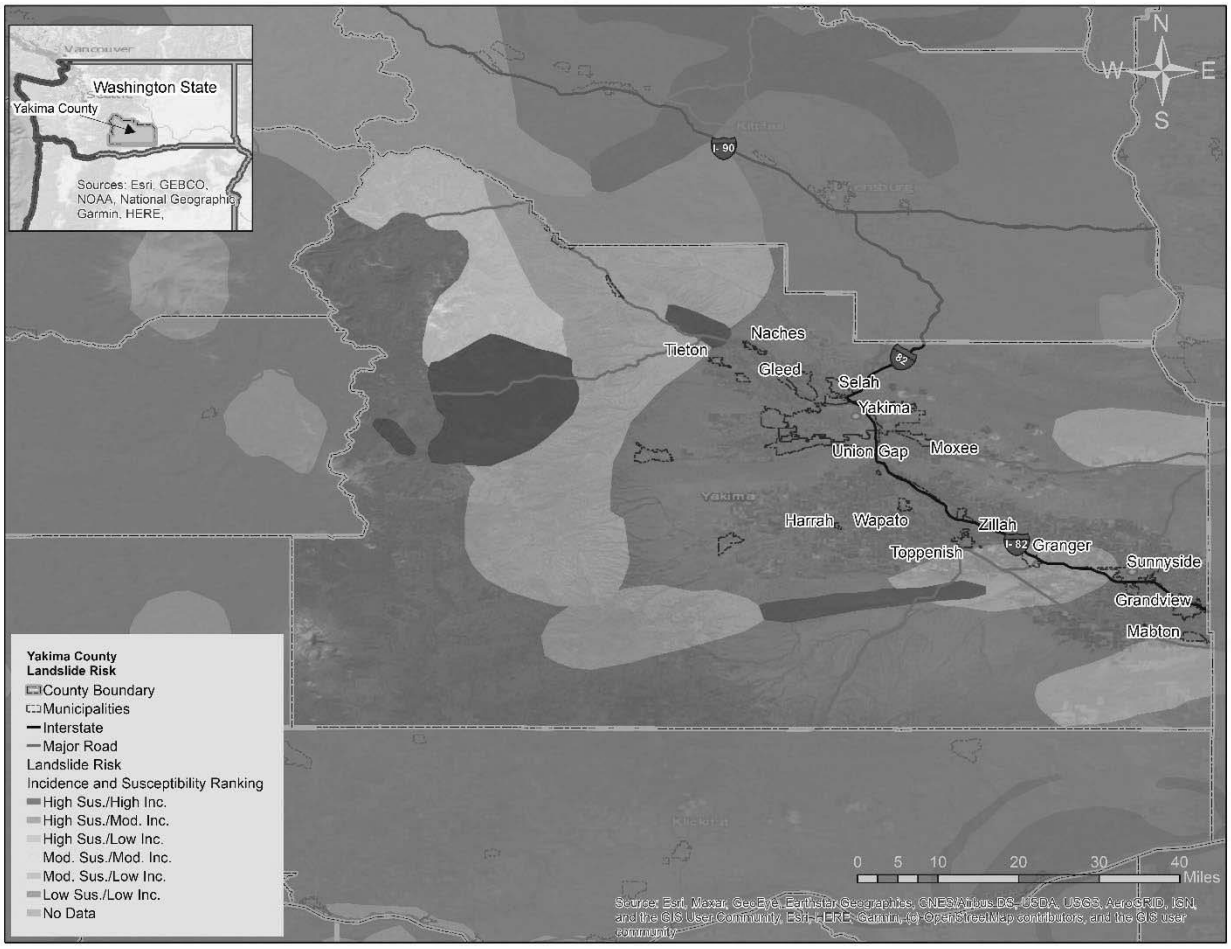
[54] U.S. Dept. of Interior, USGS. Fact Sheet 2004-3072. Accessed from: https://pubs.usgs.gov/fs/2004/3072/

geologists and geotechnical engineers to determine soil stability for construction standards. Landslide susceptibility maps, like the one illustrated in **Figure 3.15,** describe the relative likelihood of future landsliding based on the properties of the site, including prior failure, rock or soil strength, and steepness of slope. The extent of a landslide ultimately depends on the depth of the landslide and how far it might travel downslope over a given distance. Landslides can be shallow and slow-moving or very fast-moving, depending on these many factors.

Location

Landslides are common on steep slopes (20 degrees or greater) and areas where erosion has occurred. Yakima County is located between mountain ranges and has several rivers that flow throughout. As illustrated in **Figure 3.15**, landslide risk is greatest in the western section of the county in the areas surrounding US-12 and SR-410, as well as along the Toppenish Ridge. The communities of Nile, Toppenish, Naches, and Tieton are situated closest to these hazard areas. According to the 2018 Washington State HMP, nearly 50% of the Yakima County land area is exposed to landslide hazards.

Figure 3.15. Landslide Risk by Susceptibility and Incidence, Yakima County



Past Occurrences

Yakima County has experienced seven significant landslide incidents since 1960. These events collectively led to over $14 million in property damages, but no reported injuries or fatalities. No significant events have occurred during the HMP analysis period (2015-2021).

Of note is an ongoing, slow-moving landslide in the Rattlesnake Hills. This landslide is about 20 acres in size, located near Union Gap, WA. Geologists and engineers expect the landslide to slowly move south, running into a nearby quarry. A bypass road to I-82, Thorp Road, has been closed since 2018 as a precautionary measure. There is a low probability scenario where the landslide could accelerate and reach I-82, nearby homes, or the Yakima River, and irrigation conveyance and other utilities are currently at risk. The Washington Department of Natural Resources and other agencies continue to monitor the landslide. Local agencies, including YVEM and Yakama Nation, are working to plan for various scenarios, including evacuations, detour routes, damming of the river, and subsequent flooding.[55]

In 2009, the Nile Valley landslide moved over 40 million cubic yards of earth, rock, and debris across about 110 acres. This incident buried one house and severely damaged four others. In addition to this immediate property damage, the landslide blocked the Naches River and flooded the valley, causing additional flood damage to approximately 20 homes. The landslide destroyed a section of SR-410, illustrated in **Figure 3.16**, and led to about $22 million in direct costs. It also required constructing a detour route, re-channelizing the river, and reconstructing the highway. This cost is not captured in the property damage estimates above. The landslide also led to evacuations for 60 residents and a nearby residential program and resort, as well as precautionary power shutoffs for about 800 customers.[56]

Figure 3.16. Nile Valley Landslide on SR-410
Source: Washington Dept. of Transportation

The incident resulted in a State of Emergency declaration by the Governor and an emergency proclamation by Yakima County, but Yakima County did not qualify for FEMA Individual Assistance. There have been two Presidential Disaster Declarations for Yakima County related to mudslides and landslides resulting from severe storms and flooding, including in 1997 (DR-1159) and 2009 (DR-1817).

Future Probability

Yakima County has experienced a significant landslide event approximately once every 9 years since 1960. Damaging landslides are expected to increase in the future, given the intensity of rain events and rapid snowmelt, an increase in wildfires and forest vulnerability, and increasing development in landslide and wildfire prone areas. It is **Likely** (expected to occur every 5-10 years) that a significant landslide will occur in Yakima County.

[55] Washington State Department of Natural Resources. Rattlesnake hills landslide. Accessed from: https://www.dnr.wa.gov/rattlesnake-hills-landslide#:~:text

[56] History Link. Massive landslide in the Nile Valley (Yakima County) blocks State Route 410 and redirects the flow of the Naches River on October 11, 2009. Accessed from: https://www.historylink.org/File/9224

Climate Change Impacts

Landslide events can be expected to increase in frequency in the future as a result of warmer, wetter winters and hotter, dryer summers. These conditions stress forested areas throughout the Cascades, increasing wildland fire risk and associated soil mobilization and landslides. Additionally, heavy rain events are the primary cause of landslides and are expected to happen with more frequency and intensity due to human-caused climate change.

Yakima County Vulnerabilities

The most vulnerable areas are those downhill of a steep slope where there is high susceptibility to landslides, including recent occurrences. Landslides can damage property and critical facilities, as well as blocking and damaging critical transportation infrastructure. Large slides can also block or divert waterways, leading to necessary improvements to maintain irrigation and flood control infrastructure.

Loss Estimates

Table 3.31 summarizes the 2022 Expected Annual Loss for landslides in Yakima County, as provided by the FEMA National Risk Index. Expected annual loss is a likelihood and consequence component of risk that measures the expected loss of building value, population, and agricultural value each year.

Table 3.31. 2022 Expected Annual Loss – Landslide and Erosion[57]

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Landslide	$148,780	$85,237	$63,543	0.01	n/a

Impacts on the Yakima County Population and Vulnerable Populations

According to the 2018 Washington State HMP, 5% of the Yakima County population is directly exposed to landslides. Very few homes are in areas that may experience landslides, rockslides, or mudflows. That said, many community members may experience the indirect impacts of landslides, including damage to agricultural lands, contaminated water sources, disrupted transportation routes, or subsequent flooding from dammed rivers.

Built Environment and Critical Infrastructure

In Yakima County, most of the built environment is not located in higher risk landslide areas. Roadways are most likely to be impacted by landslides, requiring alternate transportation routes. According to the 2018 Washington State HMP, about 5% of the general building stock in Yakima County is exposed to landslides. Conversely, a significant portion of Yakima County's critical facilities are exposed to landslide hazards – up to 40% as estimated by the 2018 Washington State HMP. This is similar to the statewide average exposure.

[57] FEMA. National Risk Index for Natural Hazards. Accessed from https://www.fema.gov/flood-maps/products-tools/national-risk-index

The 2022 exposure analysis considered critical facilities in Yakima County with a medium or higher landslide risk. The results are summarized in **Table 3.32**. Facilities of note include four fire stations in the Nile-Cliffdell Fire District, the Tieton Dam Hydro Electric Project, two small airports, and Naches Valley High School and Hope Academy, both in Naches.

Table 3.32. Yakima County Critical Facilities Exposure to Landslide

Facility Type	Number of Exposed Facilities
Communications	3
Education	2
Emergency Services	4
Hospitals	0
Mass Care	0
Transportation	32
Utilities	3
Total Facilities Exposed by Hazard	**44**

Impacts on Government and Emergency Operations
A landslide could damage communications and power lines that are in its track and block roads once it has reached flat land. As in the 2009 Nile Valley landslide, a significant incident could disrupt power and communications, as well as limit access to certain areas. A landslide blocking any critical transportation corridor could slow or limit emergency response until a detour is established.

Impacts on the Economy and Businesses
Impacts to the economy and businesses are minimal from a landslide, as most businesses are located outside of landslide risk areas. Businesses could be impacted indirectly if a landslide were to disrupt communications or power or block critical transportation routes.

Impacts on Natural and Cultural Resources
Landslides can impact agricultural lands by damaging crops and livestock. In addition, landslides can impact irrigation systems, requiring expensive improvements or replacements. Landslides and erosion are also likely to impact river basins and drainage areas, potentially impacting water quality and fisheries, or causing changes to channels and river flow. Landslides in forested areas could also damage timber stands.

Overall Risk Ranking

Yakima County has a **Medium Risk** to landslides and other geologic events. FEMA has rated Yakima County **Relatively High Risk** for landslides, with a risk score is 25.67. According to the 2018 Washington State HMP, Yakima County has a **Medium-Low Risk** to landslides. **Table 3.33** below summarizes the risk assessment results for the landslide hazard for Yakima County.

Table 3.33. Risk Assessment Results – Landslide

Criteria	Score	Description
Human Health	1	Very Low; 0-1 deaths and few injuries expected
Property Damage	3	Medium; localized, substantial
Economic Disruption	2	Low; localized, temporary
Environmental Resource Damages/Degradation	2	Low; localized, minor
Emergency Services Burden	3	Medium; localized, temporary
Critical Facilities Exposure	1	Very Low; less than 10% exposed
Probability Score	4	Likely; expected to occur every 5-10 years
Frequency Score	4	Likely; has occurred every 5-10 years
Total Impact Score	**20**	**Medium Risk**

3.12. Public Health Emergency

This hazard profile primarily considers outbreaks of a communicable disease as a potential public health emergency facing Yakima County. Additional consideration is given to public health emergencies related to environmental health.

Communicable Disease

A large outbreak within a population may constitute a public health emergency. A communicable disease spreads between people and animals through contact with bodily fluids, direct skin contact, airborne droplets, aerosolized particles, or insect/animal bites. A widespread communicable disease can cause a public health emergency as either a more localized epidemic or as a larger global pandemic. An epidemic is essentially the spread of a specified disease within a community over a period of time. A pandemic is the spread of a communicable disease that spreads throughout other parts of the country or world. Epidemics and pandemics result in short term and long term economic, social, and health impacts on the community.

Depending on the cause and virulent strength, outbreaks can occur frequently. The spread of a communicable disease may occur as a result of a natural disaster, the release of a chemical agent, interactions with an infected animal or insect, unsafe food handling practices, or improper hygiene practices.

New and emerging diseases can cause an outbreak amongst individuals who are immunocompromised. Historically, the United States has been introduced to many new diseases such as new strains of influenza (flu), HIV/AIDS, Tuberculosis, H1N1 (variant influenza), Ebola, MERS, and SARS. New diseases may cause fear amongst residents as little is known and they may result in an epidemic or a pandemic. The United States has recently experienced the following diseases:

Pandemic Influenza

Pandemic influenza is a new and widely spread influenza virus that is different from a seasonal influenza.[58] A pandemic influenza may mirror typical symptoms of seasonal influenza such as fever, cough, sore throat, chills, and muscle and joint soreness; however, the infection and mortality rate is higher and can result in hospitalization and death. Vaccinations may not be readily available for a new strain of influenza.

COVID-19

Corona Virus 2019 or COVID-19 is an infectious disease caused by severe acute respiratory syndrome (SARS-CoV-2 virus).[59] In 2019, COVID-19 was traced to an open animal market in Wuhan, Hubei, China. Globally as of 2022, the World Health Organization (WHO) has confirmed approximately 588 million cases of COVID-19 and 6 million deaths.[60] In the United States alone, there has been nearly 91 million cases reported and one million deaths as of 2022.[61]

[58] Centers for Disease Control and Prevention. Pandemic Basics. Accessed from: https://www.cdc.gov/flu/pandemic-resources/basics/index.html

[59] World Health Organization. Coronavirus disease (COVID-19). Accessed from: https://www.who.int/health-topics/coronavirus#tab=tab_1

[60] World Health Organization. WHO Coronavirus (COVID-19) Dashboard. Accessed https://covid19.who.int/

[61] World Health Organization. United States of America: WHO Coronavirus disease (COVID-19) dashboard. Accessed from: https://covid19.who.int/region/amro/country/us

COVID-19 spreads during close contact between individuals through respiratory droplets from sneezing, talking, coughing, or breathing. Public health professionals recommend that individuals take proper precautions such as wearing a mask in public, social distancing, and isolating when infected.

Additional outbreaks include:

- **Severe Acute Respiratory Syndrome (SARS)** is a respiratory illness caused by coronavirus, called SARS-associated Coronavirus (SARS-CoV). This illness was first documented in Asia and quickly spread causing a global outbreak in 2003. During the outbreak a total of 8,098 cases were documented and 774 died. Only eight individuals tested positive for SARS in the United States.[62]
- **Middle East Respiratory Syndrome (MERS)** is also a respiratory illness caused by coronavirus (MERS-CoV) and is essentially new to humans. MERS was first recorded in Saudi Arabia in 2012 and quickly spread to other countries. According to the CDC MERS presents a low risk to the public in the United States.[63]
- **Human Immunodeficiency Virus (HIV)** is a virus that attacks the body immune system and if not treated can lead to AIDS, Acquired Immunodeficiency Syndrome. HIV was first seen in Central Africa and has jumped to other countries globally. The virus has existed in the United States since the mid to late 1970s.[64] In the 1980s the United States experienced a rapid increase in the 1980s, labeling it the AIDS epidemic.
- **Tuberculosis (TB)** presents itself as a respiratory illness caused primarily by bacteria called Mycobacterium tuberculosis. The bacteria can affect any part of the body including the kidney, spine, and brain. The bacteria that cause TB can be spread through air from one person to another.[65]

Environmental Health

Community members may also be at risk of health hazards related to their environment, typically a substance that can cause an adverse health event, including animal and insect diseases, drinking water quality, food safety, septic systems, solid waste disposal, and more. Environmental health hazards can be the result of a natural disaster, such as a wildfire, human error, or development/land use decisions that locate industrial, agricultural, or other contaminating activities near residential areas or sensitive resource areas. Common examples of environmental hazards include air contaminants, toxic waste, radiation, disease-causing microorganisms and plants, pesticides, heavy metals, and chemicals in consumer products.[66]

Environmental health hazards of concern in Yakima County include:

- **Water Quality:** Both groundwater and surface water are subject to contamination from runoff, agricultural uses, industrial uses, and other sources in Yakima County. Lower

[62] Centers for Disease Control and Prevention. SARS Basic Fact Sheet. Accessed from: https://www.cdc.gov/sars/about/fs-sars.html
[63] Centers for Disease Control and Prevention. Middle East Respiratory Syndrome (MERS). Accessed from: https://www.cdc.gov/coronavirus/mers/index.html
[64] Centers for Disease Control and Prevention. HIV Basics: About HIV. Accessed from: https://www.cdc.gov/hiv/basics/whatishiv.html
[65] Centers for Disease Control and Prevention. Basic TB Facts. Accessed from: https://www.cdc.gov/tb/topic/basics/default.htm
[66] Centers for Disease Control and Prevention. Introduction to Environmental Public Health Tracking. Accessed from: https://www.cdc.gov/nceh/tracking/tracking-intro.html

valley communities in Yakima County are working to reduce nitrate contamination concentrations in groundwater below state drinking water standards. The affected water quality is primarily the result of human activities at the surface that degrade groundwater quality in private domestic wells. According to the CDC, about 1 in 8 Americans get their drinking water from a private well, and 1 in 5 sampled private wells were found to be contaminated at levels that could affect health.[67] Disease outbreaks connected to private well sources continue to increase. Contaminants with links to possible health effects include radiological, chemical, and microbiological sources.

- **Vector-borne Diseases:** According to the WHO, vector-borne diseases are human illnesses caused by parasites, viruses, and bacteria that are transmitted by vectors.[68] Vectors are organisms that can transmit infectious pathogens between humans and animals. Common vectors include mosquitoes, fleas, ticks, blackflies, lice, etc. These vectors such as mosquitoes transmit can transmit Dengue, Yellow Fever, Rift Valley Fever, Zika, Lyme. Ticks can transmit Lyme disease, tick-borne encephalitis, Tularemia, etc. Lice may cause Typhus and Louse-borne relapsing fever and fleas may cause Plague and Tungiasis.[69] West Nile Virus, Western equine encephalitis, and St. Louis Encephalitis are present in Washington. Washington does not have mosquitos that carry dengue, Zika, or yellow fever. Around 25-50 travel-related malaria cases are diagnosed in Washington each year.

Safeguarding environmental health is also of primary concern during disaster response and recovery. Communities must safeguard drinking water, control disease-carrying vectors, ensure proper food safety, and maintain healthy environments that may be impacted by various sources of contamination during the disaster or as a consequence of response activities.

Strength/Magnitude

A pandemic occurs in waves and has the potential to last weeks to months and in some circumstances years. Once a communicable disease reaches the point of human-to-human transmission, the strength of the disease is likely to increase and easily cross geographical boundaries. A strong strain of a disease has the potential to reach even remote and isolated locations. When examining COVID-19, research has shown an overall pattern as a series of waves with surges and declines. The large spikes of COVID-19 cases occurred over the winter months.[70] The winter months have greater occurrences of travel and social gatherings.

Environmental health concerns range widely in severity and magnitude. A small source of contamination that is not mitigated may create more severe consequences over a long period of time. A short-term but severe source of contamination could leave water sources or other environmental resources degraded and dangerous for years after initial response.

[67] Centers for Disease Control. Environmental Health Services: Private Wells. Accessed from: https://www.cdc.gov/nceh/ehs/water/private-wells/index.html

[68] World Health Organization. Vector-borne diseases. Accessed from: https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases

[69] Ibid.

[70] Johns Hopkins Medicine. Coronavirus second wave, third wave and beyond: What causes a COVID surge. Accessed from: https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/first-and-second-waves-of-coronavirus

Location

Cities with the largest populations in Yakima County are more susceptible to a communicable disease outbreak due to the number of residents living near each other. The county seat, the City of Yakima, has the largest population in the area with 96,000 residents. That said, additional factors influence the spread of disease. During COVID-19 in Yakima County, the lower valley saw higher rates of transmission based on social factors, including multigenerational housing, limited personal transportation access, limited access to healthcare, and more. Other factors influencing disease spread include areas with high contact with animals, high international travel and trade, and access to healthcare. That said, communicable diseases can affect all Yakima County residents, and their spread does not respect city or county boundaries.

Environmental health hazards can impact residents across Yakima County. People living in close proximity to contaminant sources, including industrial areas, high-density urban areas, and transportation corridors (major highways and railroads) are likely to experience higher exposure to hazards.

Past Occurrences

During the 20th and 21st centuries, the globe has seen multiple pandemics. Pandemics have been seen during 1918, 1957, 1968, 2009, and 2020 – almost every 30 years. These pandemics include:

- **1918 (Spanish Flu):** The pandemic that occurred during the 1918-1919 was seen as the most severe in history. Approximately 500 million people, about one-third of the world's population, became infected. In the United States alone, the number of deaths reached at least 50 million with about 675,000 occurred in the United States.[71] Mortality ranged between age, however children younger than 5 years of age, 20-40 years old, and 65 years and older had a high rate.[72]
- **1957 (Asian Pandemic Flu-H2N2):** During 1957 a new virus emerged in East Asia with the first case reported in Singapore and followed to Hong Kong, and the United States in Summer of 1957. There were approximately 1.1 million deaths worldwide with 116,000 in the United States.[73]
- **1968 (Hong Kong Flu-H3N2):** In the 1968 a new pandemic emerged worldwide. The pandemic was first documented in the United States. Deaths rose to 1 million worldwide and approximately 100,000 in the United Stated. The virus continues to circulate worldwide as a seasonal influenza.[74]
- **2009 (Swine Flu-H1N1):** During the spring of 2009, a novel virus emerged globally. The first case of the H1N1 virus was detected in the United States and spread quickly around

[71] Centers for Disease Control and Prevention. 1918 Pandemic (H1N1 virus). Accessed from: https://www.cdc.gov/flu/pandemic-resources/1918-pandemic-h1n1.html
[72] Ibid.
[73] Centers for Disease Control and Prevention. 1957-1958 pandemic (H2N2 virus). Accessed from: https://www.cdc.gov/flu/pandemic-resources/1957-1958-pandemic.html
[74] Centers for Disease Control and Prevention. 1963 pandemic (H3N2 virus). Accessed from: https://www.cdc.gov/flu/pandemic-resources/1968-pandemic.html

the world. An estimated 60.8 million cases were reported, 274,304 hospitalizations, and 12,469 deaths in the United States.[75]

During the HMP analysis period (2015-2021), Yakima County experienced multiple outbreaks of communicable diseases and viruses. According to the 2018 Washington State HMP, the state experienced outbreaks of influenza, pertussis, mumps, and foodborne illnesses, all of which impacted Yakima County. In 2017, Yakima County experienced an outbreak of mumps affecting five people and potentially exposing many others.[76] In 2018, the county experienced an outbreak of Norovirus, a gastrointestinal virus, with 17 total cases.[77]

More recently, in 2020 Yakima County declared COVID-19 a public health emergency. Globally, the pandemic resulted in millions of deaths. In Yakima County, there have been 78,884 confirmed cases and 818 deaths as of July 2022.[78] COVID-19 is an ongoing pandemic at the time of this plan update. In 2022, the emerging global threat is Monkeypox. On July 28, 2022, Yakima Health District identified the first case of Monkeypox in Yakima County.[79]

Related to environmental health, Yakima County has experienced several incidents during the HMP analysis period, including:

- **PFAS Groundwater Contamination:** Some wells on or near the Yakima Training Center have been identified as contaminated with Per- and Polyfluoroalkyl Substances (PFAS). The U.S. Army, as the owner of the Yakima Training Center, coordinated with Yakima County on testing, monitoring, mapping, and restoration of clean drinking water for those affected. This is an ongoing concern at the time of HMP development.
- **Lower Yakima Valley Groundwater Management Area:** As a response to high levels of nitrate in groundwater, an advisory group formed in 2012 to implement alternative management strategies to reduce nitrate concentrations. Work is ongoing to improve water quality and continue monitoring and testing in the region.
- **Lower Yakima Watershed Pesticide Reduction:** As an intensive agricultural area, the Lower Yakima River Basin is found to have a high concentration of legacy pesticides that contaminate the water, erode soils, and affect fish and aquatic habitats. The region is working with the Washington State Department of Ecology to improve water quality and reduce pesticides in the watershed.[80]
- **Middle Yakima River Basin Bacteria:** Wide Hollow Creek, Cowiche Creek, and Moxee Drain are included on the Washington State list of impaired water bodies due to excessive fecal bacteria. Sources of contamination include wildlife feeding areas, livestock, rural and urban stormwater runoff, and on-site septic systems. The region is

[75] Centers for Disease Control and Prevention. 2009 H1N1 pandemic (H1N1pdm 09 virus). Accessed from: https://www.cdc.gov/flu/pandemic-resources/2009-h1n1-pandemic.html
[76] Washington State Department of Health. Mumps outbreak 2017. Accessed from: https://doh.wa.gov/you-and-your-family/illness-and-disease-z/mumps/mumps-outbreak-2017
[77] Washington State Department of Health. Annual Communicable Disease Report. Accessed from: https://doh.wa.gov/sites/default/files/legacy/Documents/5100/420-004-CDAnnualReportIncidenceRates.pdf
[78] Washington State Department of Health. COVID-19 data dashboard. Accessed from: https://doh.wa.gov/emergencies/covid-19/data-dashboard#dashboard
[79] Yakima Health District. Monkeypox. Accessed from: https://www.yakimacounty.us/2727/Monkeypox
[80] Washington State Department of Ecology. Water and Shorelines: Director of improvement projects. Accessed from https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Total-Maximum-Daily-Load-process/Directory-of-improvement-projects/Yakima-watershed-toxics-reduction-project

working with the Washington State Department of Ecology and the EPA to improve water quality and reduce bacteria levels.[81]

- **Septic Systems:** Malfunctioning septic systems can contaminate groundwater and surface water, potentially affecting individuals as well as the environment. Rural areas of Yakima County have a high number of septic systems, which may be vulnerable to natural disasters or other disruptions that lead to malfunctions.

Future Probability

A public health emergency in Yakima County is **Somewhat Likely** (expected to occur every 11-50 years). The county may experience small outbreaks more regularly, but an epidemic/pandemic is now expected approximately every 30 years, given the hazard history. Public health emergencies stemming from communicable diseases may become more frequent in the future, given the risk of vector-borne illnesses linked to the changing climate and a declining acceptance of vaccinations as an effective preventative tool.

Climate Change Impacts

Research on climate change and public health indicates a connection between the change in climate and the frequency of infectious diseases. Mild and warmer temperatures allow for population increases in vectors that infect animals. According to the CDC, mild winters, early springs, and warmer temperatures are giving mosquitoes and ticks more time to reproduce, spread diseases, and expand their habitats throughout the United States.[82]

Yakima County Vulnerabilities

A public health emergency resulting from a disease can have significant impacts to Yakima County, resulting in loss in every facet of Yakima County, including human health and safety, critical infrastructure, government and emergency operations, economy, and cultural resources.

Loss Estimates

Losses for an epidemic or pandemic are difficult to predict, however, data is available on the initial impacts of COVID-19. According to recent research, COVID-19 could result in net losses starting at $3.2 trillion and reaching approximately $4.8 trillion in U.S. GDP.[83] The World Bank Organization, students risk losing $17 trillion in lifetime earnings in present value, or about 14% of today's global GDP due to COVID-19 pandemic related school closures.[84]

Impacts on the Yakima County Population and Vulnerable Populations

An outbreak of a disease or virus can have severe negative impacts on residents in Yakima County. According to the CDC, Yakima County has a very high vulnerability based on the Social Vulnerability Index (SVI).[85] Social vulnerability is driven by social and demographic factors

[81] Washington State Department of Ecology. Water and Shorelines: Directory of improvement projects. Accessed from: https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Total-Maximum-Daily-Load-process/Directory-of-improvement-projects/Mid-Yakima-Basin-Bacteria-TMDL

[82] Centers for Disease Control and Prevention. Climate change and infectious diseases. Accessed from: https://www.cdc.gov/ncezid/what-we-do/climate-change-and-infectious-diseases/index.html

[83] USC News. Business closures and partial reopenings due to COVID-19 could cost the U.S. trillions. Accessed from: https://news.usc.edu/178979/business-closures-covid-19-pandemic-united-states-gdp-losses/

[84] The World Bank. Learning losses from COVID-19 could cost this generation of students close to $17 trillion in lifetime earnings. Accessed from: https://www.worldbank.org/en/news/press-release/2021/12/06/learning-losses-from-covid-19-could-cost-this-generation-of-students-close-to-17-trillion-in-lifetime-earnings

[85] Centers for Disease Control and Prevention. Social vulnerability index. Accessed from: https://data.cdc.gov/Vaccinations/Social-Vulnerability-Index/ypqf-r5qs

within the community, including high poverty rates, limited access to healthcare, technology, and transportation, and other factors. Individuals who are socially vulnerable are at greater risk to contract and experience severe symptoms from a disease or virus.

Furthermore, public health emergencies tend to have widespread impact on a population, but some residents are at more risk than others. At risk populations include:

- Children aged 5 and younger
- Adults older than 65 years and older
- Pregnant women
- Individuals with chronic medical conditions (i.e., asthma, heart failure, obesity, etc.)
- People with compromised immune systems (i.e., diabetes, HIV, cancer, etc.)

When specifically examining COVID-19, the attributes listed above can put residents at a higher risk of COVID-19.[86] A large portion of Yakima County's residents additionally suffer from chronic diseases weakening individuals' defenses and making them vulnerable to disease.

It is important to note that there are significant racial and ethnic disparities in the potential impact of a public health emergency. Inequities in the social determinants of health put some groups at increased risk of getting sick or dying, as was the case during the global COVID-19 pandemic. Some factors influencing this risk include:

- **Healthcare access and utilization:** those without access to adequate insurance, or those with limited access due to a lack of transportation, childcare, the ability to take time off work, or language and cultural barriers.
- **Occupation:** people in "essential work settings" such as healthcare facilities, emergency operations, farms, factories, grocery stores, and public transportation will be in close contact with the public during a public health emergency. Additionally, individuals with limited paid sick days may feel pressured to come to work even if they are symptomatic or live with some showing symptoms.
- **Education, income, and wealth gaps:** people with limited job options, due to lower school completion rates or barriers to college, have less flexibility to leave jobs that put them at greater risk of exposure. Individuals with lower incomes cannot afford to miss work and/or do not have adequate savings.
- **Housing:** people living in more crowded housing may find it more difficult to avoid close contact or exposure. Additionally, people with lower incomes are at risk of eviction, shared housing, or homelessness.

Impacts on Built Environment and Critical Infrastructure

The greatest risk to critical infrastructure is the availability of personnel. The staff themselves may become ill or need to attend to family members or others who are ill. Additionally, jurisdictions and companies responsible for managing critical infrastructure will need to have

[86] Centers for Disease Control and Prevention. Factors that affect your risk of getting very sick from COVID-19. Accessed from: https://www.cdc.gov/coronavirus/2019-ncov/your-health/risks-getting-very-sick.html

[87] Centers for Disease Control and Prevention. Risk for COVID-19 Infection, Hospitalization, and Death By Race/Ethnicity. Accessed from https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html

adequate protocols in place to protect workers from exposure while at work. Additionally, the healthcare system across the country suffered during COVID-19, and a lack of local healthcare workers in Yakima County is more severe post-pandemic, leaving a fragile healthcare system. Additionally, one hospital in Yakima County closed in 2020, leaving residents with fewer options for emergency and public health services.

Impacts on Government and Emergency Operations

As with COVID-19, a public emergency may result in large number of hospitalizations overwhelming emergency responders, operations, and facilities. An outbreak can halt government operations by delaying project timelines and closure of government buildings. Yakima County experienced closure and limited government services from COVID-19.

Impacts on the Economy and Businesses

The impact of a large disease outbreak can result in significant losses to the local economy and businesses. An outbreak of disease can result in a shortage of employees and the disruption of the supply chain.[88]

Impacts on Natural and Cultural Resources

While a communicable disease does not have immediate effects on the environment, a prolonged event like that of COVID-19 can lead to more limited resources and staffing for important environmental management activities. Public agencies responsible for water quality testing, parks and open space management, and other essential services may face resource limitations or budget cuts that restrict these activities.

Overall Risk Ranking

Yakima County has a **High Risk** to a public health emergency. **Table 3.34** below summarizes the risk assessment results for the hazard for Yakima County.

Table 3.34. Risk Assessment Results – Public Health Emergency

Criteria	Score	Description
Human Health	5	Very High; 10+ deaths and 20+ injuries
Property Damage	1	Minimal
Economic Disruption	5	Very High; long-term disruption
Environmental Resource Damages/Degradation	1	Minimal
Emergency Services Burden	5	Very High; wide-spread and long-term burden
Critical Facilities Exposure	1	Minimal
Probability Score	3	Somewhat Likely; expected every 11-50 years
Frequency Score	3	Somewhat Likely; has occurred every 11-50 years
Total Impact Score	**24**	**High Risk**

[88] Market Business News. The effects of coronavirus on business. Accessed from: https://marketbusinessnews.com/the-effects-of-coronavirus-on-businesses/262030/

3.13. Severe Weather

Spring and summer storms are relatively common events in eastern Washington. These storms normally occur between April and September and may include thunder and lightning, hail, wind, intense rainfall and more infrequently, tornadoes. Severe wind events can occur throughout the year. Severe weather may also include dust storms resulting from high wind events.

- **Hail** is defined as precipitation in the shape of balls of ice that are more than five millimeters wide.
- **Lightning** is an electrical charge created by thunderstorms.
- **Wind** events, the most common severe weather event, include winds up to 40 mph or greater sustained for an hour or more but are not the result of thunderstorms.
- **Tornadoes** are a destructive circling column of air that reaches the ground from a cumulonimbus cloud.
- **Thunderstorms** are any storm that produces one or more of the following phenomena: 1) a tornado, 2) damaging winds of 58 mph or more, or 3) hail with a diameter of 1 inch or larger.
- **Dust Storms** are defined as weather events that poor visibility that is reduced to 1 km or less as a result of blowing dust in the area.

Note that severe weather profile does not include winter weather hazards (heavy snow, rain, sleet, and ice storms). This is a distinction from the 2018 Washington State HMP.

Strength/Magnitude

Given severe weather includes multiple types of hazards, there are different scales and measurements to define each.

The Enhanced Fujita (EF) Scale is used to measure tornado severity and ranges from EF0 to EF5 tornadoes. **Table 3.35** describes EF Scale and associated damage potential.

Table 3.35. Enhanced Fujita Scale for Tornadoes[89]

EF Number	Wind Speed (mph)	Description of Damages
0	40-72	Light Damage: Leaves blowing, broken branches, etc.
1	73-112	Moderate Damage: Vehicles moved; roof surfaces damaged
2	113-157	Considerable Damage: Large tree snapped, roofs torn, mobile homes destroyed
3	158-207	Severe Damage: Trains overturned, cars lifted, trees uprooted.
4	208-260	Devastating Damage: Houses leveled, cars overthrown, weak structures blown away
5	261-318	Incredible Damage: Strong structure foundations lifted and carried away, vehicles airborne, trees debarked.

[89] National Weather Service. The Enhance Fujita Scale (EF Scale). Accessed from: https://www.weather.gov/oun/efscale

The Beaufort Wind Scale, detailed in **Table 3.36**, is used to measure wind speeds and describe potential impacts from wind storms.

Table 3.36. Beaufort Wind Scale[90]

Wind Force Level	Description	Wind Speed (mph)	Impact Descriptions
0	Calm	<1	Vertical smoke rise
1	Light Air	1-3	Wind direction shown by smoke drift
2	Light Breeze	4-7	Winds felt on face
3	Gentle Breeze	8-12	Leaves in constant motions
4	Moderate Breeze	13-18	Dust is raised
5	Fresh Breeze	19-24	Small trees sway
6	Strong Breeze	25-31	Large ranches in motion
7	Near Gale	32-38	Whole trees in motion
8	Gale	39-46	Twigs break off trees
9	Strong Gale	47-54	Slight structural damage
10	Storm	55-63	Trees uprooted. Considerable structural damage.
11	Violent Storm	64-72	Widespread damage
12	Hurricane	73+	Devastation level damage

[90] National Weather Service. Beaufort wind scale. Accessed from: https://www.weather.gov/mfl/beaufort

The TORRO Hailstorm Intensity Scale (H0 to H10), detailed in **Table 3.37**, is used to measure intensity and describe potential damage related to hail size, energy, and fall speed.

Table 3.37. TORRO Intensity Scale for Hailstorms[91]

Scale	Intensity Category	Hail Size: Diameter (mm)	Kinetic Energy J m^{-2}	Potential Damage Impacts
H0	Hard Hail	5	0-20	No damage
H1	Potentially Damaging	5-15	>20	Slight damage to crops and plants
H2	Significant	10-20	>100	Significant damage to crops and vegetation
H3	Severe	20-30	>300	Severe damage to crops, glass structures, wood and paint damage
H4	Severe	25-40	>500	Widespread damage on glass structures, vehicle damage
H5	Destructive	30-50	>800	Wholesale glass destruction, roof damage, significant injuries reported
H6	Destructive	40-60		Aircraft damage, brick walls pitted
H7	Destructive	50-75		Severe roof damage. Serious injuries reported.
H8	Destructive	60-90		Severe aircraft damage
H9	Super Hailstorms	75-100		Extensive structural damage. Severe or fatal injuries.
H10	Super Hailstorms	>100		Extensive structural damage. Severe or fatal injuries.

Thunderstorms are categorized using a 5-point scale called the Storm Prediction Center (SPC) from the National Weather Service, detailed in **Table 3.38**.

Table 3.38. Storm Prediction Center (SPC) for Thunderstorms[92]

Category	Description
1 – Marginal	Isolated severe thunderstorms possible. Low severe intensity.
2 – Slight	Scattered severe storms possible
3 – Enhanced	Numerous and persistent storms possible
4 – Moderate	Widespread long-lived intense severe storms likely
5 – High	Widespread severe long-lived and extremely intense storms expected

[91] The Tornado and Storm Research Organization. The TORRO hailstorm intensity scale. Accessed from: https://www.torro.org.uk/research/hail/hscale

[92] NOAA, National Weather Service. Storm Prediction Center. Accessed from: https://www.spc.noaa.gov/misc/about.html

Location

The entire state of Washington is susceptible to severe weather due to heavy precipitation coming from the Pacific Ocean. All areas within Yakima County have identified severe weather as a potential hazard.

Past Occurrences

In September 2020, much of eastern Washington experienced wildfires and straight-line winds, qualifying for a Presidential Disaster Declaration (DR-4584) in February 2021. While straight-line winds were an important factor in this disaster, most qualifying damages resulted from subsequent wildfire impacts, as described in the Wildland-Urban Interface (WUI) Fire hazard profile.

Table 3.39 details severe weather occurrences reported on the NOAA Storm Events Database for Yakima County within the HMP analysis period (2015-2021). **Appendix D** contains a list of all severe weather events prior to 2015, as well as a more detailed description of each occurrence. According to the 2018 Washington State HMP, Yakima County experienced five significant hail events, 6 lightning events, 123 wind events, and one tornado between 1960 and 2017.

Table 3.39. Past Severe Weather Occurrences, Yakima County (2015-2021)

Location	Date	Type	Property Damages	Narrative
South Broadway	5/21/2015	Thunderstorm Wind	None reported	About an inch of rain in 30-60 minutes was recorded and a thunderstorm with strong outflow boundary produced winds up to 70 MPH.
South Broadway	5/23/2015	Hail	None reported	Most storms produced moderate rain and small hail; one storm did produce 0.88inch hail.
Yakima Valley	11/17/2015	High Wind	None reported	Gusts were widespread and ranged from 58 MPH to a gust of 72 MPH. Some areas reported winds over several hours ranging from 40-50 MPH.
Zillah	5/1/2019	Dust Devil	None reported	A dust devil that formed that resulted in five injuries reported.
Yakima Valley	10/25/2019	High Wind	$8,000	A powerful shortwave trough and associated cold front swept over the Cascades.
Yakima Valley	11/27/2019	High Wind	None reported	Strong winds downed trees in Selah.
Union Gap	5/30/2020	Thunderstorm Wind	None reported	A powerful upper-level storm system moved across the area during the afternoon and evening helping to trigger severe thunderstorms.
Yakima Valley	9/7/2020	High Wind	None reported	A strong cold front produced strong northerly wind gusts of 40-65 mph.

Table 3.39. Past Severe Weather Occurrences, Yakima County (2015-2021)				
Location	**Date**	**Type**	**Property Damages**	**Narrative**
Yakima Valley	10/13/2020	High Wind	None reported	Strong Pacific storm system produced locally damaging winds.
Yakima Valley	10/24/2021	High Wind	None reported	A deep Pacific low pressure system that passed to the northwest of the forecast area caused 85 MPH winds.
Yakima Valley	11/15/2021	High Wind	None reported	A strong cold front passage produced strong wind gusts across lower elevation areas.

Using data from the NOAA Storm Events Database, the following maps illustrate historic hail, wind, and tornado events in Yakima County between 1955-2021. As shown in **Figure 3.17**, hail events have been reported throughout the county, but are generally less intense, with hail less than 2.5 inches in diameter. As shown in **Figure 3.18**, wind events have been reported in several locations around the county, with several events reaching 78 mph. Finally, in **Figure 3.19**, there has been one EF2 tornado in Yakima County, near the City of Yakima in 1957, as well as several EF1 tornadoes since the 1950s.

Figure 3.17. Historic Hail Events, Yakima County (1955-2021)

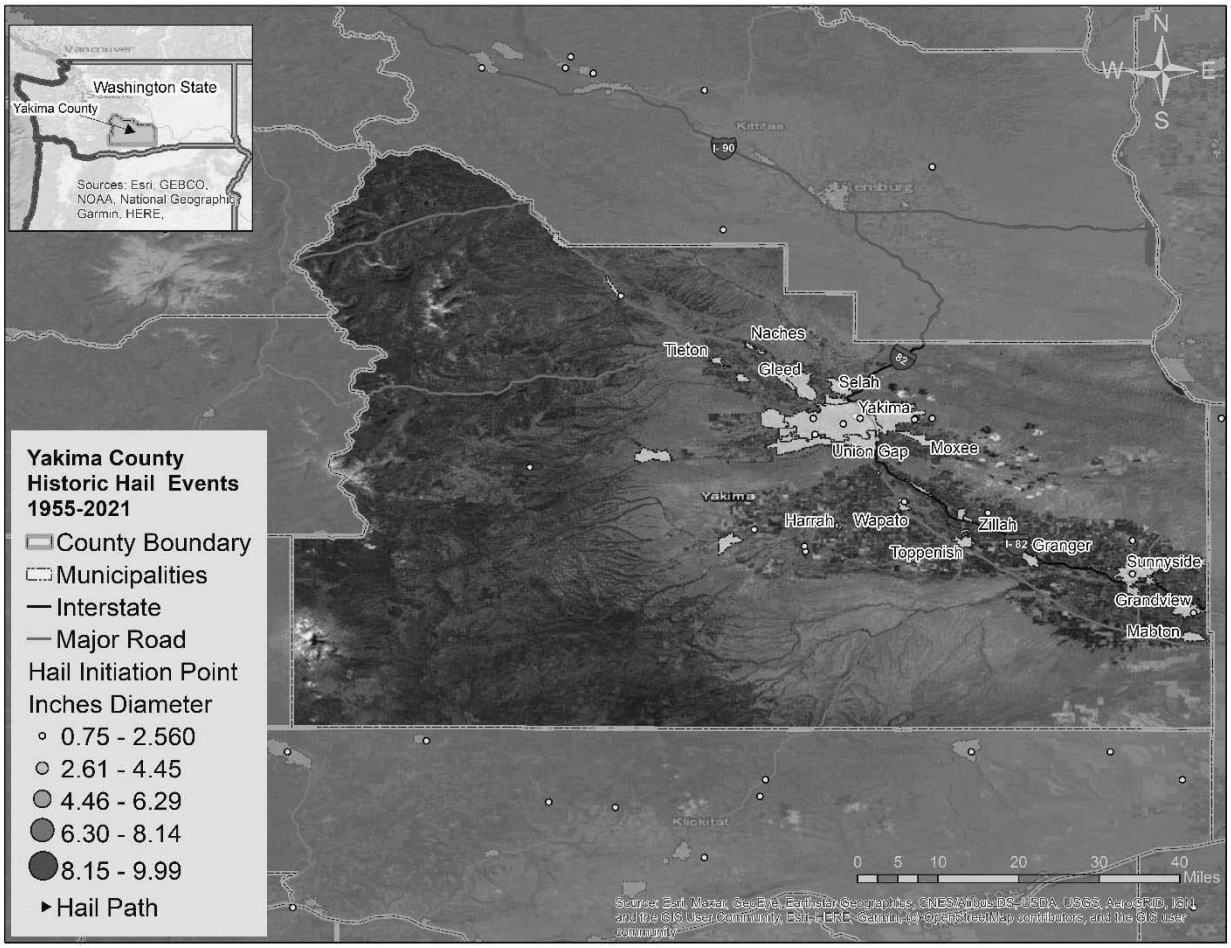


Figure 3.18. Historic Wind Events, Yakima County (1955-2021)

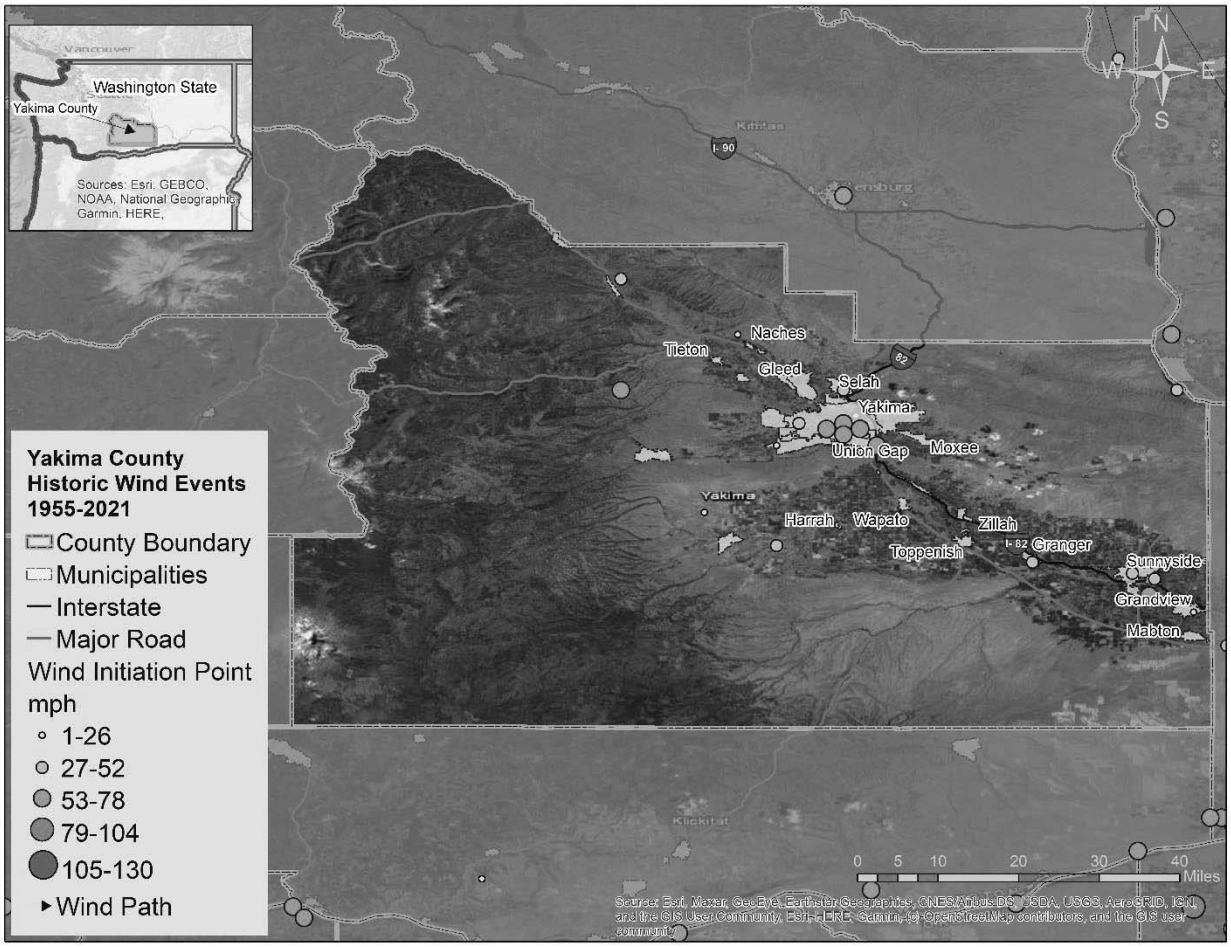
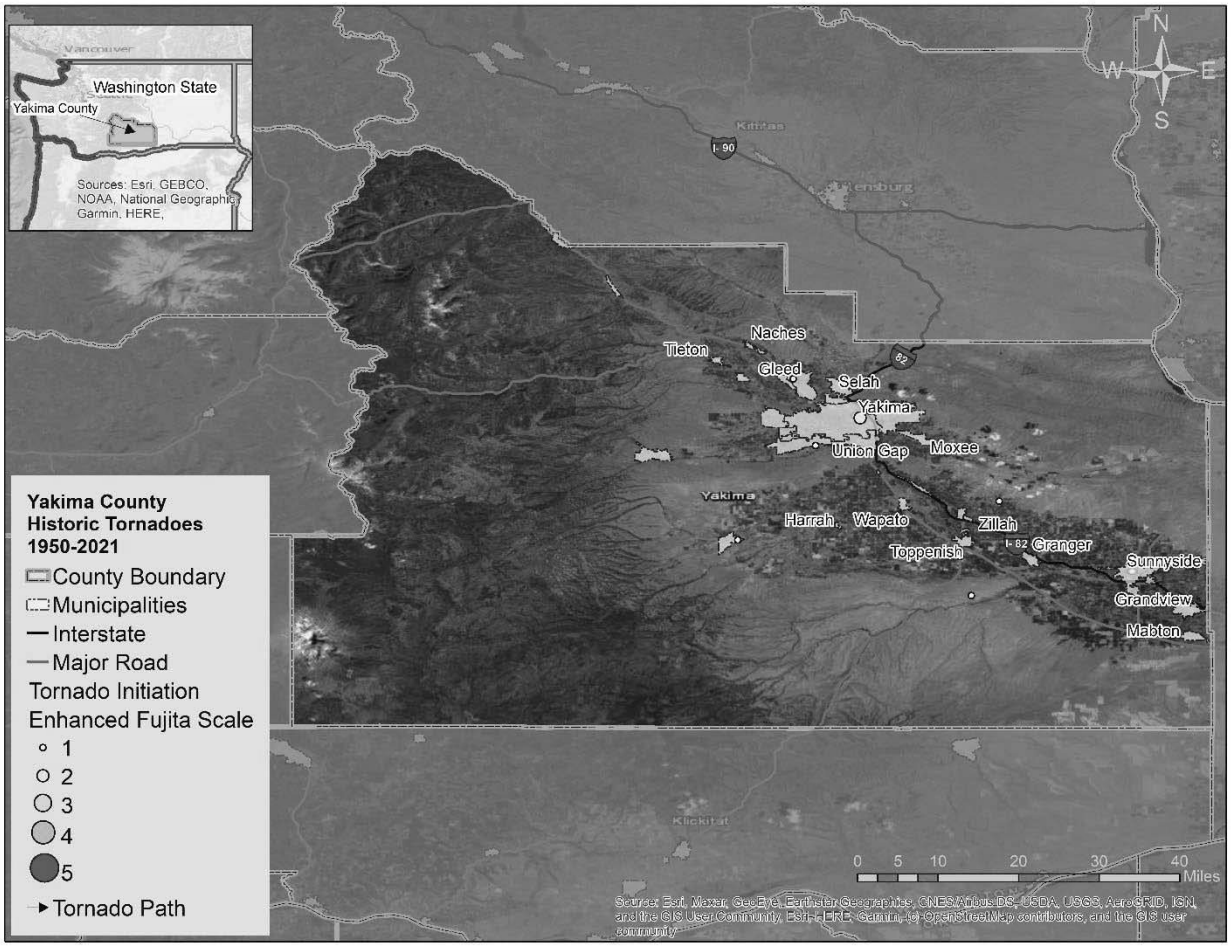


Figure 3.19. Historic Tornadoes, Yakima County (1950-2021)



Future Probability

Although there has been one Presidential Declared Disaster during the HMP analysis (2015-2021), severe weather events are an almost annual occurrence, with multiple incidents each year in Yakima County. Given the entire county is susceptible to severe weather, a high frequency of past occurrences, and the impact of the changing climate, severe storms are considered **Highly Likely** (occurring every 1-4 years).

Climate Change Impacts

Given severe weather events are integrated within the natural climatic cycle, major changes are expected in the future. Climate change is shifting the volume of atmospheric systems by adding more energy. This new energy is expected to create stronger hailstorms, winds, and intensify rain showers which ultimately disrupt the natural climatic cycle. According to the Washington Climate Change Impacts Assessment, annual precipitation percentages are expected to increase by 2% by the 2040s, including in the Yakima River Basin.[93]

[93] Climate Impacts Group. The Washington Climate Change Impact Assessment. Assessed from: https://cig.uw.edu/wp-content/uploads/sites/2/2020/12/wacciareport681-3.pdf

Yakima County Vulnerabilities

Severe weather events contribute to limited impacts to Yakima County. Annual economic losses are expected in the thousands of dollars for the region, mostly due to hail and wind damage. Severe weather events can damage critical infrastructure and the built environment and disrupt normal operations

Loss Estimates

According to FEMA's National Risk Index, the total expected annual loss in Yakima County for severe weather events is $687,382. Expected annual loss is a likelihood and consequence component of risk that measures the expected loss of building value, population, and agricultural value each year. Individually, hail is expected to cost the county about $347,645/year, strong wind events will cost $193,171/year, tornadoes total $74,781/year, and lightning events cost $71,785/year. These expected losses are summarized in **Table 3.40**.

Table 3.40. 2022 Expected Annual Loss – Severe Weather[94]

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Hail	$347,645	$2,662	$10,801	0.00	$334,182
Lightning	$71,785	$11,669	$60,117	0.01	n/a
Strong Wind	$193,171	$4,619	$188,411	0.02	$141
Tornado	$74,781	$29,854	$44,399	0.01	$528

According to the 2018 Washington State HMP, severe weather events have caused over $159 million in damages in Yakima County since 1960. This is inclusive of winter weather events.

Impacts on the Yakima County Population and Vulnerable Populations

Severe weather can lead to the isolation of community members due to downed powerlines or hazardous travel conditions. People that are dependent on electricity for medical devices are most vulnerable to this hazard. The most significant impacts of severe weather are related to secondary hazards, including flooding from a severe thunderstorm or wildfire caused by high winds or lightning strikes. According to the 2018 Washington State HMP, 54% of Yakima County's vulnerable population is in areas ranked medium or higher for severe weather hazards. This is inclusive of severe winter storms and is the highest of any county in the state.

Impacts on Built Environment and Critical Infrastructure

Hail, wind storms, and tornadoes can disrupt the critical transportation infrastructure and accessibility. Utilities, including communications and power lines, may also be disrupted by wind storms and tornadoes. This type of disruption is detrimental to sharing critical information to the public and across all type of first responders.

Impacts on Government and Emergency Operations

Both tornadoes and wind storms can disrupt the day-to-day business or continuity of government. These hazards can also disrupt emergency response, such as police, fire, and ambulance services. This type of delay can impact rescue times and postpone immediate medical care. According to the 2018 Washington State HMP, Yakima County's first responder

[94] FEMA. National Risk Index for Natural Hazards. Accessed from https://www.fema.gov/flood-maps/products-tools/national-risk-index

facilities are at medium-high risk to severe weather exposure. However, all first responder buildings in the county have been built to withstand severe weather events.

Impacts on the Economy and Businesses
Agricultural areas of the state, including Yakima County, are expected to experience major economic and business losses due to any significant severe weather events due to the damage of crops and farm production. Hail or severe wind can produce widespread damage, while a tornado may make more limited, but still destructive impacts within agricultural areas. The Yakima River Basin produces the largest agricultural economic returns in Washington and is considered one of the most productive areas in the country.

Impacts on Natural and Cultural Resources
Given severe weather events are an integral piece of the natural climatic cycle, they are essential to the maintenance and sustainability of all local biodiversity. Severe weather events will have a limited impact on natural resources.

Overall Risk Ranking

Yakima County has a **Medium Risk** to severe weather events. FEMA's National Risk Index and the 2018 Washington HMP both break out severe weather into various hazards, each with their own risk rating. These ratings are summarized in **Table 3.41** below.

Table 3.41. Summary of Risk Ratings for Severe Weather Hazards

Hazard	FEMA Risk Rating	Washington HMP Risk Rating
Hail	Relatively Moderate	High (south county) Medium-High (north county)
Lightning	Relatively Low	High (west county) Medium (east county)
Severe Wind	Relatively Moderate	Medium-High (south, east county) Medium (northwest county)
Tornado	Relatively Low	Medium-High (entire county)

Table 3.42 below summarizes the risk assessment results for the severe weather hazard for Yakima County.

Table 3.42. Risk Assessment Results – Severe Weather

Criteria	Score	Description
Human Health	2	Low; 2-3 deaths, 4-5 injuries
Property Damage	3	Medium; widespread, repairable
Economic Disruption	1	Minimal
Environmental Resource Damages/Degradation	1	Minimal
Emergency Services Burden	2	Low; widespread, temporary burden
Critical Facilities Exposure	1	Minimal
Probability Score	5	Highly Likely; expected every 1-4 years
Frequency Score	5	Highly Likely; has occurred every 1-4 years
Total Impact Score	**20**	**Medium Risk**

3.14. Severe Winter Weather

Winter storms consist of phenomena such as heavy snow, heavy winter rain, freezing rain, sleet, and ice storms, or a combination of such events. Major winter storms can contribute to flooding in areas not prone to riverine flooding due to the flow of immense amounts of water in one area. Most severe winter storms develop on the Pacific Ocean and travel inland towards counties located in the valley regions of Washington, including Yakima County.

The NWS defines snow as precipitation that forms in clouds that when air temperatures remain below freezing throughout the atmosphere to create snowflakes, or ice crystals that accumulate as they fall to ground level. There are five different classifications of snow phenomenon including:

- **Snow flurries** occur when there is a short period of time of light snow fall with no major accumulations of snow expected
- **Snow showers** occur when snow falls at brief times with fluctuating intensity and has the possibility for accumulation
- **Snow squalls** are short, but intense snow showers with gusty winds and significant accumulation
- **Blowing snow** can be both wind-driven snow or falling/loose snow from the ground lifted by wind causing drifting and reducing visibility
- **Blizzards** are the strongest snow event by having winds over 35 mph with the combination of snow and blowing causing low visibility up to ¼ of a mile or for at least three hours at a time.

Additional winter storm weather events, as defined by NWS, include: [95]

- **Sleet** is partially melted snowflakes that freeze as they fall through a deep layer of freeing air and become frozen rain drops before they reach ground level
- **Freezing rain** happens when snowflakes first travel through a warm layer of air that turn the flakes into liquid drops then fall through a thin layer of freezing air at a fast rate that prevents the liquid from freezing. Therefore, as the liquid drops are cooled, they can instantly freeze once in contact with anything that is cold in temperature (below 0 degrees Celsius).
- **Ice storms** occur if there is major continuation of freezing rain lasting several hours

[95] NOAA. Severe weather 101: Types of winter weather. Accessed from: https://www.nssl.noaa.gov/education/svrwx101/winter/types/

Strength/Magnitude

The Winter Storm Severity Index (WSSI) from the NWS categorizes the level of impact a selected winter storm will have on the area. The WSSI Scale is provided as **Table 3.43** below.

Table 3.43. Winter Storm Severity Index[96]

Level	Description of Expected Storm Impacts
None	No snow, ice, or blizzard conditions forecasted
Limited	Small snow or ice accumulations to be forecasted with minimal impacts
Minor	Minor disruptions to those unprepared. No to minimal recovery time required.
Moderate	Major impacts to those unprepared. One- or two-day recovery time needed for after snow/ice accumulation.
Major	Significant impacts to those prepared and unprepared. Several days needed for recovery after snow/ice accumulation.
Extreme	Historic and widespread impacts. Many days up to weeks of recovery needed after snow/ice accumulation.

According to the NWS, for snowfall to be categorized as heavy snowfall, it must accrue in a non-mountainous area to four inches or more within a 12-hour timeframe or accumulate six or more inches of snow within a 24-hour period. For mountainous areas, heavy snowfall is categorized when 12 inches or more of snow is accumulated within a 12-hour timeframe or 18 inches or more within a 24-hour timeframe.

Location

All communities within Yakima County are vulnerable to severe winter storms. The intensity and quantity of precipitation from a winter storm depends on the elevation of the atmospheric disturbance. The mountainous areas/foothills of the county experience more significant impacts due to snow. Low elevation areas experience less snow precipitation compared to high elevation areas but can still be impacted.

Past Occurrences

The most recent, significant winter storm for the area was the Yakima Valley blizzard of February 2019. The severe winter storm caused major impacts on local farmers and their livestock. The storm brought 80 mph winds, two feet of snow, and 20 below temperatures. The extreme impacts resulted in 1,830 cow deaths and was reported as “an unprecedented event that left the local community shocked and puzzled.”[97]

[96] NOAA, National Weather Service. Winter Storm Severity Index (WSSI). Accessed from: https://www.weather.gov/gjt/WSSI_Tutorial

[97] Columbia Insight. Yakima valley blizzard: Anomaly or harbinger or climate change. Accessed from: https://columbiainsight.org/yakima-valley-blizzard-anomaly-or-harbinger-of-climate-change/

Table 3.44 below outlines 19 severe winter storms and winter weather occurrences reported on the NOAA Storm Events Database within the HMP analysis period (2015-2021). **Appendix D** contains a list of all winter storm events prior to 2015, as well as a more detailed description of each occurrence. According to the 2018 Washington State HMP, there were 31 winter weather events in Yakima County from 1960-2017.

Table 3.44. Severe Winter Storms and Weather, Yakima County (2015-2021)

Date	Event Type	Property Damages	Narrative
12/17/2015	Heavy Snow	None reported	A weather system produced widespread winter precipitation across the pacific northwest, with a warm front quickly to follow. Several inches of snow accumulated across the central Washington area. Snowfall amounts in inches are as followed: (14) just north of Trout Lake, (8) 4 miles north northeast of The Dalles, (6.5) 12 miles northeast of Appleton, (6.5) 4 miles east northeast of Thorp, and (6) 2 miles north northwest of Tieton.
12/21/2015	Heavy Snow	None reported	Heavy snow fell over portions of central Washington and Oregon due to a cold front. Snowfall amounts in inches are as followed: (20) at Ski Bluewood, (12) in Cle Elum, (8) 5 miles north northeast of Yakima, (8) in Bickleton, and (6) 4 miles east northeast of Thorp.
12/8/2016	Heavy Snow	None reported	A major Pacific storm brought snow to most of the forecast area. Heaviest snows occurred from south-central Washington south to central Oregon. Accumulation of 5-10” of snow in areas across Yakima County.
12/14/2016	Heavy Snow	None reported	A strong Pacific system moved through the area and over modified Arctic air. This resulted in widespread snow. Accumulation of 7-12” on snow in areas across Yakima County.
1/1/2017	Heavy Snow	None reported	Significant snow fall over portions of South-central Washington and North-central Oregon on January 1st and 2nd. Measured snow fall of 10 inches in West Valley.
1/7/2017	Heavy Snow	None reported	A Pacific storm system brought widespread snow to the Pacific Northwest. Also significant ice accumulated in southeast Washington. Up to 6” of snow and freezing rain.
1/17/2017	Ice Storm	None reported	Accumulated ice of .38 inches at Toppenish.
2/5/2017	Heavy Snow	None reported	Storm total snow accumulation of 7 inches at Tieton.

Table 3.44. Severe Winter Storms and Weather, Yakima County (2015-2021)			
Date	**Event Type**	**Property Damages**	**Narrative**
2/8/2017	Winter Storm	None reported	Winter storm produced a snow accumulation of 12 inches with an ice accumulation of 0.38 inches on top of the snow.
12/28/2017	Ice Storm	None reported	One quarter (0.25) inch of ice from freezing rain at Tieton.
11/23/2018	Winter Weather	None reported	Four inches of slushy snow accumulation fell resulting in Interstate 90 being closed in both directions.
1/3/2019	Winter Weather	None reported	Cold air trapped in the upper reaches of the Yakima Valleys with warm air overspreading aloft brought pockets of freezing rain. Interstate 90 was closed in both directions because of several multi-vehicle crashes.
2/4/2019	Heavy Snow	None reported	One person was killed (indirect) and another injured (indirect) in a six vehicle crash on Interstate 82 three miles north of Selah. The cars were traveling east along the interstate during a snow storm and ran into each other as the drivers attempted to slow for an accident ahead. A pair of storm systems brought significant snow to all elevations on the 3rd and 4th of February. Wraparound moisture from the first system brought 8 to 12 inches of snow to the Blue Mountains. Initial precipitation with the second system combined with lingering wraparound moisture brought between 3 and 13 inches to all elevations on the 4th of February. Over 200 accidents were reported due to slippery conditions. Interstate 82 between Yakima and Ellensburg was closed for an hour to clear multiple accidents.
2/9/2019	Blizzard	$2,200,000	A potent winter storm brought significant snow accumulations to much of central and eastern Washington beginning on the evening of the 8th and peaking on the 9th of February. Along and in the lee of more exposed ridges in the Yakima and Kittitas Valleys and along the Horse Heaven hills blizzard conditions were observed with sustained winds between 35 and 40 mph (30 to 35 knots) and observed visibilities near zero. Snow drifts in the Richland area as high as 5 feet were reported with some secondary roads remaining impassable for days. I-90 from Ellensburg to

Table 3.44. Severe Winter Storms and Weather, Yakima County (2015-2021)			
Date	**Event Type**	**Property Damages**	**Narrative**
			Vantage, I-82 from Yakima to Ellensburg and I-82 from south of the Tri-Cities to the Oregon border were all closed for significant portions of the day due to massive snow drifts and near zero visibility. Across the region over 500 additional motor vehicle accidents were reported by the Washington State Patrol. In the Yakima Valley impassable roads and harsh conditions resulted in the loss of over 1700 head of cattle at an estimated value of 2.2 million dollars. Snowfall amounts ranged from 5 to 7 inches in Yakima, 6 to 12 inches in Ellensburg and 5 to 10 inches in the Simcoe Highlands. Accurate snowfall measurements were very difficult due to blowing and drifting snow.
2/14/2019	Heavy Snow	None reported	A storm brought a mix of wintry precipitation to the region through the day on the 14th of February. Warm air aloft was primarily confined to Benton, Walla Walla and Franklin counties where a light coating of freezing rain fell followed by light snow. Accumulations in these ranges ranged from trace ice to around a tenth of an inch and up to 2 inches of snow. Further west, Klickitat, Yakima and Kittitas County saw mostly snow with total accumulations between 3 and 8 inches.
2/23/2019	Heavy Snow	None reported	Persistent troughing off the coast of the Pacific Northwest focused a stream of mid-level moisture over the Inland Northwest resulting in a long duration snow event as the plume drifted north and south several times between the 22nd and 25th of February. Breezy northeastern winds in the lower Columbia Basin and Yakima Valley, especially on ridge tops resulting in drifts nearing 5 feet in height making many roads over the ridge tops impassable for several days. Storm total snow accumulations were measured at 25.2 inches in Snowden, 16.5 inches in White Salmon, 10 inches in Ellensburg, 10 inches in Trout Lake, 8 inches in Richland, 9 inches in Walla Walla, 8 inches in Kennewick and 6 inches in Yakima.

Table 3.44. Severe Winter Storms and Weather, Yakima County (2015-2021)			
Date	**Event Type**	**Property Damages**	**Narrative**
9/29/2019	Winter Weather	None reported	Several inches of snowfall coupled with melting/refreezing snow led to treacherous travel conditions and causing 1 fatality.
12/18/2019	Winter Storm	None reported	Heavy snow and sleet fell along the east slopes of the Washington Cascades.
11/12/2020	Winter Storm	None reported	Moderate to heavy snow developed on mountains and light to moderate snow accumulations on higher elevation valleys.

Future Probability

Severe winter storms are an annual occurrence in Yakima County and surrounding jurisdictions. Given much of the land area is susceptible to winter weather, a high frequency of past occurrences, and the impact of the changing climate, severe winter storms are considered **Highly Likely** (expected to occur every 1-4 years).

Climate Change Impacts

Climate change will lead to a shift in precipitation and an increase in air temperature, which will significantly impact hydrology and water resources in the Yakima River Basin. Winters are expected to get warmer and wetter in the future, potentially reducing snowpack and heavy snowfalls. As noted in the Washington Climate Change Impacts Assessment, many climate models are unclear about the winter weather impacts in the Cascades as compared to the rest of the Pacific Northwest. It is possible that winter precipitation will decrease in the Cascades, as compared to the rest of the region. Ultimately, climate change experts anticipate that more precipitation will fall as rain rather than snow in the future, increasing rain-on-snow events and potentially leading to more catastrophic flooding.

Yakima County Vulnerabilities

Severe winter storms can lead to many intersection impacts on a community, stemming from the closure of critical transportation routes due to hazardous conditions, widespread power outages, damage to residential and commercial property, loss of livestock and vegetation, and the potential to cause fatalities and injuries.

Loss Estimates

Table 3.45 summarizes the 2022 Expected Annual Loss for winter weather and ice storms in Yakima County, as provided by the FEMA National Risk Index. Expected annual loss is a likelihood and consequence component of risk that measures the expected loss of building value, population, and agricultural value each year. Expected losses from winter weather are minimal in Yakima County, with some expected property damages and agricultural losses.

Table 3.45. 2022 Expected Annual Loss – Severe Winter Weather[98]

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Winter Weather	$33,096	$9,364	$1,785	0.00	$21,946
Ice Storm	$2,103	$79	$2,024	0.00	n/a

Impacts on the Yakima County Population and Vulnerable Populations

According to the 2018 Washington State HMP, less than 10% of Yakima County's vulnerable population is in medium or higher severe winter storm or weather exposure areas. However, groups of people experiencing homelessness or with unsuitable housing, people with access and functional needs or disabilities, and low-income families are highly vulnerable to the impacts of severe winter storms. These impacts may stem from increased traffic accidents due to hazardous road conditions, limited access to medical care or assistance if roads are closed or too dangerous to travel on, or power outages limiting the use of essential medical devices. People living in unsuitable housing may develop hyperthermia due to prolonged exposure to cold temperatures from power outages or insufficient heating sources.

Impacts on Built Environment and Critical Infrastructure

Winter storms can be highly disruptive to critical infrastructure, including power failures, limited road access, and burst water pipes. Past intense snowstorms have closed major highways like I-82 for extended periods, given storms can last for multiple days.

Impacts on Government and Emergency Operations

Severe winter storms disrupt Yakima County's emergency response services, such as fire, police, and ambulance services. These facilities are generally located in areas with high exposure to winter storms. However, these facilities are expected to withstand severe winter conditions because they are built to higher building standards. First responders face an increase in calls from vulnerable residents in distress from isolation, road accidents, or loss of power to their homes.

Impacts on the Economy and Businesses

Severe winter storms impact Yakima County's private sector by disrupting normal business activities, including power outages, which can impact the local economy. Winter storms in the

[98] FEMA. National Risk Index for Natural Hazards. Accessed from https://www.fema.gov/flood-maps/products-tools/national-risk-index

late or early season result in damage to crops or lost livestock, as occurred in 2019. Furthermore, there is an increased threat of food scarcity and supply chain disruption when roads are closed.

Impacts on Natural and Cultural Resources

The changing climate could impact river hydrology, which is an important part of the delicate, but complex relationship of the region's soil, vegetation, water sources, and wildlife. Late or early season winter storms can destroy crops and damage agricultural production by either not supplying water storage resources for irrigation purposes or inundating crops with heavy rains.

Overall Risk Ranking

Yakima County has a **High Risk** to severe winter weather. FEMA has rated Yakima County **Relatively Moderate Risk** for winter weather, with a risk score is 17.59. According to the 2018 Washington State HMP, Yakima County has a **High Risk** to severe weather overall, inclusive of both spring/summer and winter storms. **Table 3.46** below summarizes the risk assessment results for the severe winter weather hazard for Yakima County.

Table 3.46. Risk Assessment Results – Severe Winter Weather

Criteria	Score	Description
Human Health	1	Very Low; 0-1 deaths and few injuries expected
Property Damage	1	Minimal
Economic Disruption	4	High; widespread, medium-term disruption
Environmental Resource Damages/Degradation	1	Minimal
Emergency Services Burden	2	Low; widespread, temporary burden
Critical Facilities Exposure	5	High; most critical facilities are exposed
Probability Score	5	Highly Likely; expected every 1-4 years
Frequency Score	5	Highly Likely; has occurred every 1-4 years
Total Impact Score	**24**	**High Risk**

3.15. Volcanic Eruption

USGS describes volcanoes as vents "at the Earth's surface through which magma (molten rock) and associated gases erupt, and also the cone built by effusive and explosive eruptions." Volcanoes are classified as active, dormant, or extinct. When a volcano is erupting or showing the potential of eruption, it is considered active. A dormant volcano is one that is not currently active, but scientists believe could erupt again. An extinct volcano is one that scientists believe will likely not erupt again. When a volcano erupts, it causes widespread damage, but it also creates nutrient-rich soil and provides a source of geothermal energy for many countries.

Strength/Magnitude

The magnitude of a volcano is determined by historical occurrences using the Volcanic Explosivity Index (VEI). A non-explosive volcano, VEI 1, occurs often and does not create significant impact. A VEI 8 is destructive and can wipe out the entire community. **Figure 3.20** depicts past eruptions and where they fall on the scale.[99]

Figure 3.21 depicts the threat assessment for volcanoes which was developed by the USGS Volcano Hazards Program to categorize the 169 volcanoes in the U.S. Volcanic threat is defined as the "qualitative risk posed by a volcano to people and property." This threat assessment considers both exposure and the relative danger of volcanic hazards, as shown in the figure below. There are five threat levels: Very High, High, Moderate, Low, and Very Low. Of 57 priority volcanoes in the country (Very High or High Threat), nine are in Oregon and Washington.[100]

Figure 3.20. VEI Scale

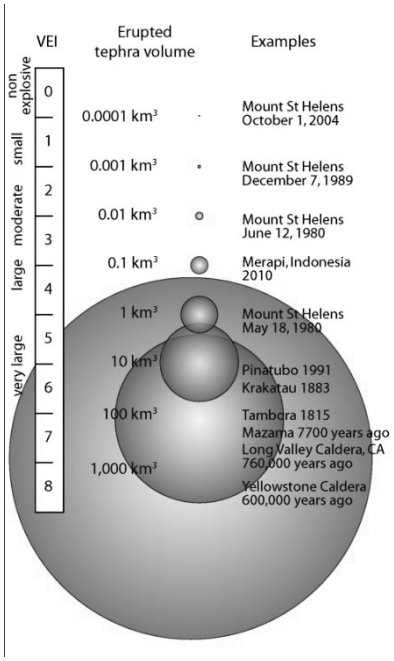


Figure 3.21. Volcano Threat Potential

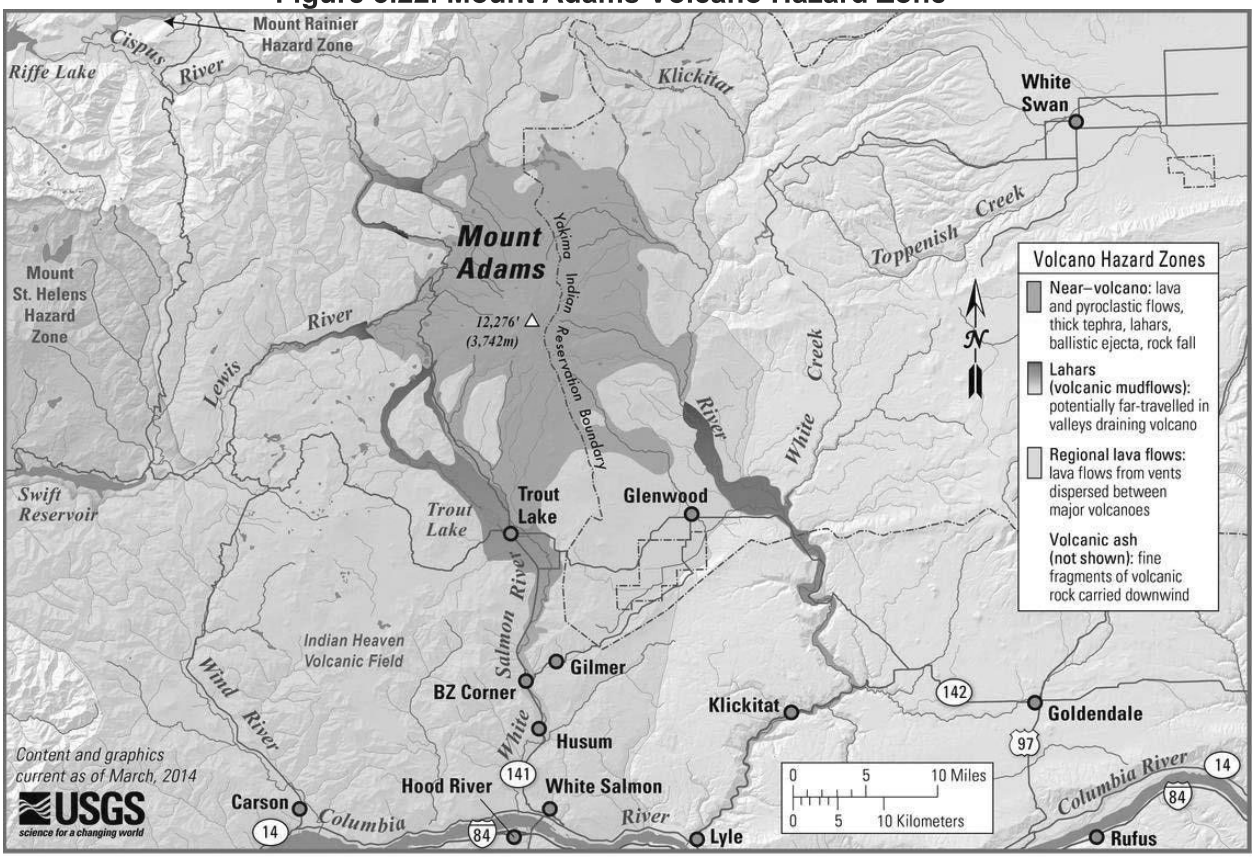
[99] National Park Service. Volcanic Explosivity Index (VEI). Accessed from: https://www.nps.gov/subjects/volcanoes/volcanic-explosivity-index.htm#:~:text

[100] USGS. National volcano early warning system - monitoring volcanoes according to their threat. www.usgs.gov/programs/VHP/national-volcano-early-warning-system-monitoring-volcanoes-according-their-threat

Location

There are five active volcanoes in Washington State in the Cascade Range: Mt. Baker, Glacier Peak, Mt. Rainier, Mt. Adams, and Mt. St. Helens. Mt. Adams is in the very southwest corner of Yakima County and the Yakama Reservation. **Figure 3.22** is a map of Mt. Adams and its hazards zones. There are no Yakima County communities located in the volcano hazard zones (0% of the population is exposed), and about 10% of the overall land area is exposed to volcanic activity, according to the 2018 Washington State HMP. Mt. Adams is the largest volcano in Washington and the summit contains unstable altered rock that can produce debris avalanche and lahars.

Figure 3.22. Mount Adams Volcano Hazard Zone[101]



[101] USGS. Mount Adams: Hazards, Accessed from: https://www.usgs.gov/volcanoes/mount-adams/hazards

Past Occurrences

The eruptions of Mt. St. Helens are the only major volcanic incidents in the Cascades in the last century. First, in 1980, 210 square miles of wilderness were burned and 57 people were killed. In 2005, there were no injuries, but ash coated hundreds of vehicles.

Damage from Mt. St. Helens explosion included:[102]

- 4 billion board feet of salable timber were damaged or destroyed
- 7,000 big game animals (deer, elk, and bear) perished in the area most affected by the eruption, as well as all birds and most small mammals
- 12 million Chinook and Coho salmon fingerlings were killed when hatcheries were destroyed
- 40,000 young salmon were lost when they were forced to swim through the turbine blades of hydroelectric generators
- 2.4 million cubic yards of ash (equivalent to about 900,000 tons in weight) were removed from highways and airports in Washington State
- $2.2 million in ash removal costs over 10 weeks
- 185 miles of highways and roads and 15 miles of railways destroyed or extensively damaged

Damages in Yakima County from Mt. St. Helens included ash removal, closed highways due to limited visibility, and habitat damage from ash fall.

Future Probability

Predicting volcanic eruptions that create significant damage is a challenge. There has been one historical occurrence, Mt. St. Helens, in recent memory. According to the 2018 Washington State HMP, the last major event for Mt. Rainier was in 1502, and the last eruption of Mt. Adams was about 1,000 years ago. Given this limited history, the future probability of a major volcanic event impacting Yakima County is **Highly Unlikely** (expected to occur every 100+ years). However, smaller eruptions that release gases do occur regularly.

Climate Change Impacts

Volcanoes are a small contributor to climate change because they release carbon dioxide into the atmosphere. The small injections each time there is an eruption contribute to the depletion of the ozone layer. There is no evidence that climate change has any impact on the movement of tectonic plates.

Yakima County Vulnerabilities

There are five active volcanoes near Yakima County. Although there is enough distance to be safe from pyroclastic flows, the county will be impacted by other volcanic hazards. The most recent eruption of Mt. St. Helens provides historical perspective on potential vulnerabilities when the next volcano erupts.

Various volcano hazards that could impact the county are:

- **Pyroclastic density** currents are gravity-driven, rapidly moving, ground-hugging mixtures of rock fragments and hot gases. This mixture forms a dense fluid that moves

[102] USGS. Impacts and aftermath. Accessed from: https://pubs.usgs.gov/gip/msh/impact.html

along the ground with an upper part that is less dense as particles fall toward the ground. Temperatures may be as hot as 900 degrees Celsius, or as cold as steam.

- **Lahars** are part of the family of debris flows that are fluids composed of mixtures of water and particles of all sizes from clay-size to gigantic boulders. The abundance of solid matter carries the water, unlike watery floods where water carries the fragments. Debris flows have the viscous consistency of wet concrete, and there is a complete transition to watery floods.
- **Lava flows** rarely threaten human life because lava usually moves slowly - a few centimeters per hour for silicic flows to several km/hour for basaltic flows.
- **Volcanic gases** released to the atmosphere during an eruption and while the magma lies close to the surface from hydrothermal systems. The most abundant volcanic gas is water vapor; other important gases are carbon dioxide, carbon monoxide, sulfur oxides, hydrogen sulfide, chlorine, and fluorine.
- **Tephra (ash) falls** range from ash (<2mm) to larger debris that can damage property and injure people by the force of falling fragments. Ash fall can damage agricultural lands if buried to greater than 10cm in depth. Additionally, fine-grained particles in the air and water can clog filters and vents, impact machines and industrial equipment, and lead to difficulty breathing.[103]

Loss Estimates

Table 3.47 summarizes the 2022 Expected Annual Loss for volcanic eruptions in Yakima County, as provided by the FEMA National Risk Index. Expected annual loss is a likelihood and consequence component of risk that measures the expected loss of building value, population, and agricultural value each year. The high expected annual losses stem from significant damage resulting from tephra (ash) fall in an event like Mt. St. Helens.

Table 3.47. 2022 Expected Annual Loss – Volcanic Activity[104]

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Volcanic Activity	$2,648,766	$2,229,610	$419,156	0.06	n/a

Impacts on the Yakima County Population and Vulnerable Populations

The entire community is vulnerable to the impacts of a volcanic eruption. Thick layers of ash can enter the atmosphere making it difficult for people to breathe. Drinking water in Washington is sourced from wells and springs. Both the ash and the fallout from the eruption can contaminate water sources, limiting the supply of safe drinking water. There is a high risk to the Yakama Reservation because Mt. Adams is partially located on the Reservation.

Built Environment and Critical Infrastructure

There is very little built environment or critical infrastructure around Mt. Adams, which is the closest threat to Yakima County. The farms around Yakima County that rely on constructed irrigation canals are at risk of losing crops due to ash fall and contaminated water.

[103] Richard V. Fisher, UC Santa Barbara. Hazardous Volcanic Events. Accessed from: https://volcanology.geol.ucsb.edu/hazards.htm

[104] FEMA. National Risk Index for Natural Hazards. Accessed from https://www.fema.gov/flood-maps/products-tools/national-risk-index

Transportation will be impacted based on the amount of ash fall as visibility is decreased and roadways may be closed for several days. Ash fall damages electrical and mechanical equipment, contaminates oil systems, clogs air filters and pumps, and causes short circuits in electrical systems which leads to power outages.

Impacts on Government and Emergency Operations
Government operations will be impacted if the communications infrastructure is damaged from ash fall. Ash fall could also limit emergency operations by restricting access to certain areas and limiting visibility on roadways.

Impacts on the Economy and Businesses
Physical damage to people, buildings, and communications infrastructure could prevent businesses from operating normally, and if there is large-scale damage, the recovery time might impact the economy. Agriculture is a large contributor to the Yakima County economy and crop and livestock losses from ashfall could lead to some economic and business losses.

Impacts on Natural and Cultural Resources
The Yakama Reservation is land sacred to the tribes living in the area and contains many artifacts that could never be produced again. There is a low probability that an eruption would impact the entire Reservation, but a major eruption of Mt. Adams may result in relocation and the loss of important natural and cultural resources.

The ashfall from a volcanic eruption contaminates water drinking sources which can create health issues for people and wildlife. It also impacts biodiversity. It may displace species and leave lasting impacts to the ecosystem which requires it to adapt and change.

Overall Risk Ranking

Yakima County has a **Low Risk** to volcanic activity. FEMA has rated Yakima County **Very High Risk** for volcanic activity, with a risk score is 94.86. According to the 2018 Washington State HMP, Yakima County has a **Low Risk** to volcanic activity. **Table 3.48** below summarizes the risk assessment results for the volcanic activity hazard for Yakima County.

Table 3.48. Risk Assessment Results – Volcanic Event

Criteria	Score	Description
Human Health	1	Very Low; 0-1 deaths and few injuries expected
Property Damage	1	Very Low; Minimal
Economic Disruption	3	Medium; widespread but temporary
Environmental Resource Damages/Degradation	3	Medium; widespread but minor
Emergency Services Burden	1	Very Low; minimal
Critical Facilities Exposure	1	Very Low; minimal critical facilities are exposed
Probability Score	1	Very Unlikely; expected to occur every 100+ years
Frequency Score	1	Very Unlikely; has occurred every 100+ years
Total Impact Score	**12**	**Low Risk**

3.16. Wildfire

Wildfires are ignited by nature or humans, and cause destruction to the topography of the county, such as forests, brush, crops, and grasslands areas. Fires from least intensity to highest intensity include ground fires, crawling/surface fires, ladder fires, and crown fires. Lower intensity fires, such as ground fires, burn buried organic matter, while crawling/surface fires burn low-lying vegetation and matter. Ladder fires burn low-level vegetation, such as vines and small trees, while crown fires consume at a higher level, burning moss and tall trees. In Washington, wildfire season tends to start in July and end in September. A common cause for wildfires includes lightning strikes during the peak of the season in July, while human-caused incidents occur during the early and late stages of the season. Regardless of fire season, wildfires have taken place every month of the year.[105]

Strength/Magnitude

According to the National Wildfire Coordinating Group, wildfires are categorized into different classes based on their size, meaning the number of acres burned.

The sizing chart is as follows:

- Class A – one-fourth of an acre or less
- Class B – more than one-fourth of an acre, but less than 10 acres
- Class C – 10 acres or more, but less than 100 acres
- Class D – 100 acres or more, but less than 300 acres
- Class E – 300 acres or more, but less than 1,000 acres
- Class F – 1,000 acres or more, but less than 5,000 acres
- Class G – 5,000 acres or more

Washington State also follows the Interagency Fire Regime Condition Class (FRCC) guidance to describe wildfires with regards to fire regime, frequency, interaction with other types of dangerous agents, and what season the fire occurred. Fire regime encompasses the frequency, extent, and severity of the fire incident.

- **Frequency** is the number of fires occurring within an area
- **Extent** is the total area burned by a single incident
- **Severity** defines the effects and impacts to the landscape

[105] Washington Emergency Management Division. 2018 Washington State Enhanced Hazard Mitigation Plan Risk and Vulnerability Assessment. Accessed from: https://mil.wa.gov/asset/5f233441409d0

There are five types of natural fire regimes, summarized in **Table 3.49** below. Each type is based on the frequency of fires combined with fire severity that reflects the percentage of dominate foliage/trees replaced.

Table 3.49. Fire Regime Types[106]

Type	Frequency	Severity Level	Description
One (I)	0-35 Years	Low / Mixed	Low-severity fires replacing less than 25% of foliage/trees. Mixed-severity fires that replace up to 75% of foliage/trees.
Two (II)	0-35 Years	Replacement	High-severity fires replacing more than 75% of foliage/trees.
Three (III)	35-200 Years	Mixed / Low	Mixed-severity or high-severity of fires
Four (IV)	35-200 Years	Replacement	High-severity fires
Five (V)	200 or More Years	Replacement / Any Severity	Replacement severity that includes all types of frequency levels.

Intensity is another method of classifying wildfires, calculated by the rate of heat energy released per unit time per unit length of fire distribution. Lower intensity fires are a part of the natural wildland fire cycle and benefit the environment. High intensity fires, however, have major negative impacts on the environment including the soil's productivity level, erosion, and ability to repel a large mass of water.

Location

Fire season in Yakima County occurs a bit earlier than the state, typically from May through October; however, the season may extend through dry periods. The most common places for wildfires to start within the county are in fields, lawns, wooded wildland areas, and along transportation corridors. The areas with the most repeated cycles of wildfires include the west valley of Yakima County, where residents live in an open shrub-steppe range, as well as the riparian corridors throughout the Lower Valley and Selah areas. While wildfires can occur across the county, the most impactful fires are those that move into or originate in the Wildland-Urban Interface (WUI). Smaller fires occur frequently in the gap-to-gap reach of the Yakima River along the Yakima Greenway. While these wildfires are not large in acreage, they occur adjacent to or within populated areas and pose a significant risk to communities.

Figure 3.23 (following page) shows the WUI areas within Yakima County, indicating areas of high-density development with wildland fuel types. While areas across the county include vegetation and fuels vulnerable to wildfire, many of these areas are either uninhabited or have very low density of human development. The following jurisdictions have medium to high-density WUI:

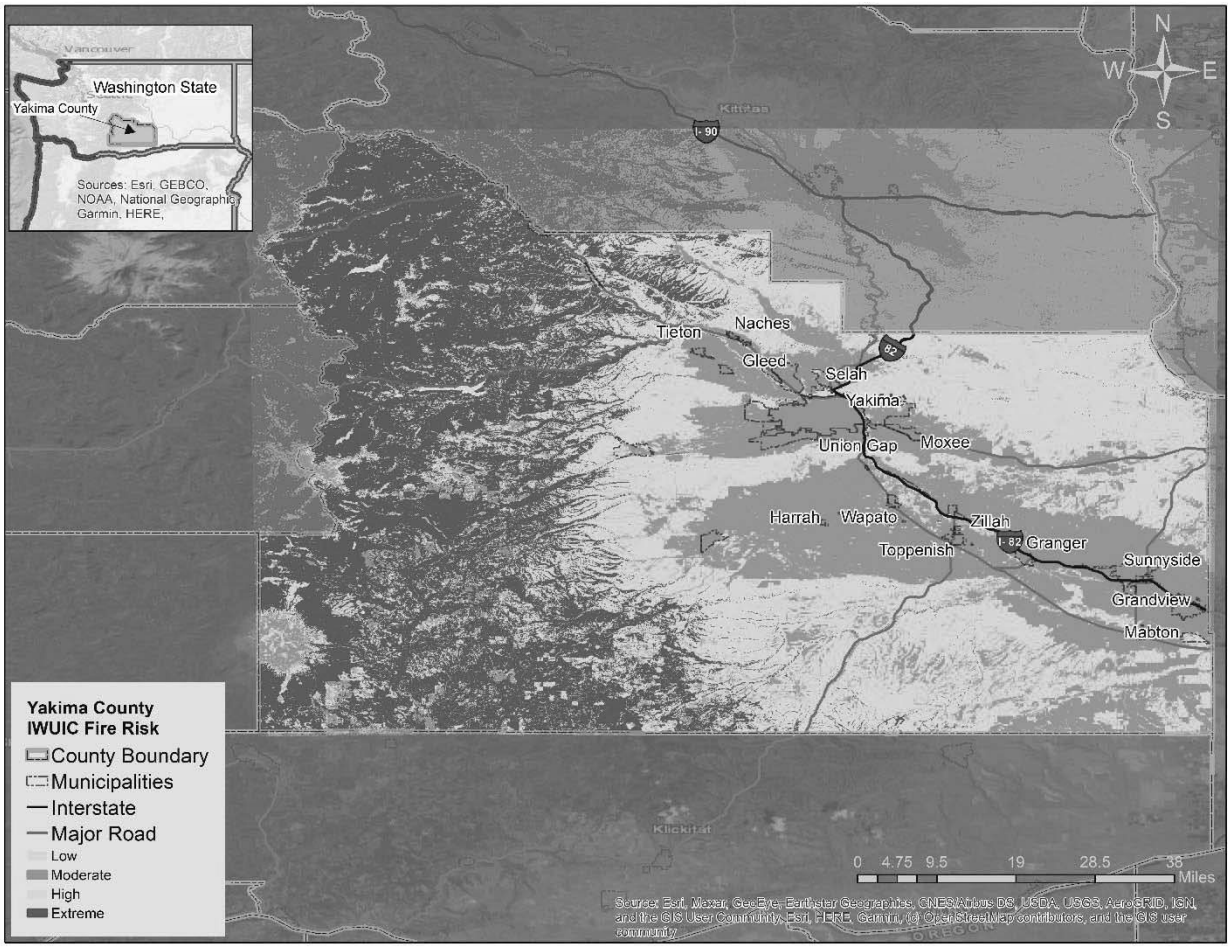
- City of Grandview
- City of Granger
- City of Moxee
- City of Selah
- City of Sunnyside

[106] Landfire. Interagency Fire Regime Condition Class (FRCC). Accessed from: https://landfire.gov/frcc/frcchome.php#:~:text

- City of Tieton
- City of Toppenish
- City of Union Gap
- City of Wapato
- City of Yakima
- City of Zillah
- Town of Harrah
- Town of Naches

These cities, excluding Harrah, are surrounded by WUI areas categorized as high or extreme risk for potential fires. These cities are located alongside major highways that also cut through areas of high and extreme fire risk, which can both increase the risk of human-caused fires, as well as result in major road closures.

Figure 3.24. Wildland-Urban Interface (WUI), Yakima County



Past Occurrences

Yakima County has been a part of 12 Presidential Disaster Declarations for wildfire between 2000-2021, including five during the HMP analysis period (2015-2021). At the time of plan development, an additional 5,800+ acre wildfire was burning within Yakima County (Cow Canyon).

Table 3.50 below outlines wildfire events of 1,000 acres or more reported in Yakima County during the HMP analysis period. Wildfire history is based on several reports from the Bureau of Land Management for Oregon and Washington, USDA Forest Service, Washington State Department of Natural Resources, and the Yakima County Community Wildfire Protection Plan (CWPP).

Table 3.50. Past Wildfire Occurrences, Yakima County (2015-2021)[107]

Fire Name	Date	Acres	Narrative
Schneider Springs	08/04/2021	107,000	**Presidential Disaster Declaration DR-5415,** ignited by a lighting storm that blanketed the northern Cascade Mountain Range in the Naches Ranger District. The fire grew quickly in the next several days in record hot and dry conditions, burning in heavy timber, standing dead trees, and very steep terrain that was difficult for ground resources to access. This was a managed fire under a full suppression strategy where resources shifted around the fire perimeter to protect communities and take actions with the high probability of success. A total of 107,322 acres burned and was 100% contained on October 31st, 2021.
Burbank	07/10/2021	7,859	Located 8 mi NE of Yakima
Evans Canyon	8/31/2020	75,817	**Presidential Disaster Declaration DR-5342** ignited about eight miles north of Naches. The wildfire grew to 30,000 acres over a period of 72 hours. Residents evacuated over 2,900 homes in the Wenas and Selah. The wildfire burned west to east through forested areas of Naches west in the Wenas area and towards Selah.
North Brownstone	08/16/2020	5,966	**Presidential Disaster Declaration DR-5330,** located 10 mi SW of Union Gap
Taylor Pond	08/16/2020	24,892	Fire mostly within the Yakima Training Center
Alkali Canyon	6/20/2019	4,000	Fire mostly within the Yakima Training Center
Pipeline	07/23/2019	6,515	Located 7 mi N of Selah
Lefthand	07/23/2019	3,406	Located 17 mi NW of Naches

[107] Washington State Department of Natural Resources (DNR) Large Fires Map and 2020 Wildfire Season Report, Bureau of Land Management and USDA Forest Service 2018 Pacific Northwest Wildfire Season Summary, Northwest Annual Fire Reports (2015-2021)

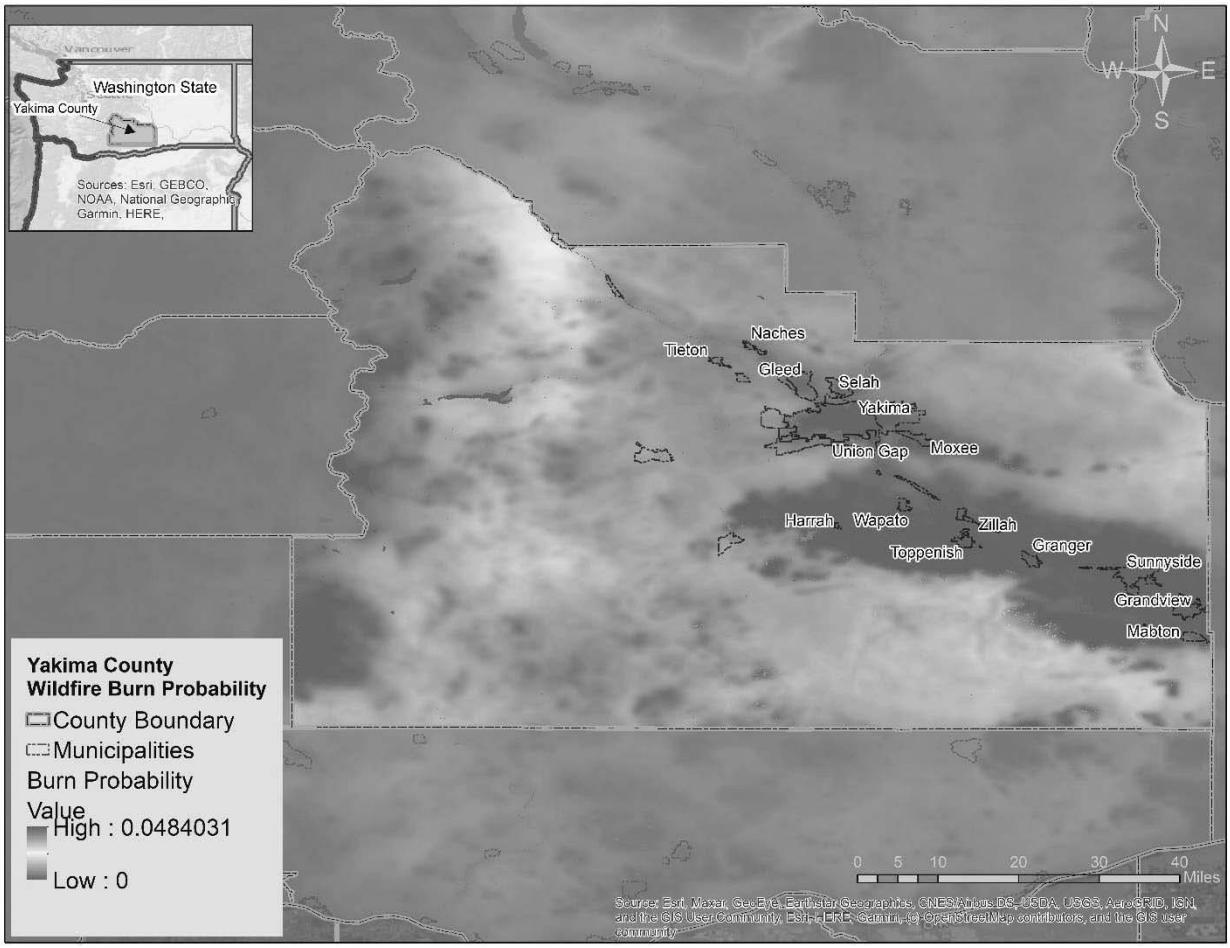
Table 3.50. Past Wildfire Occurrences, Yakima County (2015-2021)[107]			
Fire Name	**Date**	**Acres**	**Narrative**
Glade Creek	09/08/2018	12,735	Located 7 mi SE of Mabton
Meninick Pass	08/16/2018	5,537	Located 5 mi S of White Swan
Hawk	08/10/2018	700	**Presidential Disaster Declaration DR-5269,** started southwest of Yakima and caused Level Three evacuations on the first night.
Miriam	07/30/2018	5,400	Located 2 mi SE of White Pass
Conrad	07/01/2018	4,583	Located 14 mi NW of Yakima
Buffalo	06/02/2018	1,780	Located 10 mi N of Yakima
Boylston	07/19/2018	71,200	Shut down I-90 east of Ellensburg for 24 hours and mainly burned on the Yakima Training Center. The fire led to Level Three evacuations and destroyed five buildings.
L Road	07/19/2018	23,900	Started south of Vernita and lasted several days causing a temporary closure of State Route 24
Norse Peak -	08/11/2017	52,062	Located 11 mi W of Cliffdell and cost nearly $20 million
American	08/10/2017	3,855	Located 11 mi W of Cliffdell and cost $1.1 million
Glade 3	07/30/2017	10,669	Located 3 mi S of Mabton and cost $300,000
Sheep	07/23/2017	1,771	Located 3 mi N of Selah and cost $203,000
400	07/20/2017	26,087	Located 4 mi W of Mattawa and cost $1.2 million
Silver Dollar	07/02/2017	30,984	Located 30 miles east of Yakima and cost $1,300,000
Rattlesnake Hills	07/05/2017	2,916	Located 2 miles southeast of City of Yakima and cost $351,072
South Wenas	06/27/2017	2,846	**Presidential Disaster Declaration DR-5187,** located 3 mi S of Selah and cost $504,420
Rock Creek	09/10/2016	1,383	Located 12 mi NW of Naches and cost nearly $4 million
Tule #6	08/21/2016	8,469	Located 25 miles southeast of City of Yakima and cost $700,000
Lower Crab Creek	08/06/2016	6,000	Located 32 miles northeast of Yakima and cost $750,000.
Range 12	07/30/2016	176,581	Located 12 mi N of Sunnyside and cost nearly $35 million
Beam Road	06/20/2016	1,293	Located 21 miles southeast of Yakima and cost $50,000
Meeks Table	09/12/2015	1,183	Located 14 mi NW of Naches and cost about $3.5 million
Cougar Creek	08/10/2015	53,534	Located 9 mi NW of Glenwood and cost over $23 million

Future Probability

Yakima County has experienced 12 wildfire-related federally declared disasters since 2000, approximately one every two years, including five events in the HMP analysis period (2015-2021). There have been 30 wildfires greater than 1,000 acres in the HMP analysis period. Given the significant land area exposed to wildfire, a high frequency of past occurrences, and the impact of the changing climate, wildfires are considered **Highly Likely** (expected to occur every 1-4 years).

Figure 3.25 illustrates Burn Probability (or Wildfire Likelihood), considering the annual probability of a wildfire burning in a specific location. Factors contributing to this probability include topography, weather, and ignition history. As indicated in dark blue, urban areas tend to have a lower burn probability than wildland areas but can still experience significant impacts when fires move into the WUI, or from smaller fires that start in open spaces, parks, or drainages within urban areas.

Figure 3.25. Wildfire Burn Probability, Yakima County



Climate Change Impacts

According to the 2018 Washington State HMP, climate change impacts include a statewide increase in shorter, wetter winters with less snow and an increase of drier and longer summers. When combined with the present high fuel and vegetation status of the forest, these conditions indicate there will be an increase in high intensity fires. According to the Washington Climate Change Impacts Assessment, increased summer temperature and decreased summer precipitation will lead to significantly increased burn areas in the state. Increased burning from wildfires projected to double by the 2040s and triple by the 2080s.

Yakima County Vulnerabilities

Yakima County is highly vulnerable to the impacts of wildfires. Economic losses are expected in the millions, in addition to negative impacts to local community members, including those who are most vulnerable, destruction of critical infrastructure and the built environment, disruption of operations, and potential loss of natural and cultural resources that is all attributed to wildland fires.

Loss Estimates

Table 3.51 summarizes the 2022 Expected Annual Loss for wildfires in Yakima County, as provided by the FEMA National Risk Index. Expected annual loss is a likelihood and consequence component of risk that measures the expected loss of building value, population, and agricultural value each year. Nearly all losses stem from property damage.

Table 3.51. 2022 Expected Annual Loss – Wildfire[108]

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Wildfire	$2,540,263	$2,538,070	$2,188	0.00	$5

The last Presidential Disaster Declaration for the state of Washington was declared in February 2021 (FEMA-4584-DR) for wildfires and straight-line winds in multiple counties, including Yakima, that occurred the year prior in September 2020. Yakima County's per capita impact was around $9.55, and the wildfire caused major highways to close, disrupting recreation and hunting events.[109] The Evans Canyon fire in 2020 resulted in over 74,800 acres burned and caused $3,318,873 in damages.[110] According to the 2018 Washington State HMP, Yakima County experienced nearly $10 million in damages over 8 wildfire events between 1960-2017. That does not include significant events in 2020-2021.

Impacts on the Yakima County Population and Vulnerable Populations

The 2018 Washington State HMP indicated less than 3% of Yakima County's population is in medium or higher wildfire exposure areas. Vulnerable populations to wildfire include people who have been marginalized and/or disproportionally impacted by chronic poverty and inequality, have certain disabilities, or other access and functional needs. Emphasized by research, wildfires pose additional stress to vulnerable people because these populations may not have the resources to combat the negative impacts of fire. They may also be more exposed, including

[108] FEMA. National Risk Index for Natural Hazards. Accessed from https://www.fema.gov/flood-maps/products-tools/national-risk-index
[109] Federal Emergency Management Agency. FEMA-4584-DR. Accessed from https://www.fema.gov/disaster/4584
[110] Washington State Department of Natural Resources. Wildfire Season 2020. Accessed from: https://www.dnr.wa.gov/publications/rp_fire_annual_report_2020.pdf

those in unsuitable housing conditions or with lower incomes and subsequently fewer resources for fuel reduction and other mitigation measures. Wildfire impacts are exacerbated due to secondary hazards, such as impacts from smoke and poor air quality, which can cause health issues to populations inhaling the toxins in the air.[111]

A 2018 study found that census tracts that are majority Black, Hispanic, or Native American experience a 50% greater vulnerability to wildfire compared to other census tracts.[112] Over 50% of Yakima County identifies as Hispanic or Latino, a community that is disproportionately vulnerable to wildfires based on adaptive capacity, access to resources, and language barriers. Migrant farmworkers are also highly vulnerable to the impacts of wildfire due to exposure to wildfire smoke and poor air quality, language barriers, and often unsuitable housing conditions.

Impacts on Built Environment and Critical Infrastructure

According to the 2018 Washington State HMP, 2.5% of Yakima County's built infrastructure is exposed to wildland fires, while 47% or 280 critical facilities are located within wildfire exposed areas (medium or higher risk). Local drinking water systems have been impacted due to the increase in turbid water from burn scars. Turbid water can contain viruses, parasites, and bacteria, and lead to increased filtration and processing burdens for water infrastructure.

The 2022 exposure analysis considered critical facilities in Yakima County with a high or extreme wildfire risk. The results are summarized in **Table 3.52**. Facilities of note include four fire stations in the Nile-Cliffdell Fire District, three dams (Tieton, Clear Creek, and Bumping), a heliport in White Swan, and Naches Valley High School and Hope Academy, both in Naches.

Table 3.52. Yakima County Critical Facilities Exposure to Wildfire

Facility Type	Number of Exposed Facilities
Communications	6
Education	2
Emergency Services	4
Hospitals	0
Mass Care	0
Transportation	25
Utilities	7
Total Facilities Exposed by Hazard	**44**

Impacts on Government and Emergency Operations

Many emergency services facilities in Yakima County, including 50% of all fire stations (28 total), eight law enforcement buildings, and 27 EMS facilities are at high risk to wildfires due to their location, according to the 2018 Washington State HMP. Moreover, wildfires create major disruptions for emergency response efforts within the county. Wildfires may lead to the closure of critical transportation routes, as well as hazardous driving conditions due to smoke. Government and emergency operations could also experience disruption due to poor air quality, limiting travel or work by personnel.

[111] Davies IP, Haugo RD, Robertson JC, Levin PS. (2018). The unequal vulnerability of communities of color to wildfire. PLoS ONE 13(11): e0205825. Accessed from https://doi.org/10.1371/journal.pone.0205825
[112] Ibid.

Impacts on the Economy and Businesses

Wildfires can create direct and indirect economic costs through the loss of crops or agriculturally productive land, potential workdays lost due to evacuations or poor air quality, suppression effort costs, and road access interruptions. Wildfires can lead to years of disruption as agriculturally productive areas are restored.

Impacts on Natural and Cultural Resources

The impacts of wildfires on Yakima County's natural resources include destruction of profitable agricultural lands, devastation to wildlife habitats, like the Toppenish National Wildlife Refuge, feeding stations, and critical habitats, and potentially contaminated watersheds. Wildfires in riparian areas reduce canopy and shading potential for streams, many of which provide habitat for Endangered Species. As for cultural resources, the southern part of the county is made up predominantly of Yakama Nation, which contain cultural resources valuable to indigenous communities. Large wildfires pose a threat to sacred, pre-contact lands across Yakima County, as well as associated artifacts and culturally significant resources that cannot be reproduced. This vulnerability is noted in the Yakama Nation Climate Adaptation Plan, which recognizes that wildfire can inhibit access, deteriorate or destroy sites, and curtail the use of ceremonial and ancestral use of key areas.

Overall Risk Ranking

Yakima County has a **High Risk** to wildland fire. FEMA has rated Yakima County **Relatively High Risk** for wildfire, with a risk score is 17.59. According to the 2018 Washington State HMP, Yakima County has a **Medium-High Risk** to wildfires. **Table 3.52** below summarizes the risk assessment results for the wildland fire hazard for Yakima County.

Table 3.52. Risk Assessment Results – Wildfire

Criteria	Score	Description
Human Health	1	Very Low; 0-1 deaths and few injuries expected
Property Damage	3	Medium; localized, substantial
Economic Disruption	3	Medium; widespread, temporary
Environmental Resource Damages/Degradation	4	High; localized and severe
Emergency Services Burden	3	Medium; localized and medium-term burden
Critical Facilities Exposure	1	Very Low; less than 10% of facilities exposed
Probability Score	5	Very Likely; expected every 1-4 years
Frequency Score	5	Very Likely; events have occurred every 1-4 years
Total Impact Score	**25**	**High Risk**

3.17. Cyber Threat/Attack

Cyberattacks can fiscally and reputationally impact federal, state, and local governments, as well as private institutions and organizations. FEMA defines cyberattacks as "malicious attempts to access or damage a computer system."[113] The word, cyberattacks, also extends to the disruption of communications technologies.

Cybercriminals and nation state actors employ various tactics for cyberattacks, the common cyberattacks include:

- Malware
- Phishing
- Man-in-the-Middle (MitM)
- Denial of Service (DOS) or Distributed Denial of Service (DDOS)
- SQL Injections

Aggressors direct their attacks on an individual's or business's phone, computer system, gaming system, medical machines, and other internet connected devices.[114] The motives for cybercriminals to conduct a cyberattack typically include:

- Financial profit
- Humiliation
- Taking a political or social stand
- Competition
- Intellectual challenge

Strength/Magnitude

Cyber criminals, hackers, and nation state actors can attack computer systems on both a local and global scale. An attack on a computer system may be delivered via numerous methods and essentially from anywhere on the globe. New methods of computer entry are developed daily and at a constant rate. An estimated 450,000 pieces of newly developed malware is detected every day.[115] On average, hackers attack computers about every 39 seconds and globally an estimated 30,000 websites are hacked daily.[116] Unless steps are taken for protection, no one person or business is immune from a cyberattack.

Cybercriminals can impact millions of people and disrupt their way of life with a cyberattack. Among the most severe cyberattacks are mega breaches. Mega breaches are defined as data breach incidents that affects one million people or more.[117]

Although organizations use different metrics, the National Cybersecurity and Communications Integration Center (NCCIC) developed the NCCIC Cyber Incident Scoring System (NCISS) to

[113] FEMA. Cyberattack. Access from: https://community.fema.gov/ProtectiveActions/s/article/Cyberattack
[114] US Department of Homeland Security. Cybersecurity. Accessed from: https://www.ready.gov/cybersecurity
[115] AV-Test. Malware. Accessed from: https://www.av-test.org/en/statistics/malware/
[116] TechJury. How many cyber-attacks happen per day in 2022? Accessed from: https://techjury.net/blog/how-many-cyber-attacks-per-day/
[117] Washington State Office of the Attorney General. AG data breach report: 2021 sets new record for number of data breaches and ransomware attacks. Accessed from: https://www.atg.wa.gov/news/news-releases/ag-data-breach-report-2021-sets-new-record-number-data-breaches-and-ransomware

provide a tool for estimating the risk and potential impact of an incident.[118] The NCISS aligns with other national agencies terminology and provides six priority levels. The six priority levels are summarized in **Table 3.53** below.

Table 3.53. Cyber Incident Scoring System[119]

Priority Level	Description
Emergency	An Emergency priority incident poses an imminent threat to the provision of wide-scale critical infrastructure services, national government stability, or the lives of U.S. persons.
Severe	A Severe priority incident is likely to result in a significant impact to public health or safety, national security, economic security, foreign relations, or civil liberties.
High	A High priority incident is likely to result in a demonstrable impact to public health or safety, national security, economic security, foreign relations, civil liberties, or public confidence.
Medium	A Medium priority incident may affect public health or safety, national security, economic security, foreign relations, civil liberties, or public confidence.
Low	A Low priority incident is unlikely to affect public health or safety, national security, economic security, foreign relations, civil liberties, or public confidence.
Baseline	A baseline priority incident is highly unlikely to affect public health or safety, national security, economic security, foreign relations, civil liberties, or public confidence. The bulk of incidents will likely fall into the baseline priority level with many of them being routine data losses or incidents that may be immediately resolved.

Past Occurrences

There is no record of reported cyberattacks in Yakima County, however, Washington State has seen an uptick in cybercriminal activity, with 2021 as the highest year in data breach notices and cyberattacks. In 2021, Washingtonians saw one of the largest mega breaches since the 2018 Equifax and 2017 ActiveOutdoors incidents. According to the Washington State Attorney General's Office, the 2021 Accellion cyberattack exposed the names, Social Security numbers, account information, addresses, and email of 1.3 million Washingtonians.[120] Mega breaches may impact anywhere from one to 50 million individuals and can cost up to about $350 million.[121]

[118] CISA. CISA national cyber incident scoring system. Accessed from: https://www.cisa.gov/uscert/CISA-National-Cyber-Incident-Scoring-System
[119] Ibid.
[120] Washington State Attorney General's Office. 2021 data breach report. Accessed from: https://agportal-s3bucket.s3.amazonaws.com/2021%20Data%20Breach%20Report.pdf
[121] VentureBeat. bm security study: Mega data breaches cost $40 million to $350 million. Accessed from: https://venturebeat.com/2018/07/10/ibm-security-study-mega-data-breaches-cost-40-million-to-350-million/#:~:text

Table 3.54 summarizes major reported cyberattacks in Washington during the HMP analysis period (2015-2021). Record of these incidents comes from various agency press releases.

Table 3.54. Major Cyberattacks in Washington State (2015-2021)		
Date	**Location**	**Event Narrative**
01/24/22	Washington State Department of Licensing (DOL)	The DOL experienced a breach in security in its IT system, POLARIS. Personal data of licensed professionals have been exposed.
12/20 - 02/21	State of Washington, Washington State Auditor's Office (SAO)	SAO's third-party vendor, Accellion, experienced a breach in data. The attack hit the vendor's data files, specifically their legacy File Transfer Appliance (FTA) product. The information accessible to cyber criminals includes files on individuals who filed for State unemployment benefits. The information included names, social security numbers, date of birth, email addresses, bank information, etc.
12/29/21	Washington State Department of Transportation (WSDOT)	Data held at WSDOT was exposed due to a vulnerability. The data of 2,200 people was exposed; however, it is not known if the information was illegally used.
5/16/21	State of Washington Department of Labor and Industries (L&I)	The contracted interpreter scheduling system for L&I identified access to personal information of employees who were not patients.
	Washington State University (WSU) Foundation	WSU Foundation's third-party service provider stored was attacked and potentially exposed the personal information of users of the service.
10/14/18	Washington State Patrol	An individual illegally entered an agency vehicle and stole a portable hard drive. The driver's license numbers, and social security number were taken from the data.
07/29/17	Equifax, Inc.	Equifax's website vulnerability allowed cybercriminals access to personal files. Individual's names, Social Security numbers, addresses, etc.
08/22/16	ACTIVEOutdoors	The online provider for hunting and fishing license in Idaho, Oregon, and Washington was illegally accessed. Data on individual's name, address, and driver license.

In addition to state agencies, regular citizens have borne the brunt of large cyberattacks where customer data is stolen, including the 2021 Kronos cyberattack and 2017 Nuance cyberattack, both of which impacted Yakima County residents. Additionally, numerous Washington counties have experienced cyberattack incidents. The infrastructure of Washington's local communities continues to be targeted by cybercriminals and other actors. Impacted sectors of local infrastructure include government, education, healthcare facilities, communications, public safety, and information technology. Although not an exhaustive list, Yakima County's neighboring communities with reported cyberattacks include:

- Benton County

- Douglas County
- Jefferson County
- King County
- Kitsap County
- Kittitas County
- Okanogan County
- Pierce County
- Thurston County

Local governments have been attacked by malware, ransomware, trickbot, phishing, etc. These attacks exposed the personal information of residents, disrupted communications, shut down systems, destroyed data, cost local government thousands, and have even permanently closed the doors of business and organizations. Often, exposure of personal information occurs through third-party vendors assisting host companies and organizations.[122]

Future Probability

Washington experienced multiple cyber incidents in recent years and the occurrence of these attacks is expected to increase. According to the Washington SAO, cyberattacks spiked in 2021, with a report stating that "cyberattacks caused 87.5% of all reported data breaches – up from 63% in 2020."[123]

The future probability of a cyberattack in Yakima County is **Likely** (expected to occur every 5-10 years), given the growing frequency of events in the region, state, and across the nation.

Climate Change Impacts

Currently, there is no data suggesting a relationship between cyber incidents and climate change conditions.

Yakima County Vulnerabilities

Yakima County is highly vulnerable to cyber incidents. According to the Yakima County Community Preparedness Survey, summarized in **Appendix C**, 50.7% of survey respondents said cyberattacks pose a "High Risk" to their households or businesses, and 40.2% said that mitigation actions to cyberattacks should be a "High Priority" for local government. Community members, businesses, and local government are all highly vulnerable to cyberattacks. Local governments are prone to cyber incidents if they do not have the necessary knowledge or funds and often use antiquated systems. Additionally, cyberattacks can cause millions in dollars of loses for the community, and the cost is growing each year. While it is challenging to mitigate the impact of cyberattacks on individuals and businesses, there are opportunities to reduce the vulnerability of government and critical infrastructure systems that are essential to daily life.

Loss Estimates

Cyberattacks create the potential for severe impacts and significant loses in Yakima County. A cyberattack on one the region's largest sectors such as agriculture, forestry and fishing, health services, local government, business, education, and manufacturing, could lead to significant

[122] Forbes. Risks and vulnerabilities when using third-party vendors. Accessed from: https://www.forbes.com/sites/forbestechcouncil/2021/06/14/risks-and-vulnerabilities-when-using-third-party-vendors/?sh=37dbcfd72a4b

[123] Washington State Attorney General's Office. 2021 data breach report. Accessed from: https://agportal-s3bucket.s3.amazonaws.com/2021%20Data%20Breach%20Report.pdf

disruption to daily life or the economy. According to a recent report, IBM estimated the cost of a data breach in 2021 to be $4.24 million, an increase from 2019.[124] The cost of cyber incidents is expected to continue growing in the upcoming years.

Impacts on the Yakima County Population and Vulnerable Populations

Cyber incidents do not discriminate. Cyberattacks have the potential to impact residents of any age. Seniors and young children unaware of security measures may be highly targeted through their daily devices. Recent research suggests that "every year cyber criminals steal roughly $40 billion from senior citizens," often because of phishing scams.[125] Additionally, data breaches, especially on hospital systems, have exposed the information of elderly individuals. Elderly individuals are highly vulnerable and often represent most reported victims. Cyberattacks may not only impact the identity of vulnerable populations but their health as well by targeting medical devices. The identity and information of children may also be exposed or stolen by cybercriminals and may go unrecognized.[126]

Impacts on Built Environment and Critical Infrastructure

Cyberattacks on critical infrastructure are of major concern. Cyberattacks on critical infrastructure can lead to the disruption of power, water, transportation, financial, and communications systems.[127] Disruption to any critical infrastructure sector can have negative financial impacts and affect daily activities. In 2020, the Port of Kennewick was attacked by ransomware which disabled access to emails and computer systems. The Port did not pay $200,000 in ransom and instead worked to restore or restart their systems.[128]

Impacts on Government and Emergency Operations

Government and emergency operations facilities are often heavily dependent on their network and internet connection. Any computer or electronic device connected to the internet has the potential to be hacked and maliciously used. Cyberattacks can disrupt government communications, preventing incoming or outgoing calls from residents and clients. Cyber incidents can also disrupt systems preventing the organization or clients from paying bills, accessing storage files, or may even destroy vital records. In 2020, a series of phishing emails led a former clerk of the City of Tenino to automated payments to out of state banks costing the City $280,309 in public funds.[129]

Impacts on the Economy and Businesses

Local businesses and organizations that heavily rely on internet access for financial management have the potential to be negatively impacted by cyber threats. Small businesses are not immune to cybercriminal activity – many are the target of attacks and only a few are

[124] UpGuard. What is the cost of a data breach in 2022? Accessed from: https://www.upguard.com/blog/cost-of-data-breach
[125] SiliconANGLE. As cybercriminals target the elderly, here's how to stop their attacks. Accessed from: https://siliconangle.com/2020/07/28/cybercriminals-target-elderly-heres-stop-attacks/#:~:text
[126] Government Technology. Cyber attacks on schools: Who, what, why and now what? Accessed from: https://www.govtech.com/education/k-12/cyber-attacks-on-schools-who-what-why-and-now-what
[127] U.S. Government Accountability Office. Protecting critical infrastructure from cyberattacks. Accessed from: https://www.gao.gov/blog/protecting-critical-infrastructure-cyberattacks#:~:text
[128] The Maritime Executive. Ransomware cripples IT systems of inland port in Washington State. Accessed from: https://www.maritime-executive.com/article/ransomware-attack-cripples-systems-of-inland-port-in-washington-state
[129] Government Technology. Washington city loses $280, 309 to successful phishing scam. Accessed from: https://www.govtech.com/security/washington-city-loses-280-309-to-successful-phishing-scam

equipped or prepared. The loss per attack on small business on average is more than $188,000. Unfortunately, small businesses often go under after experiencing a cyberattack.

Impacts on Natural and Cultural Resources

There is limited data to suggest cyberattacks have a large impact on natural and cultural resources. The organizations that steward these resources may be vulnerable to a cyberattack that limits their programs and services, at least temporarily.

Overall Risk Ranking

Yakima County has a **Medium Risk** to cyber threats and attacks. **Table 3.55** below summarizes the risk assessment results for the cyber hazard for Yakima County.

Table 3.55. Risk Assessment Results – Cyber Threat/Attack

Criteria	Score	Description
Human Health	1	Very Low; 0-1 deaths and few injuries expected
Property Damage	1	Minimal
Economic Disruption	2	Low; localized and temporary
Environmental Resource Degradation/Damage	1	Minimal
Emergency Services Burden	2	Low; localized and temporary
Critical Facilities Exposure	5	High; most critical facilities are exposed
Probability Score	5	Very Likely; expected every 1-4 years
Frequency Score	1	Very Unlikely; no documented history
Total Impact Score	**18**	**Medium Risk**

3.18. Dam and Levee Failure

Dams are engineered structures used to store water for the purposes of flood control, water supply, irrigation, energy generation, and recreation. Dams are constructed to lay across a body of water and can control or completely stop the movement of water.

Levees are defined as structures, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water as to reduce risk from temporary flooding. Levees are constructed and placed parallel to a moving body of water such as rivers.

Dams and levees serve different purposes and their position to the water is unique. The primary purpose of levees is to reduce flood risk and protect life and property. Dams also serve as risk management to prevent flooding; however, they also create infrastructure benefits for both the surrounding community and industries. These structures can help reduce flooding hazards; however, they do not remove all risk – dams and levees may both experience failure.

Dam Failure

Dam failure is the uncontrollable and sudden release of water as a result of structural failure. The amount of water released by a dam is destructive. It can cause damage to the environment and be fatal to human lives. A failure of a dam can also result in the inundation of vital infrastructure such as bridges, roads, and water systems. According to the Stanford University's National Performance of Dam Program, there have been approximately 1,000 dam failures over the past four decades.[130] Dam failure occurs once in every three years in Washington, as recorded in the 2018 Washington State HMP.

According to the Association of State Dam Safety Officials, dam failure is a result of many factors. The top factors to dam failures include the following:[131]

- **Overtopping:** Overtopping is the spill of water over the dam. Overtopping is a great indication of potential dam failure.
- **Foundation defects:** Foundation defects are deficiencies and faults with the dam including settlement and slope instability.
- **Cracking:** Cracking of the dam occurs from the natural settling of the structure.
- **Piping and Seepage:** Piping is when seepage is not properly filtered through the dam which can form sinkholes. 20% of dam failures occur as a result of piping and seepage.

Dam failure may occur because of disasters or human-caused incidents such as sabotage and planned dam removal.[132]

[130] The Associated Press. At least 1, 680 dams across the US pose potential risk. Accessed from: https://apnews.com/article/ne-state-wire-us-news-ap-top-news-sc-state-wire-dams-f5f09a300d394900a1a88362238dbf77

[131] Energy Education. Dam Failures. Accessed from: https://energyeducation.ca/encyclopedia/Dam_failures

[132] USACE Hydrologic Engineering Center. Causes and types of dam failure. Accessed from: https://www.hec.usace.army.mil/confluence/rasdocs/ras1dtechref/latest/performing-a-dam-break-study-with-hec-ras/estimating-dam-breach-parameters/causes-and-types-of-dam-failures

Levee Failure

A failure of a levee system can also result in the sudden and rapid release of water. Levee failure can similarly inundate the surrounding area flooding homes, critical infrastructure, water systems, bridges, and roads. Levee failure may result from many factors, including:

- **Breach**: When parts of the structure break away allowing water to flow through
- **Levee Overtopping**: Occurs when water tops and exceeds the top of the crest of the levee
- **Sand Boil:** Occurs when pressured water is moved in an upward direction and flowing through soil pores exceeding the weight from the soil above it

Levee failures may also occur because of natural disasters or human-caused incidents.

Strength/Magnitude

The National Inventory of Dams (NID) Report lists 28 of the dams with High Hazard Potential in Yakima County. Dam ratings are based on the potential damage a dam failure can cause downstream and result in the loss of life and outstanding economic loss. As required by the Dam Safety Regulatory Program, dams must have an Emergency Action Plan (EAP), especially if the dam has a High Hazard Potential rating, however, according to the NID, only 69% of the dams in Yakima County have an EAP.

The Washington Department of Ecology develops an Inventory of Dams Report containing 1,226 regulated dams in selected counties across the state. Dam hazard potential is assigned by the State based on the potential consequences downstream if the dam were to fail and release the reservoir. The hazard index is summarized in **Table 3.56.**

Table 3.56. Dam Hazard Potential, Washington Dept. of Ecology

Category	Code	Consequences
High	1A	Greater than 300 lives at risk
	1B	From 31 to 300 lives at risk
	1C	From 7 to 30 lives at risk
Significant	2D	From 1 to 6 lives at risk
	2E	No lives at risk but significant economic or environmental impacts
Low	3	No lives at risk

Location

According to the Washington Department of Ecology's Inventory of Dams Report, Yakima County has a total of 72 dams. Of these, 26 dams have a High Hazard Potential, threatening 7 or more lives downstream. The 1A (highest risk) dams include the Sunnyside Reservoir and Roza WW5 Reregulation Reservoir, both along the Yakima River, Bumping Lake Dam on the Bumping River, Tieton Dam on the Tieton River, and French Canyon Dam on Cowiche Creek. Additionally, several High Hazard Potential (Class 1A) dams in neighboring counties may threaten Yakima County communities, including the Cle Elum Dam and Keechelus Dam in Kittitas County, WA.

Table 3.57 below summarizes the Yakima County communities located within these dam inundation areas, as illustrated in **Figures 3.26 – 3.30** on the following pages.

Table 3.57. High Hazard Potential Dams and Inundation Areas, Yakima County

Dam Name	Cities in Inundation Area
Bumping Lake	Gleed, Naches, Union Gap, and Yakima
Cle Elum	Granger, Selah, Toppenish, Union Gap, Wapato, Yakima
French Canyon	Tieton
Keechelus	Selah, Toppenish, Union Gap, Wapato, and Yakima
Roza	Selah, Yakima, Union Gap, Yakima County Fire District #2
Sunnyside	Granger, Wapato, Zillah
Tieton	Gleed, Naches, Toppenish, Union Gap, Wapato, Yakima, and Zillah

Figure 3.26. Bumping Lake Dam Inundation Area

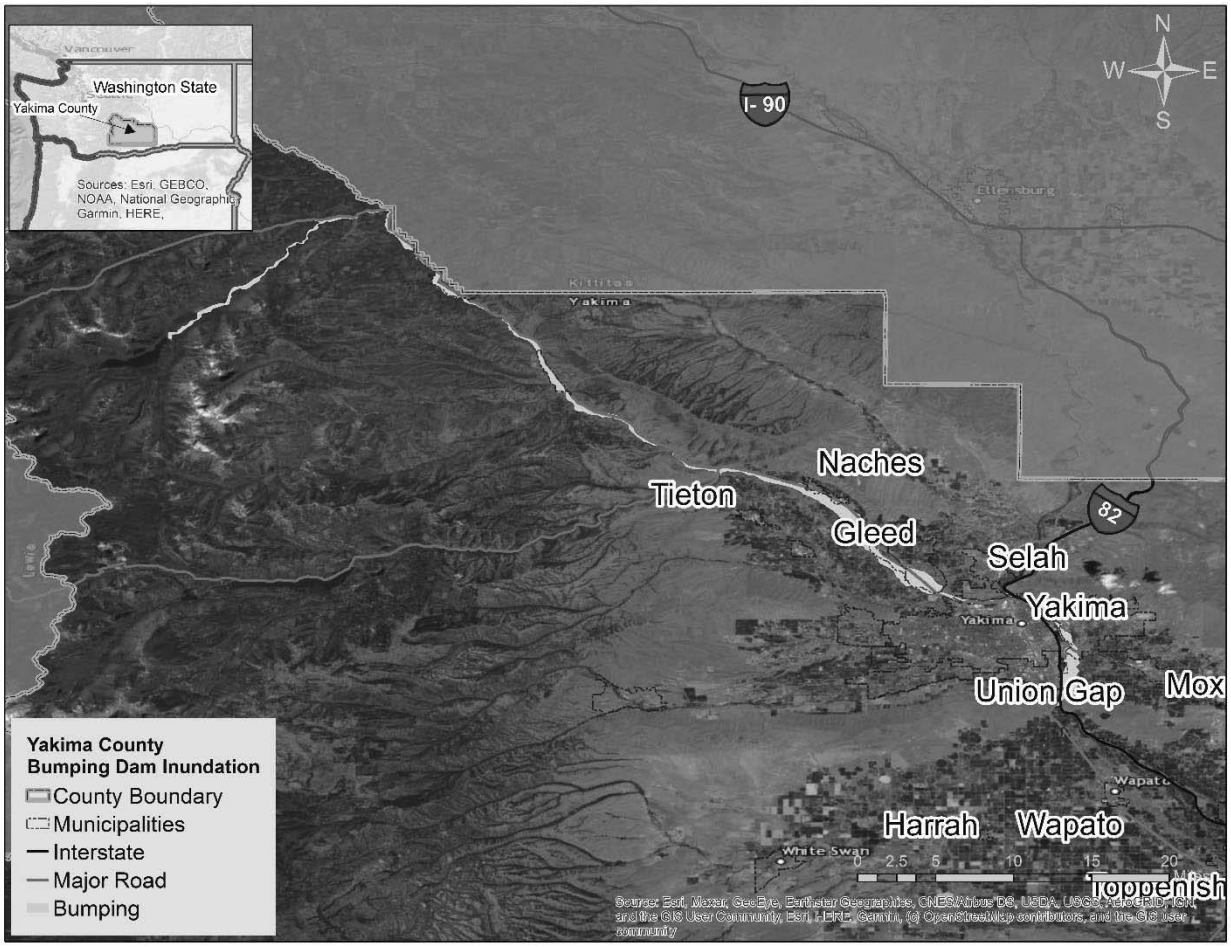


Figure 3.27. Cle Elum Dam Inundation Area

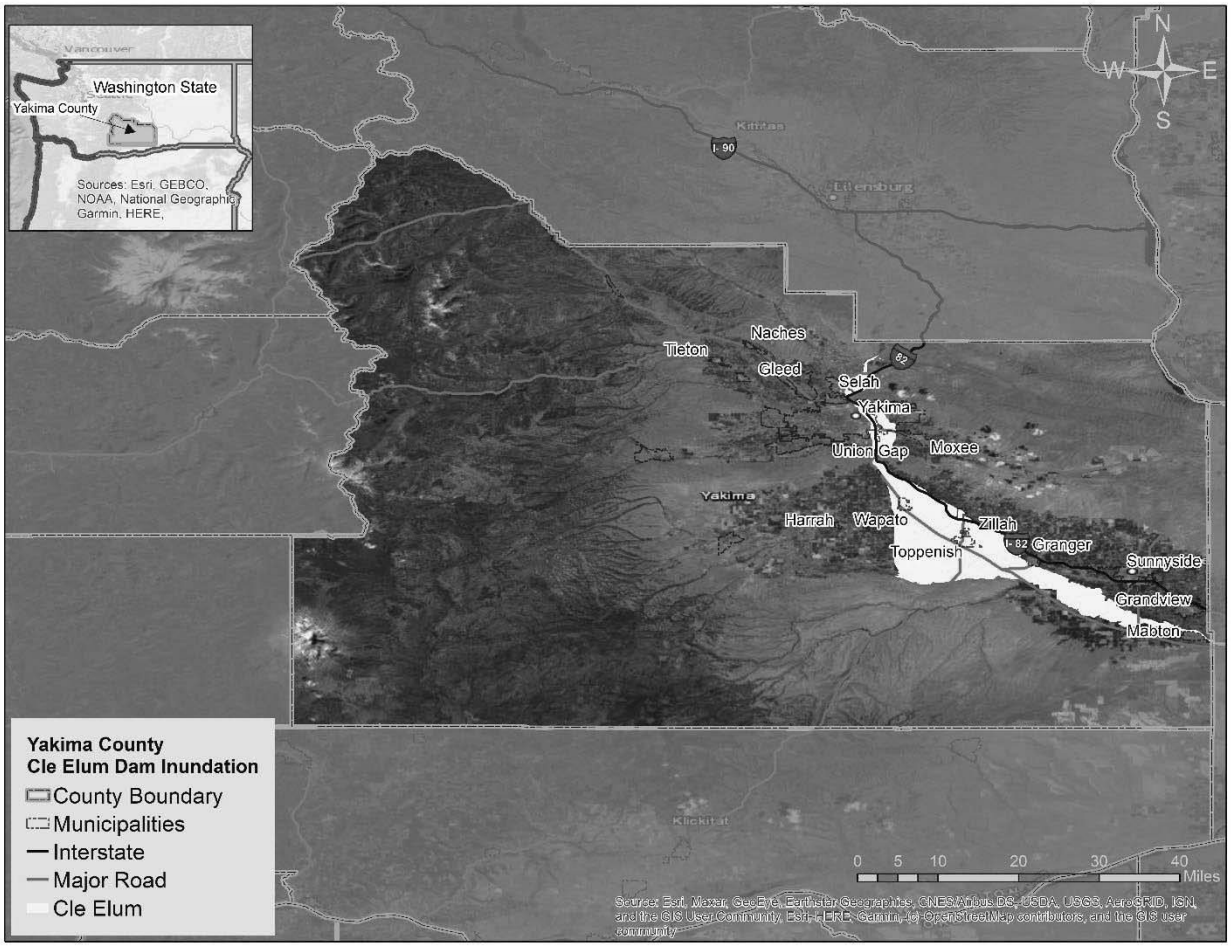


Figure 3.28. Keechelus Dam Inundation Area

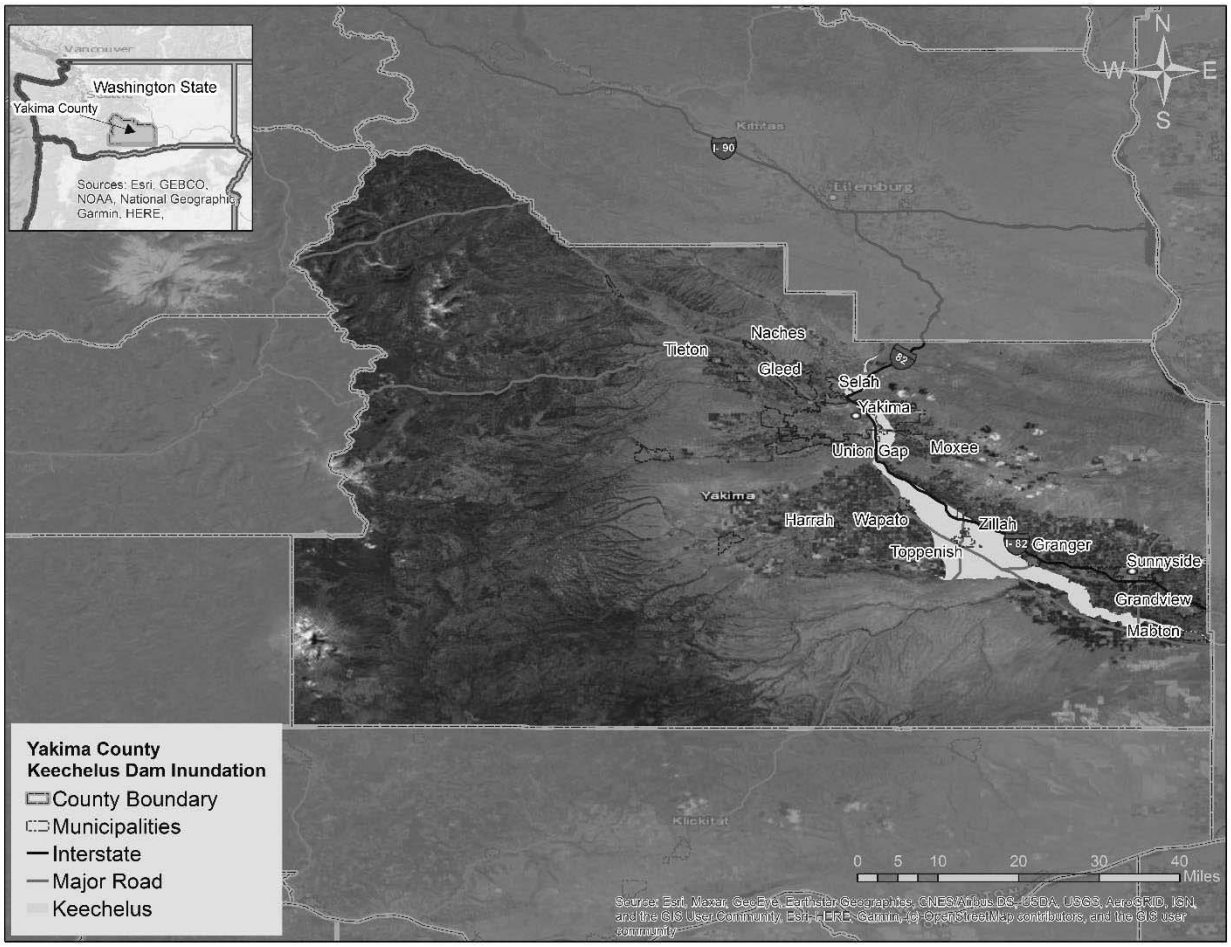


Figure 3.29. French Canyon Inundation Area

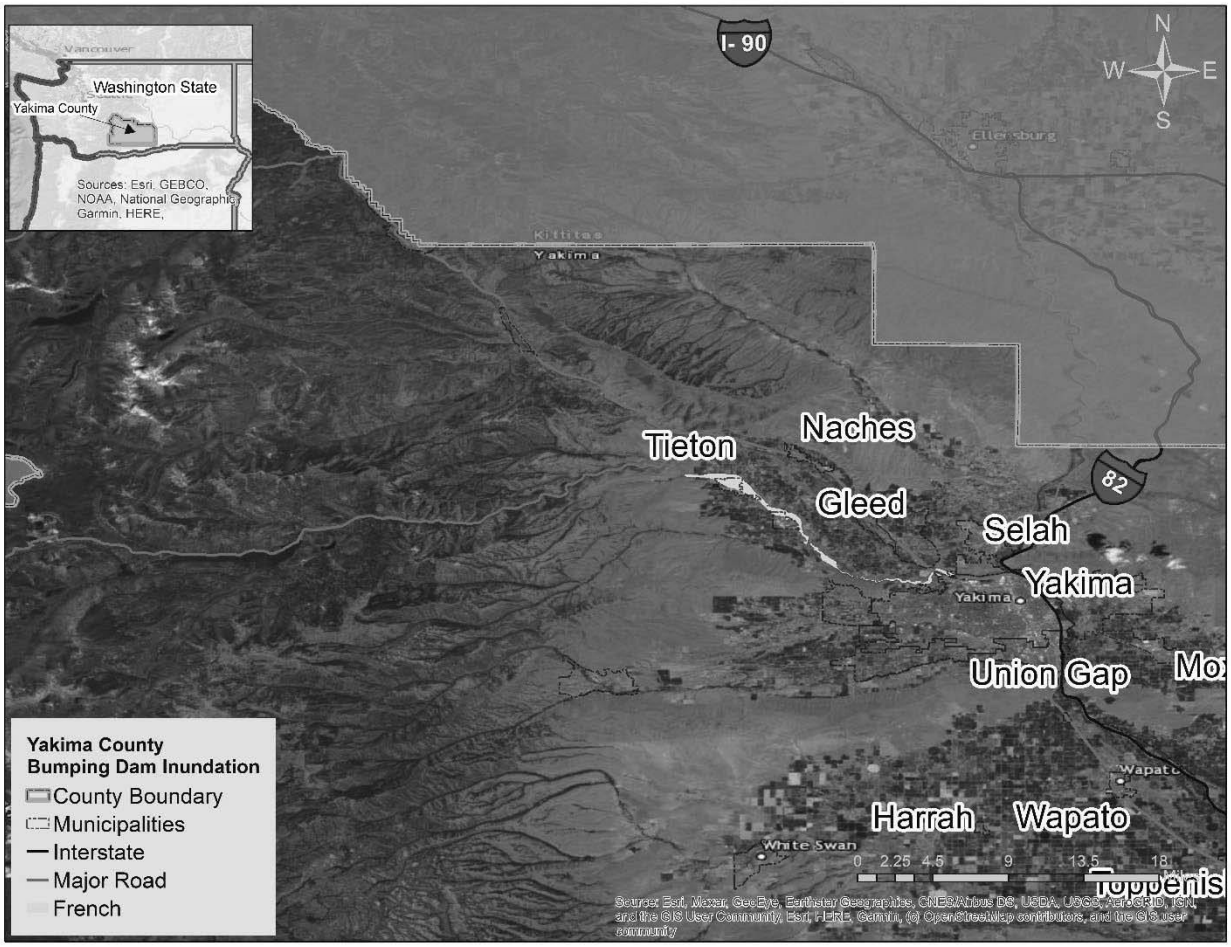
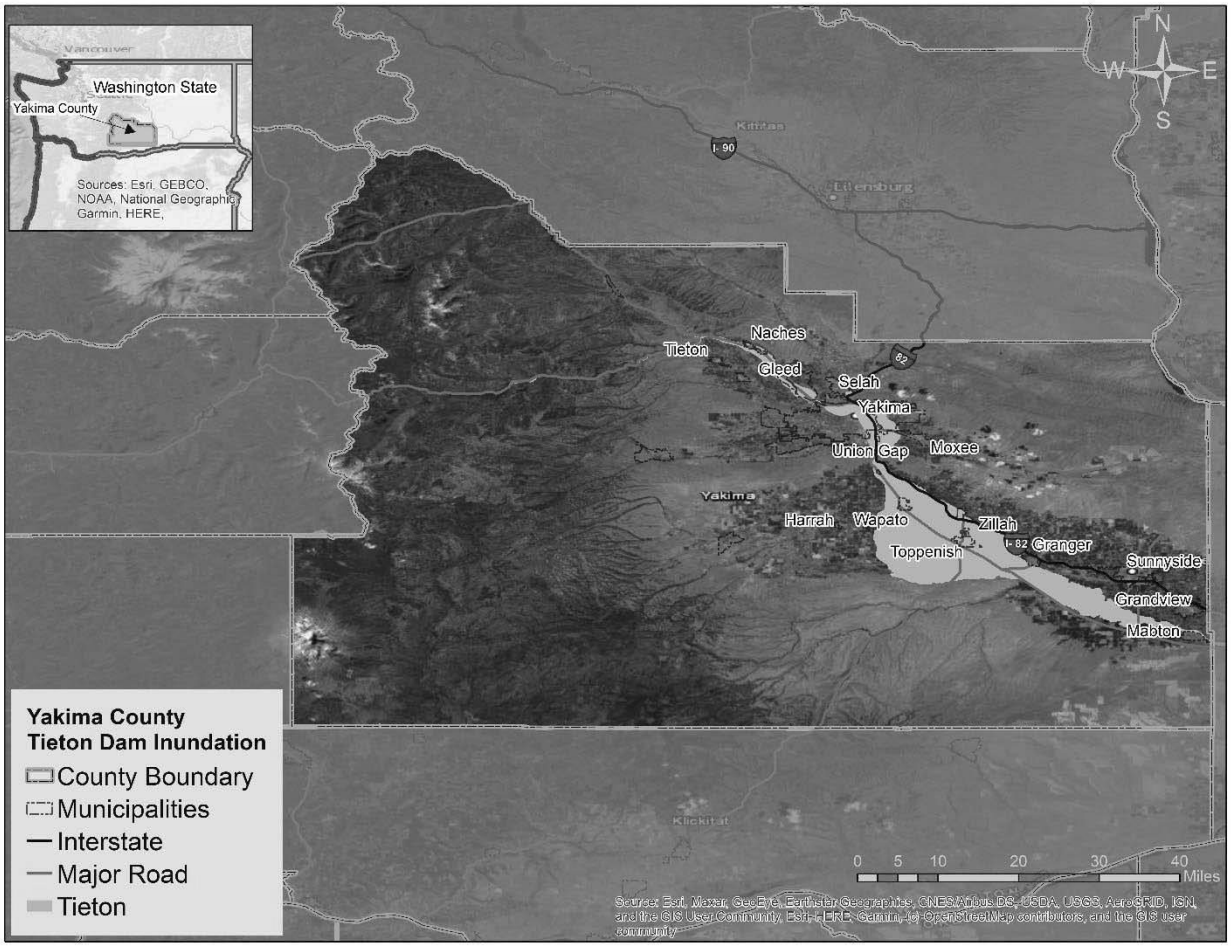
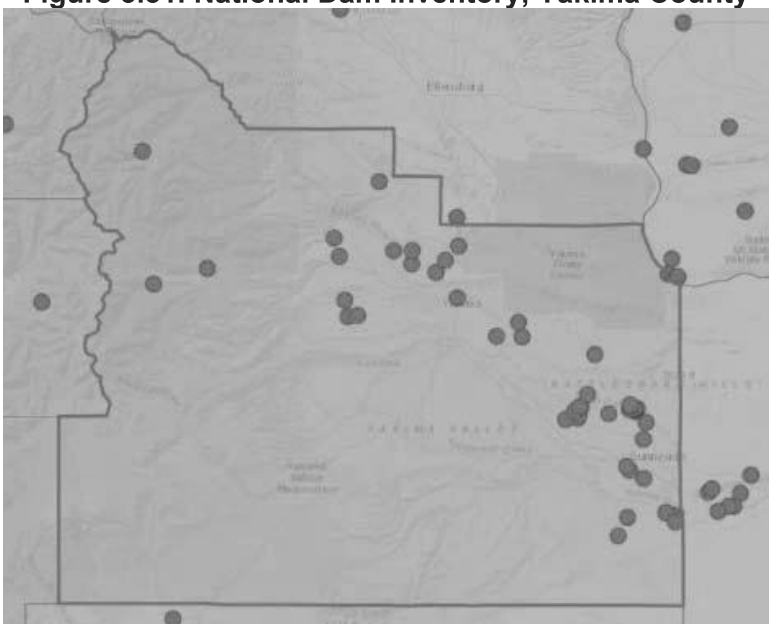


Figure 3.30. Tieton Dam Inundation Area



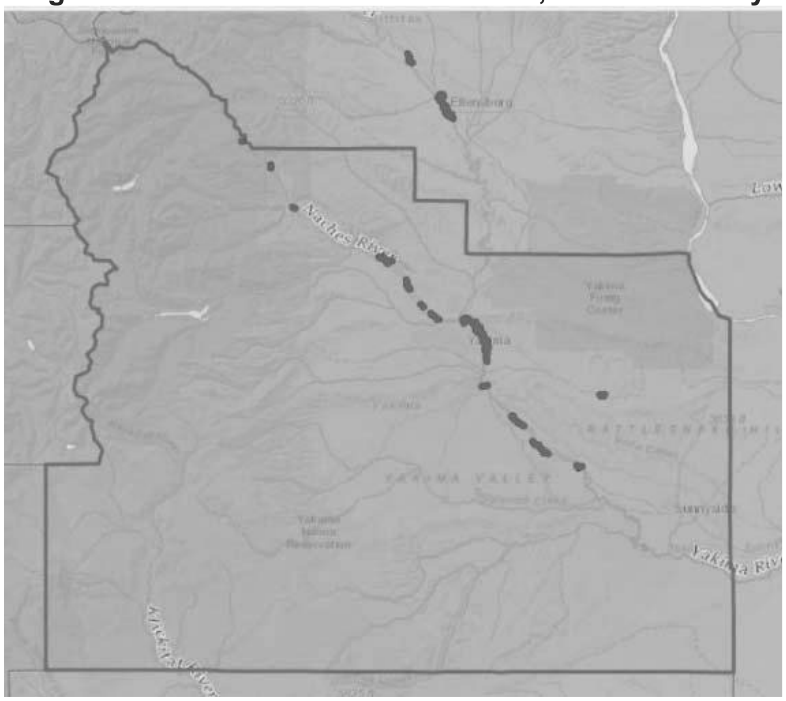
In addition to these High Hazard Potential Dams, dams are found all throughout the county as indicated in **Figure 3.31** below.

Figure 3.31. National Dam Inventory, Yakima County



The National Levee Database lists a total of 28 systems reaching 23 miles in Yakima County. The levee network is primarily found along the Yakima River and Naches River. **Figure 3.32** illustrates the levees in Yakima County.

Figure 3.32. National Levee Database, Yakima County



Past Occurrences

Drawing from the 2018 Washington State HMP, Washington has experienced numerous dam failures since 1918. However, there has been no significant dam failure incident in Yakima County. Yakima County has experienced significant flooding from a levee breech. In 2017, a small levee was breached in a field owned by DeRuyter Brother Dairy farm. As a result, the levee released a mix of water and dairy waste into homes downhill.[133]

Future Probability

The future probability of a dam and levee failure in Yakima County is **Very Unlikely** (expected once every 100+ years). Given the limited history of failures in the county and increased attention to maintenance and preparedness, the rate of failures is not expected to increase.

Climate Change Impacts

Researchers expect that the frequency of dam failures and levee failure or overtopping will increase due to the changing climate.[134] An increase in water run-off from human-caused climate change, short yet heavy precipitation, and less intense but long duration precipitation contributes to the risk of dam failure.

Yakima County Vulnerabilities

Incidents involving a dam or levee failure can result in significant property damage, loss of life, or environmental and natural resource destruction. A dam failure can greatly deplete water accessibility for the county to use for irrigation and limit water availability for critical services such as firefighting, at least temporarily.

Loss Estimates

An estimate of losses is often based on the potential damage a dam failure can cause to communities downstream. The aftermath of a dam or levee failure can be catastrophic and costly to the local government and its residents. Dam and levee failures can inundate homes and businesses, costing owners thousands of dollars to repair, clean, and recuperate. As described by FEMA, flooding is one of the most common and expensive hazards in the United States. Just one inch of water in a single-story residence, roughly 1,000 square feet, can create approximately $11,000 of damage; whereas one foot of water can reach upwards of $29,000 of damage.[135] With large quantities of water released, the local community may also lose the surrounding natural environmental and agricultural resources including farming fields and ecosystems.

Impacts on the Yakima County Population and Vulnerable Populations

Dam failure in Yakima County could have a severe impact on the residents and businesses, especially to those living near the dams or in the inundation zone. Often, residents are unaware of their location in relations to dams. According to FEMA, communities are often near or around at least one dam.[136] Dam failures can affect roads, bridges, and natural habitat, leaving those who depend on these for transportation or livelihood affected. The aftermath of a flood from a

[133] KING-TV. Dairy waste floods homes near Yakima. Accessed from: https://www.king5.com/article/tech/science/environment/dairy-waste-floods-homes-near-yakima/281-418867608
[134] The New York Times. Expect more: Climate change raises risk of dam failures. Accessed from: https://www.nytimes.com/2020/05/21/climate/dam-failure-michigan-climate-change.html
[135] FEMA. Flood insurance and the NFIP. Accessed from: https://www.fema.gov/fact-sheet/flood-insurance-and-nfip#:~:text
[136] FEMA. Living with dams: Know your risks. Accessed from: https://www.fema.gov/sites/default/files/2020-08/fema_living-with-dams_p-956.pdf

dam failure may also result in bodies of stagnant water, attracting vector borne animals and developing serious diseases and pathogens.

Impacts on Built Environment and Critical Infrastructure
The failure of the dams and levees can have a serious impact on the nearby built environment and critical infrastructure. Dam and levee failure has the potential to affect every sector of Yakima County's critical infrastructure. A release of a large quantity of water from a dam can inundate the roads, bridges, farming fields, businesses, or powerlines. A failure of levees can result in the contamination of local water systems, including the drinking water. The failure of levees and dams may cause water to inundate industrial facilities and farms, moving chemicals and farm waste to residential areas.

The 2022 exposure analysis considered critical facilities in Yakima County located within a mapped dam or levee inundation area. The results are summarized in **Table 3.58**. Given the significant number of Yakima County communities located in dam inundation areas, there is a high number of critical facilities exposed.

Table 3.58. Yakima County Critical Facilities Exposure to Dam/Levee Failure

Facility Type	Number of Exposed Facilities
Communications	7
Education	63
Emergency Services	18
Hospitals	1
Mass Care	26
Transportation	147
Utilities	30
Total Facilities Exposed by Hazard	**292**

Impacts on Government and Emergency Operations
The dams built in Yakima County serve a specific purpose to the area. The dams' function are used for domestic water supply, irrigation, recreation, and flood control amongst other things.[137] Dam failure has the potential to disrupt normal and emergency operations and stop the dam from serving its original purpose. Emergency first responders face the risk of danger if they are unfamiliar with how to respond to a failed dam or if the dam operators do not have an EAP.

Impacts on the Economy and Businesses
Dam failure can have major impacts on Yakima County's local economy and businesses. The inundation of businesses, roads, and vital infrastructure may halt the supply chain process and severely impact the local economy. The cleanup and restoration of the land has serious financial ramifications, especially for residents without insurance. As Yakima County has a large agricultural sector, a levee failure may deplete water resources for irrigation resulting in millions of dollars in loss of product. Dam owners may take full responsibility for the incident and be

[137] Department of Ecology State of Washington. Inventory of dams report selected Washington counties and selected dam hazard categories. Accessed from: https://apps.ecology.wa.gov/publications/documents/94016.pdf

liable for the reconstruction cost for downstream damages.[138] Most of the levee systems are publicly owned, leaving local governments responsible for the cost of clean-up and restoration.

Impacts on Natural and Cultural Resources

In addition to the displacement of residents, the impact from a dam failure to the nearby natural resources can be heavy. Dam failure can impact the natural ecosystem of animals and plants. A deluge of the natural environment may affect and disrupt the natural flow of water and destroy an animal's breeding grounds and ecosystems.[139]

Overall Risk Ranking

Yakima County has a **High Risk** to dam or levee failure. **Table 3.59** below summarizes the risk assessment results for the hazard for Yakima County.

Table 3.59. Risk Assessment Results – Dam/Levee Failure

Criteria	Score	Description
Human Health	5	Very High; 10+ deaths and 20+ injuries
Property Damage	3	Medium; localized, substantial
Economic Disruption	3	Medium; widespread, temporary
Environmental Resource Damages/Degradation	4	High; localized, severe
Emergency Services Burden	4	Very High; widespread, medium-term burden
Critical Facilities Exposure	3	Medium; 20-30% exposed
Probability Score	1	Very Low; expected once every 100+ years
Frequency Score	1	Very Low; limited documented history
Total Impact Score	**24**	**High Risk**

[138] Association of State Dam Safety Officials. Ownership responsibility and liability. Accessed from: https://damsafety.org/dam-owners/ownership-responsibility-and-liability

[139] Environment 911. 5 environmental effects of dams. Accessed from5 Environmental Effects of Dams - Environment 911

3.19. Hazardous Materials Release

Occasionally because of equipment failure, human error, natural disaster, or sabotage, incidents involving hazardous materials can be harmful to the nearby environment and community. These hazardous materials are typically categorized by type and its effects. Hazardous materials and their byproducts are characterized by the Environmental Protection Agency (EPA) by ignitability, corrosivity, reactivity, and toxicity. The release of hazardous materials can be fatal to humans, plants, and animals if handled improperly and the quantities released exceed the acceptable amount. Disposal of hazardous materials often occur in transport from their point of origin to waste disposal sites via public roads, waterways, highways, and railroads.

Hazardous materials are defined and regulated by the EPA, U.S. Occupational Safety and Health Administration (OSHA), U.S. Department of Transportation (USDOT), and U.S. Nuclear Regulatory Commission. The definition and classification of hazardous material varies among agencies. USDOT categorizes hazardous materials into 9 classes, summarized in **Table 3.60**.

Table 3.60. Department of Transportation Classification	
Class 1	Explosives
Class 2	Gases
Class 3	Flammable Liquid and Combustible Liquid
Class 4	Flammable Solid, Spontaneously Combustible, and Dangerous when wet
Class 5	Oxidizer and Organic Peroxide
Class 6	Poison (Toxic) and Poison Inhalation Hazard
Class 7	Radioactive
Class 8	Corrosive
Class 9	Miscellaneous

Strength/Magnitude

The strength of any hazardous material spill or release depends on several factors, including:

- Toxicity of hazardous material
- Quantity of hazardous material spilled or released
- Dispersal characteristics of hazardous material
- Local conditions such as wind direction and topography
- Location of the spill or release in proximity to sensitive environmental areas, such as a watershed that provides a community's drinking water
- Efficacy of response and recovery actions

A spill or release of hazardous materials must be reported to the state and federal government if the amount passes a certain threshold. According to the EPA, harmful amounts of discharge oil include those that: [140]

- Violate applicable water quality standards
- Cause a film or "sheen" upon, or discoloration of the surface of the water or adjoining shorelines
- Cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines

For hazardous substances, the federal government established the Superfund Reportable Quantities (RQs) to list the quantifiable amount needed to report.[141] If the release of substances equals or exceeds the reportable quantities, the responsible parties must report it to the federal government. The RQs for each hazardous substance is listed under the Codes of Federal Regulations. Individuals must report the incidents if injury, death, evacuation, change of flight patterns, release of radioactive or biological agents, or if the marine pollutant exceeds 450 L (119 gallons) for a liquid or 400 kg (882 pounds) for a solid.[142]

[140] U.S. Environmental Protection Agency. When are you required to report an oil spill and hazardous substance release? Accessed from: https://www.epa.gov/emergency-response/when-are-you-required-report-oil-spill-and-hazardous-substance-release

[141] U.S. Environmental Protection Agency. When are you required to report an oil spill and hazardous substance release? Accessed from: https://www.epa.gov/emergency-response/when-are-you-required-report-oil-spill-and-hazardous-substance-release

[142] National Archives and Records Administration. 49 eCFR 171.15 - immediate notice of certain hazardous materials incidents. Accessed from: https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-C/part-171/subpart-B/section-171.15

Location

Incidents involving hazardous materials are not limited to one location – they can occur anywhere where hazardous materials are generated, managed, transported, or disposed of. In Yakima County specifically, it is difficult to narrow and specify where incidents occur given there are hazardous materials transported on every road in the county, using heavy rail, and passing through multiple pipelines. Hazardous materials are categorized into three types for this profile: fixed facilities, transportation, and pipelines.

Fixed Facilities

Tier II Facilities are required by the Emergency Planning and Community Right to Know Act (EPCRA) to submit a mandatory report of hazardous and toxic substances that are housed at the facility at any given point during the reporting year. Facilities are required to report Tier II substances and Extremely Hazardous Substances (EHS) that are equal to or greater than the defined Tier II reporting thresholds.

There are over 2,350 Tier II fixed facilities reporting to the EPA, Yakima Valley Emergency Management, and local fire departments in Yakima County. These facilities are located across the county, managing various chemicals and hazardous materials. Common types of fixed facilities include agricultural warehouses and processing facilities, which often store ammonia or other hazardous chemicals.

There are 46 facilities included in the EPA's Toxic Release Inventory, which includes any facility that has been reported to the EPA since 1987. In 2021, 14 of these facilities reported a release to the EPA, including Granger, Moxee, Selah, Sunnyside, Toppenish, Yakima, and Wapato.

The EPA manages an interactive site called the "Cleanups in My Community" map that includes superfund sites, brownfields, and other facilities requiring cleanup. There are 7 superfund sites in Yakima County, including Grandview, Naches, Yakima, and White Swan. Additionally, there are four brownfields, and several facilities that have required Resource Conservation and Recovery Act (RCRA) corrective action sites.

Transportation

The likeliest place for a hazardous spill or release while in transport is along one of the main transportation corridors passing through a populated area, including I-82, US-97, US-24, or US-12. The potential for a hazardous material incident from a train derailment is high considering the heavy railway traffic inside city limits. According to the U.S. DOT, Yakima County has a total of 115 miles of freight railroad.[143] There are approximately 80 miles of the Central Washington Railroad track located in Yakima County.[144]

Pipelines

Pipelines are hollow structures often underground used to transport various liquids such as oil, oil products, and natural gases. In Washington, there are approximately 36 pipeline operators

[143] U.S. Department of Transportation. County transportation profile. Accessed from: https://www.bts.gov/ctp
[144] Columbia Basin Railroad. Central Washington Railroad. Accessed from: https://cbrr.com/companies/central_washington_railroad.html#:~:text

managing 45,000 miles of pipelines.[145] According to the Washington Utilities and Transportation Commission, 25 of the pipelines carry natural gas and 10 carry hazardous liquid.[146]

Past Occurrences

Yakima County has experienced several hazardous material incidents in recent years. These incidents caused tremendous damage to the localized environment. Past incidents include a fire at a site in Grandview that closed I-82 for 24 hours, as well as ammonia leaks in local apple storage facilities. Yakima County has also experienced pipeline incidents, including on the CNG main line that runs along the Yakima River, as well as the Williamson Pipeline.

Table 3.61 includes recent significant pipelines incidents in Washington.

Table 3.61. Significant PHSMA Pipeline Incidents (2015-2020)				
Year	**Number**	**Fatalities**	**Injuries**	**Total Cost Current Year Dollars**
2020	2	0	0	$1,913,578
2019	2	0	1	$428,819
2018	1	0	0	$136,619
2017	3	0	0	$1,981,214
2016	1	0	0	$3,333,821
2015	2	0	3	$1,132,585

In 2022, a fire at the Nutrien Ag Solutions Plant in Sunnyside burned 1.7 million pounds of Sulphur and other chemicals. The fire consumed the hazardous chemicals and released them into the air.[147] Although no injuries were reported, 18 homes in the area were evacuated. Also in 2022, a fruit warehousing facility reported an ammonia leak, which was quickly resolved by emergency responders. Prior to this incident in Zillah, the last reported ammonia leak was in 2008.

In 2021, a semi-truck and trailer crashed and overturned into Toppenish Creek and its associated wetlands off US-97, approximately 4 miles south of Toppenish. The truck discharged oil into the Toppenish National Wildlife Refuge and a lamprey rehabilitation area.[148] In 2015, an above ground storage tank failed in Sunnyside causing as roughly 1,500 gallons of used motor oil to seep into the Sulphur Creek and Yakima River.[149]

These are just some of the more significant hazardous materials incidents that have occurred during the HMP analysis period (2015-2021). Smaller incidents requiring emergency response, or with some environmental damage, are more common. Larger incidents that threaten communities or require evacuation or shelter-in-place orders, are more infrequent.

[145] Washington Utilities and Transportation Commission. Pipeline Safety. Accessed from: https://www.utc.wa.gov/public-safety/pipeline-safety

[146] Washington Utilities and Transportation Commission. Pipeline Safety. Accessed from: https://www.utc.wa.gov/public-safety/pipeline-safety

[147] Yaktrinews. Chemicals burned in Sunnyside agricultural plant fire generate hazardous runoff, triggering evacuations. Accessed from: https://www.yaktrinews.com/structure-fire-at-sunnyside-agricultural-plant-draws-large-firefighting-presence-2/

[148] U.S. Environmental Protection Agency. Toppenish creek truck spill. Accessed from: https://response.epa.gov/site/site_profile.aspx?site_id=15307

[149] Department of Ecology Washington State. Sulphur Creek Oil Spill. Accessed from: https://ecology.wa.gov/Spills-Cleanup/Spills/Spill-preparedness-response/Responding-to-spill-incidents/Spill-incidents/Sulphur-Creek-Oil-Spill

Future Probability

The future probability of a major hazardous materials incident in Yakima County is **Likely** (expected to occur every 5-10 years) given the number of hazardous materials transported in the region and presence of hundreds of fixed facilities.

Climate Change Impacts

Climate change is not expected to increase the frequency or intensity of hazardous materials incidents. That said, the management, disposal, and transportation of hazardous materials has a clear impact on climate change.

Yakima County Vulnerabilities

Incidents involving the release of hazardous materials can have severe impact on the health and safety of the community and residents, the local economy, and critical facilities.

Loss Estimates

According to the 2018 Washington State HMP, property damage as a result of a pipeline incident occurring in a densely populated area of the state could generate approximately a cost of $100-500 million dollars. The EPA has the authority to manage contaminated sites under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the RCRA, and the Brownfields Laws.[150] The EPA has the authority to seek the responsible parties involved in a hazardous material spill. Congress established two funds to cover clean-up expenses if the responsible party cannot pay or is unwilling to cooperate.[151] The clean-up of hazardous material spill is the responsibility of the businesses and parties involved, not the local government where the incident occurred.

While clean-up costs are the responsibility of the company transporting or storing the hazardous material, communities can incur upfront costs for mitigation and protective actions.

Impacts on the Yakima County Population and Vulnerable Populations

A hazardous material incident can affect all community members and put them at greater risk for developing health impacts. Workers in facilities who regularly use or handle hazardous materials, transportation carriers, nearby residents, first responders, and first receivers are all at risk of health impacts from hazardous materials[152] Hazardous materials incidents have the potential to impact Yakima's residents of any age. However, certain individuals are more vulnerable and at greater risk for harm depending on the location, occupation, and type of material released. Yakima County's residents living near bodies of water (rivers, lakes, etc.), highways, railways, and industrial buildings have a higher chance of being impacted by hazardous materials due to spills or other types of releases. As of 2020, roughly 12.7% of the population live near toxic release sites.[153] Air quality may also be compromised when hazardous materials burn. Like smoke from a regular fire, individuals with heart or lung diseases, diabetes, older adults, children and teenagers may be at greater risk. Hazardous substances can have

[150] U.S. Environmental Protection Agency. Economics of land cleanup and waste management. Accessed from: https://www.epa.gov/environmental-economics/economics-land-cleanup-and-waste-management

[151] U.S. Environmental Protection Agency. Who pays. Accessed from: https://www.epa.gov/emergency-response/who-pays

[152] FEMA. Hazardous Materials Incidents. Accessed from: https://www.fema.gov/sites/default/files/2020-07/hazardous-materials-incidents.pdf

[153] Stacker. 17% percent of people live near toxic release facilities - here's how it breaks down by state. Accessed from: https://stacker.com/stories/24514/17-people-live-near-toxic-release-facilities-heres-how-it-breaks-down-state

major effects on someone' health and cause cancer, behavioral abnormalities, genetic mutations, and even physical deformation.

Impacts on Built Environment and Critical Infrastructure
Impacts on critical infrastructure from hazardous materials incidents are of major concern to Yakima County. Hazardous spills can halt production of services and utilities. The county's transportation, water and wastewater systems, energy, agriculture, and manufacturing sectors could be at risk. Hazardous material spills or broken underground storage tanks can contaminate water supplies in natural water reserves and impact wastewater treatment sites.

The 2022 exposure analysis considered critical facilities in Yakima County located within a one-mile of a main transportation corridor likely to carry hazardous materials. The results are summarized in **Table 3.62**. With a wide boundary, there are nearly 500 critical facilities in this buffer zone that may require evacuations in a hazardous materials spill.

Table 3.62. Yakima County Critical Facilities Exposure to Hazardous Materials Transport)

Facility Type	Number of Exposed Facilities
Communications	14
Education	122
Emergency Services	40
Hospitals	0
Mass Care	43
Transportation	233
Utilities	37
Total Facilities Exposed by Hazard	**489**

Impacts on Government and Emergency Operations
The release or spill of hazardous materials can heavily impact a responding agency's operations. A large release of hazardous material may cause evacuations for closure of roads delaying the response of specialized units and other operations along those routes. Initial first responders often bear the high risks associated with the incidents. Due to their involvement, HAZMAT incidents can heavily impact emergency services operations. First responders may not be able to extricate or transport individuals to receive medical care due to decontamination protocols. Emergency first responders similarly face the risk to developing serious health impacts from hazardous material incidents.

Impacts on the Economy and Businesses
According to the FEMA, "hazardous materials incidents are perhaps the most relatable and scalable, from neighborhood to national level incidents with the potential for devastating long-term impacts to the environment and the economy."[154] Land cleanup and management of hazardous materials after an incident has heavy financial implications and may even affect property values.[155] According to research, "most studies find that property values decline in

[154] FEMA. Hazardous Material Incidents. Accessed from: https://www.fema.gov/sites/default/files/2020-07/hazardous-materials-incidents.pdf
[155] U.S. Environmental Protection Agency. Economics of land cleanup and waste management. Accessed from: https://www.epa.gov/environmental-economics/economics-land-cleanup-and-waste-management

response to contamination events and/or rebound after cleanup."[156] In 2018, the total cost of damages from transporting hazardous materials in Washington was $1,333,533, in 2019 the total amount was $1,297,582, and in 2020 it reached a total of $6,168,743.[157]

Impacts on Natural and Cultural Resources

The impact of hazardous materials incidents on Yakima County's natural resources can be severe. In any incident there is the potential for hazardous substances to contaminate soils, water systems, plants, and animals. According to the Soil Science Society of America, "common contaminants in urban soils include pesticides, petroleum products, radon, asbestos, lead, chromated copper arsenate and creosote."[158] These contaminants are extremely hazardous to animals and plants. Hazardous materials incidents also result in increased predation and decrease reproduction. In plants, high levels of toxic chemicals may inhibit photosynthesis leading to their death. In other cases, the chemicals can burn plants or prevent adequate oxygenation.

[156] U.S. Environmental Protection Agency. Economics of land cleanup and waste management. Accessed from: https://www.epa.gov/environmental-economics/economics-land-cleanup-and-waste-management

[157] U.S. Department of Transportation. All incidents. Accessed from: https://portal.phmsa.dot.gov/analytics/saw.dll?Portalpages&PortalPath=%2Fshared%2FPublic%20Website%20Pages%2F_portal%2F10%20Year%20Incident%20Summary%20Reports

[158] Soil Science Society of America. Soil contaminants. Accessed from: https://www.soils.org/about-soils/contaminants/

Overall Risk Ranking

Yakima County has a **High Risk** to hazardous materials incidents. **Table 3.63** below summarizes the risk assessment results for the hazard for Yakima County.

Table 3.63. Risk Assessment Results – HazMat Release

Criteria	Score	Description
Human Health	1	Very Low; 0-1 deaths and few injuries expected
Property Damage	1	Minimal
Economic Disruption	2	Low; localized, temporary
Environmental Resource Damages/Degradation	4	High; localized, severe
Emergency Services Burden	2	Low; localized, temporary
Critical Facilities Exposure	5	Very High; most critical infrastructure exposed
Probability Score	4	Likely; expected to occur every 5-10 years
Frequency Score	4	Likely; has occurred every 5-10 years
Total Impact Score	**23**	**High Risk**

3.20. Nuclear Release/Radiological Incident

Multiple facilities in Washington State manage and deal with radiological materials and waste, however, Washington State has only one fixed nuclear facility. The Columbia Generating Station is the only commercial nuclear energy facility in the Pacific Northwest and is one of the largest producers of electricity.[159] Other sites such as Department of Energy's Hanford Site, U.S. Navy bases located in the Puget Sound region, and at the Framatome Richland Engineering and Manufacturing Facility also handle radiological material. The Hanford Site is approximately 26 miles from the nearest city in Yakima County – Sunnyside, and the Columbia Generating Station is approximately 40 miles from Grandview. When handling radiological material, there is always a concern of release to local or neighboring areas.

Commercial low-level radioactive waste is regulated by the Waste Management Section of the Washington State Department of Health and issues licensing for the disposal of radioactive waste. Currently the Washington State Department of Health licenses nearly 400 facilities in the state that use radioactive materials.[160] These sites are categorized as medical, industrial, and laboratory and often use radiation. These facilities, inspected frequently, use radiation daily for medical treatments, radiography, flow gauges, and research and development.[161]

The different types of radiation include:

- Alpha
- Beta
- Medical X-ray
- Gamma
- Neutron

All these types of radiation have different penetration abilities and effects.

Strength/Magnitude

A radiological incident may have severe impacts on Yakima County and result in millions of dollars in loss and remediation. A radiological incident can be dangerous to animal and human health, resulting in long-term health impacts and even death. Isotopes and radiation can last years, sometimes surpassing a lifetime. Therefore, consideration and care must be taken when managing a nuclear power plant and responding to a radiological incident.

Location

Any facility that handles radiological material is susceptible to a radiological or nuclear release incident. However, the larger sites may pose a greater risk to the population. A release of radioactive material from the Columbia Generating Station or Hanford Site would initiate an evacuation of the general population within a radius of approximately 10 miles of the facility and radioactive material may enter the human chain via crops or dairy products out to an approximate radius of 50 miles from the facility.[162] Yakima County falls within the 50-mile Ingestion Planning Zone for the Columbia Generating Station and the Hanford Reservation.

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[159] Energy Northwest. Nuclear Energy: Columbia Generating Station. Accessed from https://www.energy-northwest.com/energyprojects/Columbia/Pages/default.aspx

[160] Emergency Management Division. Radiological. Accessed from https://mil.wa.gov/radiological

[161] Washington Emergency Management Division. Washington State Enhanced Hazard Mitigation Plan Risk and Vulnerability Assessment. Accessed from: https://mil.wa.gov/enhanced-hazard-mitigation-plan

[162] Emergency Management Division. Radiological. Accessed from https://mil.wa.gov/radiological

Past Occurrences
There has not been a significant release of radiological material in Washington in the past 50 years.

Future Probability
The future probability of a radiological/nuclear incident in in Yakima County is **Unlikely** (expected to occur every 50+ years).

Climate Change Impacts
There does not appear to be a link between the frequency of radioactive material release and climate change. However, nuclear plants may be impacted by extreme temperatures brought on by climate change. As a result of extreme temperatures, nuclear plants run the risk of experiencing outages. After the entire energy process, nuclear plants return the water to its source and potentially heat it up. Plants cannot allow the water to reach a certain temperature, however, extreme heat is causing the water to meet the threshold ultimately pausing the plant's operations.

Yakima County Vulnerabilities
A release of radioactive material may result in great losses for Yakima County and impact a wide arrange of sectors. Impacts to Yakima County's built environment, critical infrastructure, population, and natural resources may occur.

Drawing from the Yakima County Community Preparedness Survey 2022, Yakima County participants believed that a radiological incident was a low risk (41.5%), while others believe it was a medium (34.1%) and high (19.4%) risks.

Loss Estimates
The aftermath of a radiological incident can be catastrophic and costly to the local government and residents. A radiological incident can result in significant expenses to remove toxic chemicals from the built and natural environment. Clean-up after a radiological incident can and rebuilding life can reach millions of dollars. The local economy may also lose revenue because of economic disruption from close businesses and supply chain disruptions. Most significantly for Yakima County would be a quarantine of animal and agricultural products after a radiological incident.

Impacts on the Yakima County Population and Vulnerable Populations
A radiological incident in Yakima County, the Columbia Generating Station, or neighboring radiological sites will have a severe impact on the residents and population in the county, especially those living near the sites. If exposed to radiation, residents may run the risk of developing long-term health effects including cancer. Long-term health effects may occur more in children or pregnant women. Many Yakima County residents, especially in the eastern part of the county, commute to Hanford and the Columbia Generating Station, and may be directly exposed to an incident or lose their jobs in related sectors.

Impacts on Built Environment and Critical Infrastructure
In a radiological incident, such as radiological material release or meltdown, the county's critical infrastructure may be disrupted or even destroyed. A disruption to a major bridge or highway from a radiological incident may result in the disruption of traffic flow, impeding evacuations. Additionally, the surrounding built environment may absorb radioactive material and remain contaminated for years.

Impacts on Government and Emergency Operations
A response to a radiological incident may have severe impacts to emergency first responders. Emergency first responders place themselves at risk to develop radioactive poisoning and long-term health effects. First responders must be mindful of the acceptable dose and exposure as they conduct response activities. Incident specific equipment must be used to respond to radiological incidents.

Impacts on the Economy and Businesses
As a result of a radiological incident and emergency, nearby local businesses may lose clients and may even close their doors permanently. Supply chain operations may be halted due to product contamination or the publics' fears. Drawing from the 2018 Washington State HMP, public fear would lead consumers to no longer buy agricultural products from the county or state. In the State of Washington, this may result in billions of dollars lost per year.[163] In Yakima County alone, agriculture also contributes a billion of dollars into the local economy.

Impacts on Natural and Cultural Resources
A radiological incident can greatly impact the natural resources in Yakima County. The release of radioactive material can be dangerous to animals including aquatic specifies. Nuclear radiation may disrupt animal habits and plant patterns. Critical wildlife habitats within the 50-mile Ingestion Planning Zone may be affected by a radiological incident.

Overall Risk Ranking
Yakima County has a **Low Risk** to a nuclear release. **Table 3.64** below summarizes the risk assessment results for the hazard for Yakima County.

Table 3.64. Risk Assessment Results – Nuclear Release

Criteria	Score	Description
Human Health	1	Very Low; 0-1 deaths and few injuries expected
Property Damage	1	Very Low; 0-1 deaths and few injuries expected
Economic Disruption	5	Very High; long-term disruption
Environmental Resource Damages/Degradation	5	Very High; widespread, severe, long-term
Emergency Services Burden	1	Minimal
Critical Facilities Exposure	1	Minimal
Probability Score	1	Very Unlikely; expected once every 50+ years
Frequency Score	1	Very Unlikely; no documented history
Total Impact Score	**16**	**Low Risk**

[163] Emergency Management Division. Washington State Enhanced Hazard Mitigation Plan Risk and Vulnerability Assessment. Accessed from https://mil.wa.gov/enhanced-hazard-mitigation-plan

3.21. Terrorism

Forecasting potential terrorist incidents and targets is a difficult task at the national level and in Washington State.[164] However, the growth of domestic and international terrorism attacks, as well as Homegrown Violent Extremist (HVEs) it is important to analyze such incidents.

The Washington State Legislature defines terrorism or a terrorist act as an act that is intended to: (1) intimidate or coerce a civilian population; (2) influence the policy of a branch or level of government by intimidation or coercion; (3) affect the conduct of a branch or level of government by intimidation or coercion; or (4) retaliate against a branch or level of government for a policy or conduct of the government.[165] The definition of terrorism continues to expand and includes the following terms:

- **International Terrorism** includes violent, criminal acts committed by individuals and/or groups who are inspired by, or associated with, designated foreign terrorist organization or nations (state-sponsored).[166]
- **Domestic Terrorism** is any act of violence that is dangerous to human life or potentially destructive of critical infrastructure or key resources committed by a group or individual based and operating entirely within the United States or its territories without direction or inspiration from a foreign terrorist group.[167]
- **Homegrown Violent Extremist (HVEs)** is a person of any citizenship who has lived and/or operated primarily in the United States or its territories who advocates, is engaged in, or is preparing to engage in ideologically motivated terrorist activities (including providing support to terrorism) in furtherance of political or social objectives promoted by a foreign terrorist organization but is acting independently of direction by a foreign terrorist organization.[168]
- **Targeted Violence** is violence premeditated and directed at specific individuals, groups, or location to achieve specific motives such as resolution of a grievance or to make a political or ideological statement.[169]
- **Weapons of Mass Destruction** is defined by the Department of Homeland Security as a nuclear, radiological, chemical, biological, or other device that is intended to harm many people.[170]

[164] Washington Emergency Management Division. 2018 Washington State Hazard Mitigation Plan. Accessed from https://mil.wa.gov/enhanced-hazard-mitigation-plan
[165] Washington State Legislature. RCW 70. 74.295; Terrorist act defined. Accessed from: https://app.leg.wa.gov/rcw/default.aspx?cite=70.74.285
[166] Federal Bureau of Investigation. Terrorism. Accessed from: https://www.fbi.gov/investigate/terrorism
[167] Department of Homeland Security. Domestic Terrorism and Homegrown Violent Extremism Lexicon. Accessed from: https://info.publicintelligence.net/DHS-ExtremismLexicon.pdf
[168] Department of Homeland Security. Domestic Terrorism and Homegrown Violent Extremism Lexicon. Accessed from: https://info.publicintelligence.net/DHS-ExtremismLexicon.pdf
[169] SchoolSafety.gov. Targeted Violence. Accessed from: https://www.schoolsafety.gov/targeted-violence
[170] Department of Homeland Security. Weapons of Mass Destruction. Accessed from: https://www.dhs.gov/topics/weapons-mass-destruction

Strength/Magnitude

The likelihood of an act of terrorism or extremism in Washington State is likely and is anticipated to occur annually[171].

An act of terrorism or violent extremist incident in Washington State is likely drawing from the historical incidents in the state such as attacks and prevented attacks from foreign or domestic groups.

Location

Terrorist often target areas that are densely populated and high-profile areas because of their accessibility to large population and soft targets.[172] Soft targets are "any person or thing that is relatively unprotected or vulnerable to a terrorist attack or an act of violence."[173] Any of the major urban areas, point of interest, and high profile critical infrastructure in Yakima County are at risk for an attack, however, terrorist and violent extremist may target any location in the county. Some soft targets of concern in Yakima County include the Sozo Sports Complex, Valley Mall, Yakima Fairgrounds and SunDome, as well as public facilities.

Past Occurrences

There have been no notable terrorist attacks in Yakima County. However, Washington State has experienced numerous incidents of terrorism and violent extremist attacks. Washington State has experienced the following incidents:

- Active Shooters (Single/Multiple)
- Bombings
- Arson and Firebombing
- Murder/Assassination
- Chemical, Biological, Radiological, Nuclear (CBRN) Attack/Bomb

Future Probability

It is difficult to predict future terrorist or violent extremist incidents, however, an act of terrorism or violent extremism incident in Washington State is likely and is anticipated to occur annually.[174] An act of terrorism in the State of Washington may also impact and have serious ramifications for Yakima County. Given the limited history in Yakima County, the future probability of a terrorist attack in Yakima County is **Unlikely** (expected to occur every 50+ years).

Climate Change Impacts

Researchers expect that the frequency of a terrorist or violent extremist attack will increase due to the changing climate.[175] As seen with many countries already, a change in climate may result in environmental collapse in conflict-stricken areas. Climate change has clearly exacerbated

[171] Washington Emergency Management Division. 2018 Washington State Hazard Mitigation Plan. Accessed from: https://mil.wa.gov/enhanced-hazard-mitigation-plan
[172] U.S. Cybersecurity and Infrastructure Security Agency (CISA). Securing Public Gatherings. Accessed from: https://www.cisa.gov/securing-public-gatherings
[173] Department of Homeland Security. School and Workplace Violence. Accessed from: https://www.dhs.gov/school-and-workplace-violence
[174] Ibid.
[175] UNODC. Climate Change Could Mean More Terrorism in the Future. Accessed from: https://www.unodc.org/nigeria/en/climate-change-could-mean-more-terrorism-in-the-future.html

competition over increasingly scarce resources.[176] Climate change can amplify terrorist or violent extremist activities.

Yakima County Vulnerabilities

Terrorism events can contribute to multiple impacts to Yakima County. Economic losses are expected in millions of dollars because of directed terrorism to the region. A terrorism incident can also impact and damage the county's critical infrastructure, built environment, natural resources, and disrupt government and emergency operations.

Loss Estimates

The estimated losses from a terrorist incident can reach anywhere between a million to a billion of dollars. According to the 2018 Washington State HMP, if an attack were to occur in Washington State, a less than 1 percent of gross domestic product (GDP) change would be expected.[177] Aside from the cost of cleanup or building reconstruction from a direct physical attack, a terrorist or violent extremist attack may change consumer behavior, leading to economic and business-level impacts.

Impacts on the Yakima County Population and Vulnerable Populations

Certain residents and populations in Yakima County may be seen as unprotected soft targets, resulting in more severe impacts from an act of terrorism or violent extremist incident. Residents who live near vital, popular, or significant landmarks may be more at risk to experience a terrorist incident.

Impacts on Built Environment and Critical Infrastructure

Every sector has had the attention of a terrorist group or experienced terrorist activity. An attack on Yakima County's critical infrastructure sectors may disrupt vital services and may leave the county struggling to conduct everyday functions. Furthermore, a large-scale terrorism attack in a densely populated city or against a critical infrastructure in Washington State. Depending on the size, a large attack may have the potential to change the built environment.

Impacts on Government and Emergency Operations

A terrorist or violent extremist attack can have a negative impact on government and emergency operations. A large terrorist attack may have the potential to halt government and shift domestic or international policy. Emergency first responders may be amongst the many severely impacted from an attack. First responders risk danger to their physical and mental health responding to a terrorist or violent extremist attack. By responding to terrorist incidents, first responders may expose themselves to harmful debris and contaminants that may result in health complications later in life.

Impacts on the Economy and Businesses

An act of terrorism or violent extremist incident in Yakima County can have a negative impact on the local economy and businesses. Terrorism incidents may alter economic behavior and alter consumption patterns. Local business in Yakima County may also experience disruption of their supply chain, unemployment, and inflation as global trading may come to a halt from terrorism.

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[176] UNODC. Climate Change Could Mean More Terrorism in the Future. Accessed from: https://www.unodc.org/nigeria/en/climate-change-could-mean-more-terrorism-in-the-future.html

[177] Washington Emergency Management Division. 2018 Washington State Hazard Mitigation Plan. Accessed from: https://mil.wa.gov/enhanced-hazard-mitigation-plan

Impacts on Natural and Cultural Resources

Terrorist and violent extremist incidents can also impact to the natural resources; however, it is unlikely to lead to significant loss to species or habitat. Depending on the type of incident, harmful debris and contaminants may be released to the natural environment. An act of violence, such as arson, has the potential to cause significant damage to natural resources, potentially burning large acres of land.

Overall Risk Ranking

Yakima County has a **Low Risk** to terrorism incidents. **Table 3.65** below summarizes the risk assessment results for the hazard for Yakima County.

Table 3.65. Risk Assessment Results – Terrorism

Criteria	Score	Description
Human Health	3	Medium; 4-5 deaths, 8-10 injuries
Property Damage	3	Medium; localized, substantial
Economic Disruption	2	Low; localized, temporary
Environmental Resource Damages/Degradation	1	Minimal
Emergency Services Burden	2	Low; localized, temporary
Critical Facilities Exposure	3	Medium; 20-30% exposed
Probability Score	1	Very Low; expected every 50+ years
Frequency Score	1	Very Low; no documented history
Total Impact Score	**16**	**Low Risk**

SECTION 4. MITIGATION STRATEGY

This section provides information on the process used to develop goals and action items to mitigate the potential impacts of 17 natural, technological, and human-caused hazards. It also describes the framework used to develop a successful mitigation strategy and prioritize projects for implementation. The mitigation strategy is made up of three parts: ***Mission, Goals,*** and ***Action Items.***

4.1. Mission

The mission of the Yakima County HMP is to promote sound public policy designed to protect community members, critical facilities, infrastructure, private property, and the environment from natural, technological, and human-caused hazards. This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the county towards building a safer, more sustainable community.

4.2. Mitigation Goals

The plan goals describe the overall direction that Yakima County agencies, jurisdictions, and community members can take to minimize the impacts of hazards. The goals are stepping-stones between the broad direction of the mission statement and the specific recommendations that are outlined in the action items. The HMP Committee reviewed the 2015 HMP Goals and made several small revisions, noted in blue text below.

Protect Life, Property and Public Welfare

- Implement sustainable activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resilient to natural and technological hazards.
- Reduce losses and repetitive damages for chronic hazard events while promoting insurance coverage for catastrophic hazards.
- Improve hazard assessment information to make recommendations for encouraging higher standards for safer development in areas vulnerable to natural and technological hazards.

Public Awareness

- Develop and implement education and outreach programs to increase public awareness of the risks associated with natural and technological hazards.
- Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.

Natural Systems

- Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment.
- Preserve, rehabilitate, re-establish, and enhance natural systems to serve natural hazard mitigation functions.

Partnerships and Implementation

- Strengthen communication and coordinate participation among and within public agencies, community members, non-profit organizations, business, and industry to gain a vested interest in implementation.
- Encourage leadership within the public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.

Emergency Services

- Prioritize mitigation projects for critical facilities, services, and infrastructure.
- Improve understanding of hazard risks through monitoring and assessment projects.
- Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.
- Coordinate and integrate natural and technological hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

4.3. Action Plan Matrix

Action items are activities which county agencies, participating jurisdictions, special districts, and other stakeholders can implement to reduce risk. The action items are detailed in **Table 4.1** on pages 172-186, organized by relevant hazard. To improve readability, the mitigation strategy in **Table 4.1** includes a simplified version of the strategy. The complete strategy is available as **Appendix E** to the HMP.

The HMP Committee integrated several hazard-specific mitigation plans in the development of the mitigation strategy, including:

- **2022 Community Wildfire Protection Plan (CWPP):** The CWPP includes a mitigation action plan with specific areas requiring fuels reduction and other mitigation projects. The CWPP has been adopted as an annex to this HMP. The HMP mitigation strategy does not attempt to repeat the actions included in the CWPP but highlights collective strategies.
- **Comprehensive Flood Hazard Management Plans (CFHMP):** The Yakima Countywide Flood Control Zone District manages four CFHMPs – Upper Yakima River, Lower Yakima River, Naches River, and Ahtanum-Wide Hollow. These plans identify mitigation strategies and regulatory needs for flooding in Yakima County. The Flood Control Zone District identified the top priority mitigation projects from the CFHMPs to integrate into the 2022 HMP. The HMP does not attempt to provide the same level of detail as the CFHMPs, but instead highlights priorities.

For each action item, the following information is included: Coordinating Organization, Participating Jurisdictions and Supporting Agencies, Relevant Mitigation Goals, Timeline, Estimated Cost, Funding, Potential Benefit, and Priority.

Coordinating Organization

The Coordinating Organization is the public agency with regulatory responsibility to address natural or technological hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Coordinating Organizations may include local, county, or regional agencies that are capable of or responsible for implementing activities and programs.

Participating Jurisdictions and Supporting Agencies

Supporting Agencies are public/private sector organizations that may be able to assist in the implementation of action items by providing relevant resources to the Coordinating Organization. Supporting Agencies may include, or may be listed in addition to, participating cities, towns, and special districts that plan to implement the mitigation action item as a part of the community mitigation strategy, outlined in the **Jurisdiction Annexes.**

Relevant Plan Goals

The plan goals addressed by each action item are included to monitor and evaluate how well the mitigation plan is achieving its goals once implementation begins.

Timeline

Included for each action is an estimate of timeline to inform implementation and prioritization.

- **Short-term** action items are activities which county and local jurisdiction agencies can implement with existing resources and authorities within one to two years.
- **Medium-term** action items may require new or additional resources or authorities and may take between two and five years to implement.
- **Long-term** action items are complex, multi-agency efforts that require additional resources, including grant funding, and may take more than five years to implement.
- **Ongoing** action items are programs and services that are part of a department or agencies work plans and have pre-identified and sustainable funding sources.

Funding

An important element of mitigation action implementation is the availability of funding to support the project or program. Each mitigation action includes potential funding sources, including existing local government resources or potential grant programs, as described in **Section 5.3.**

Priority

Priority level for each action item is assigned as **Low, Medium, or High** based on the prioritization analysis described in **Section 4.5.**

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
1	Agricultural Disease Outbreak	Develop a Bio-Security Agricultural Outbreak Plan as a part of the next Comprehensive Emergency Management Plan update. The plan will address education, training, surveillance, communication, containment, eradication, and recovery.	Yakima Valley Emergency Management	Washington Department of Ecology, Washington Department of Agriculture, Washington DF&W, WSU Extension, Yakama Nation	MODERATE
2	Avalanche Hazardous Materials Landslide/Erosion Severe Winter Storms	Improve alert and warning coordination and procedures to ensure travelers, visitors, and residents are aware of hazards and increased risk along roadways.	Yakima Valley Emergency Management	Washington DOT, City of Selah, City of Tieton, Town of Naches	HIGH
3	Avalanche Earthquake Landslide/Erosion Volcanic Eruption	Manage development in geologic hazard areas to reduce risk to existing and future development, as outlined in Yakima County Code Chapter 16C.08 and the Yakima County Comprehensive Plan (Actions NH 2.1 - 2.6).	Yakima County Planning	Yakima County Building Official/Code Enforcement	HIGH
4	Avalanche Earthquake Landslide/Erosion Volcanic Eruption	Manage development in geologic hazard areas to reduce risk to existing and future development, as outlined in municipal codes and comprehensive plans.	City Planning Departments and Building Officials	City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Harrah, Town of Naches	MODERATE
5	Cyber Threat/Attack	Complete a Security Risk Assessment to prioritize mediation tasks and mitigate vulnerabilities.	Yakima County IT, City of Yakima IT	Yakima Valley Emergency Management, Yakima County Fire Districts, City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Harrah,	HIGH

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
				Town of Naches, Yakima County	
6	Cyber Threat/Attack	Conduct a vulnerability assessment of critical infrastructure to a cyber threat/attack.	City of Granger	Yakima County IT, contracted IT services, Yakima Valley Emergency Management	MODERATE
7	Cyber Threat/Attack	Expand regular self-phishing and testing programs for City of Selah and City of Union Gap IT networks.	City of Yakima IT	City of Selah, City of Union Gap	HIGH
8	Cyber Threat/Attack	Conduct training and exercises for cyber intrusions and other cyber threats to critical facilities, infrastructure, and government operations.	Yakima County IT, City of Yakima IT	Yakima Valley Emergency Management, Yakima County Fire Districts, City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Harrah, Town of Naches	HIGH
9	Dam/Levee Failure Flooding	Construct improvements to Nelson Dam to reduce flooding risk and life-safety hazard and increase habitat and fish passage.	Yakima County Flood Control Zone District	U.S. Bureau of Reclamation, City of Yakima, Washington DF&W, Yakima County	HIGH
10	Dam/Levee Failure Landslide/Erosion Flooding	Implement the Gap to Gap Ecosystem Restoration Project by setting back levees and reconnecting the floodplain.	Yakima County Flood Control Zone District	U.S. Army Corps of Engineers, City of Yakima, Yakima County	HIGH
11	Drought	Continue implementation of drought risk reduction and water management projects through the Yakima Basin Integrated Plan, including identifying new surface and aquifer storage options.	Yakima Basin Integrated Plan Work Group	Yakima County, City of Yakima, City of Tieton (Yakima-Tieton Irrigation District, City of Sunnyside (Sunnyside Valley and Roza Irrigation Districts)	MODERATE

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
12	Drought	Implement mitigation strategies as identified in Irrigation District Emergency Response Plans.	Irrigation Districts	Yakima Valley Office of Emergency Management	HIGH
13	Drought	Complete a feasibility study for an aquifer recharge program to identify mitigation actions for drought risk reduction.	City of Moxee	Washington Dept. of Ecology	HIGH
14	Drought Earthquake Severe Weather Severe Winter Storms	Secure additional funding to build a second well for the town water supply to ensure redundancy.	Town of Harrah Public Works	Yakima Valley Emergency Management	HIGH
15	Earthquake	Incorporate earthquake mitigation into local planning efforts.	Yakima County Public Services	City of Yakima Public Services, Yakima Valley Emergency Management	MODERATE
16	Earthquake	Continue participation in the Great Shakeout program to increase earthquake risk awareness across the county.	Yakima Valley Emergency Management	City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Harrah, Town of Naches	HIGH
17	Earthquake	Continue participation in Cascadia Subduction Zone (CSZ) Earthquake planning and exercises.	Yakima Valley Emergency Management	Washington Emergency Management Department	HIGH
18	Earthquake	Continue water line system improvements to ensure the resiliency of city drinking water infrastructure.	City of Granger		MODERATE
19	Earthquake Severe Weather Severe Winter Storms Wildfire	Secure funding to ensure accessible facilities for long-duration emergency sheltering at the Selah Civic Center.	City of Selah	Yakima Valley Emergency Management	HIGH

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
20	Earthquake Severe Weather Severe Winter Storms	Develop an inventory of at-risk critical facilities and infrastructure, including unreinforced masonry and transportation assets, and prioritize projects.	Yakima Valley Emergency Management	Yakima County GIS, Yakima County Public Services/Permit Services, Yakima County Fire Districts, City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Harrah, Town of Naches	HIGH
21	Earthquake Severe Weather Severe Winter Storms Wildfire	Secure funding to purchase back-up power generators for critical facilities, including fire stations, emergency shelters, mass care sites, critical logistics, and water systems.	Yakima Valley Emergency Management	Yakima County Fire Districts, City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Harrah, Town of Naches, Yakima County	MODERATE
22	Extreme Temperatures Public Health Wildfire Volcanic Eruption	Coordinate with local health, social services agencies, and community partners to issue personal protective actions and advance alert/warning for hazards that may lead to public health impacts, including wildfires (smoke/air quality), extreme temperatures, or other public health emergencies.	Yakima Valley Emergency Management	Yakima Health District, City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Harrah, Town of Naches, Yakima County	HIGH
23	Extreme Temperatures Wildfire Volcanic Eruption	Establish cooling and clean air shelters within public facilities to provide temporary shelter for vulnerable residents during extreme weather and poor air quality days.	Yakima Valley Emergency Management	City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of	HIGH

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
				Toppenish, City of Union Gap, City of Yakima, Town of Harrah, Town of Naches, Yakima County	
24	Extreme Temperatures Volcanic Eruption	Develop an Emergency Water Distribution Plan.	Yakima Valley Emergency Management	Irrigation Districts, City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Harrah, Town of Naches, Yakima County	MODERATE
25	Flooding Landslide/Erosion	Clear debris in the North Fork Cowiche Creek to reduce flooding risk and potential property damage, as well as potential erosion.	City of Tieton Public Works	Yakima County Flood Control Zone District, City of Tieton, Tieton Irrigation District	HIGH
26	Flooding Landslide/Erosion Wildfire	Assess and implement emergency stabilization projects to reduce additional hazard risks in wildfire burn areas, as detailed in Burned Area Emergency Response (BAER) Assessments for the Schneider Springs Fire (2021), Evans Canyon Fire (2020), and North Brownstown Fire (2020).	Land management agencies, based on ownership and project	Yakima Valley Emergency Management, Washington DNR, US Forest Service, Yakima County Fire Districts, Yakima County Flood Control Zone District, private landowners	HIGH
27	Flooding Wildfire	Develop a public awareness and education campaign about existing mitigation programs targeted to personal preparedness measures for homeowners (ex. FireWise, defensible space, insurance programs)	Yakima Valley Emergency Management	Yakima County Flood Control District, Yakima County Fire Districts, City Fire Departments, City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish,	HIGH

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
				City of Union Gap, City of Yakima, Town of Harrah, Town of Naches, Yakima County, Washington Resource Conservation and Development Council	
28	Flooding	Assess necessary flood reduction measures to ensure ingress/egress from all fire district facilities.	Yakima Valley Emergency Management	Yakima County Fire Districts, Yakima County Flood Control Zone District, City Fire Departments, Municipal Road/Highway Departments	HIGH
29	Flooding	Update FEMA Regulatory Maps on Lower Naches River.	Yakima County Flood Control Zone District	FEMA, Yakima County, Washington State Department of Ecology, City of Yakima, Town of Naches, Yakima Valley Emergency Management	HIGH
30	Flooding	Complete the Lower Yakima River Comprehensive Flood Management Plan in coordination with Yakama Nation following or concurrent with Flood Insurance Rate Map Study.	Yakima County Flood Control Zone District	Yakama Nation, Yakima Valley Emergency Management, Town of Toppenish, Town of Granger, Town of Wapato, Yakima County, Washington DF&W, Washington DOE	HIGH
31	Flooding	Complete Flood Risk Reports for the Upper Naches and Cowiche watersheds.	Yakima County Flood Control Zone District	FEMA, Yakima County, City of Tieton, Yakima Valley Emergency Management	HIGH
32	Flooding	Pursue Naches-Rock Creek Floodplain Restoration Project in partnership with WSDOT to reduce risk to infrastructure and residences in the area through property	Yakima County Flood Control Zone District	Yakima Valley Emergency Management, Washington DOT, Yakima County, U.S. Army Corps of Engineers, Washington DF&W	HIGH

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
		purchases, levee setback/removal, and floodplain modification.			
33	Flooding	Relocate Cowiche Creek downstream of US-12 to retire irrigation structures and improve floodplain access and increase flood protection for US-12.	Yakima County Flood Control Zone District	City of Yakima, Washington DOT, Yakima County	MODERATE
34	Flooding	Preserve floodplains and other natural open spaces to maintain hydrologic functions of natural systems and reduce flood risk.	Yakima County Planning, City of Yakima Community Development	Yakima County Flood Control Zone District	HIGH
35	Flooding	Implement strategies to improve stormwater drainage system capacity as outlined in the Yakima County Comprehensive Plan, Yakima County Stormwater Management Program (2022), and City of Yakima Stormwater Management Program (2022).	Yakima County Regional Stormwater Working Group	City of Yakima, City of Selah, City of Union Gap, City of Sunnyside, Yakima County	MODERATE
36	Flooding	Improve floodplain conveyance between Meyers Road Bridge and I-82 exit to Zillah to reduce public safety hazards and flood risk near critical transportation infrastructure.	Yakima County Flood Control Zone District	Yakima Basin Integrated Plan Work Group, Yakama Nation, Yakima County Roads	HIGH
37	Flooding	Continue efforts to increase Ahtanum channel capacity and reduce flood hazard downstream to Union Gap and Yakima.	Yakima County Flood Control Zone District	Ahtanum Irrigation District, City of Union Gap, City of Yakima	HIGH
38	Flooding	Re-route Shaw Creek and improve conveyance in Wide Hollow Creek to reduce flood hazard to existing and future residential development.	Yakima County Flood Control Zone District	City of Yakima, West Valley School District, Washington DOE, FEMA	HIGH

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
39	Flooding	Increase awareness of flood risk and safety, as well as flood mitigation techniques for property owners through the implementation of FCZD's Public Outreach Plan.	Yakima County Flood Control Zone District	Yakima Valley Office of Emergency Management	MODERATE
40	Flooding	Maintain compliance with current National Flood Insurance Program (NFIP) regulations to make flood insurance available to property owners.	Local Floodplain Officials	City of Grandview, City of Granger, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Harrah, Town of Naches, Yakima County Flood Control Zone District, Yakima County	HIGH
41	Flooding	Consider entering, maintaining compliance with, or lowering Class rating for the FEMA Community Rating System (CRS), which rewards jurisdictions that are pro-active in public awareness and pre-hazard mitigation. Develop application meeting program requirements and implement.	Local Floodplain Officials	City of Grandview, City of Granger, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Naches, Yakima County	HIGH
42	Flooding	Acquire, relocate, or remove existing structures from flood hazard areas as identified in Comprehensive Flood Hazard Management Plans.	Yakima County Flood Control Zone District	Yakima County Planning Division, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Naches, Yakima County	HIGH
43	Flooding	Advance opportunistic cooperation with entities on their projects where flood risk reduction may result.	Yakima County Flood Control Zone District	City of Grandview, City of Granger, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of	HIGH

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
				Union Gap, City of Yakima, Town of Harrah, Town of Naches, Yakima County Public Services, Yakima Valley Emergency Management, Yakima County Roads	
44	Flooding	Manage crack willow and debris to increase channel capacity to contain small flood events. Replace with desirable plant species in riparian areas.	Yakima County Flood Control Zone District	City of Yakima, Yakima County	HIGH
45	Hazardous Materials	Establish a county-wide hazardous materials response team to ensure efficient and cost-effective operations.	Yakima Fire Department	Yakima County Fire Districts, Yakima Valley Emergency Management	HIGH
46	Public Health Volcanic Activity	Secure and appropriately store/stockpile personal protective equipment.	Yakima Health District	Yakima Valley Office of Emergency Management	HIGH
47	Severe Winter Weather	Identify and secure emergency contracts to secure plowing services during heavy snow fall or for other debris removal.	Town of Harrah Public Works	Yakima County Roads, Yakima Valley Office of Emergency Management	HIGH
48	Wildfire	Implement wildfire protection measures around the city's wastewater facilities to reduce risk, including fire breaks, planning for protective measures, and equipment purchases.	Grandview Fire Department Yakima County Fire District #5	City of Grandview	MODERATE
49	Wildfire	Participate in the Wildfire Ready Neighbors Program, FireWise USA, and other programs to encourage fuels reduction and property protection in areas within the Wildland-Urban Interface.	Yakima County Fire District #2 and Yakima County Fire District #12	Yakima Valley Emergency Management, Yakima County Fire Districts, Washington DNR, Yakama Nation	HIGH

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
50	Wildfire	Reduce wildfire risk through land use planning by implementing new requirements for fire-resistant design standards, encouraging fire safe development strategies, and ensuring adequate fire protection for new development as identified in the Yakima County Comprehensive Plan (Actions NH 3.1 - 3.10).	Yakima County Planning	Yakima County Fire Districts, Yakima Valley Emergency Management, Yakima County Building and Fire Division	HIGH
51	Wildfire	Develop defensible space around homes and encourage residents to participate in community awareness and education events.	CWPP Steering Committee	Yakima County Fire Districts, Yakima Valley Emergency Management, Yakima County Fire Marshal's Office, Washington DNR, U.S. Forest Service	HIGH
52	Wildfire	Offer hands-on workshops to highlight individual home vulnerabilities and how-to-techniques to reduce ignitability of common structural elements and encourage residents to participate.	CWPP Steering Committee	Yakima County Fire Districts, Yakima Valley Emergency Management, Yakima County Fire Marshal's Office, Washington DNR, U.S. Forest Service	HIGH
53	Wildfire	Encourage residents to assess and improve accessibility to their property.	CWPP Steering Committee	Yakima County Fire Districts, Yakima Valley Emergency Management, Yakima County Fire Marshal's Office, Washington DNR, U.S. Forest Service	MODERATE
54	Wildfire	Develop a community-level Community Wildfire Protection Plan for each at-risk community that will identify specific firefighting resource projects, fuels reduction projects, public education and outreach projects, and reduction in structural ignitability projects through collaboration with	CWPP Steering Committee	Yakima County Fire Districts, Yakima Valley Emergency Management, Yakima County Fire Marshal's Office, Washington DNR, U.S. Forest Service	MODERATE

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
		state, federal, tribal, county, and private entities.			
55	Wildfire	Develop a program to incorporate Firewise into all aspects of the community through education on individual roles and responsibilities for wildland fire prevention and safety.	CWPP Steering Committee	Yakima County Fire Districts, Yakima County Fire Marshal's Office, Washington DNR, U.S. Forest Service	MODERATE
56	Wildfire	Research, identify, and implement planning and development policies to facilitate rebuilding during disaster recovery.	Yakima County Planning	City of Yakima Community Development, City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Harrah, Town of Naches, Yakima County	MODERATE
57	Wildfire	Recruit additional volunteer firefighters in Fire Districts that serve as secondary response units for wildfires.	Yakima County Fire Districts	City Fire Departments	MODERATE
58	Wildfire	Establish and implement fire mitigation projects, fuel break projects, defensible space projects, maintenance and/or expansion of roads to provide for efficient firefighting access, treat slash and other fuels such as dead standing volume, provide safety zones and evacuation routes, green striping, firefighting resources, chipping programs, public education and outreach projects, as well as projects to reduce structural ignitability in at risk communities/neighborhoods/areas in Yakima County.	CWPP Steering Committee, Yakima Valley Emergency Management	Yakima County Fire Districts, City Fire Departments, Yakima County Fire Marshal's Office, Washington DNR, U.S. Forest Service, North Yakima Conservation, Yakima Greenway Association	MODERATE

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
59	Wildfire	Implement grazing programs throughout the Wildland-Urban Interface. Grazing is a tool used to for wildfire mitigation, invasive species control and wildlife habitat enhancement.	CWPP Steering Committee	Yakima County Fire Districts, Yakima Valley Emergency Management, City Fire Departments, North Yakima Conservation District Washington DNR, U.S. Forest Service	HIGH
60	Wildfire	Encourage at risk communities to continue mitigation activities on their own by providing a crew and equipment to chip material on-site.	CWPP Steering Committee	Yakima County Fire Districts, Yakima Valley Emergency Management, City Fire Departments, Yakima County Fire Marshal's Office, Washington DNR, U.S. Forest Service, North Yakima Conservation District	HIGH
61	Wildfire	Improve access/egress routes and signage.	CWPP Steering Committee	Yakima County Fire Districts, Yakima Valley Emergency Management, Yakima County Building and Fire Division, Yakima County Roads Divisions, City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Harrah, Town of Naches, Yakima County, Washington DOT, Washington DNR, U.S. Forest Service	HIGH

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
62	Terrorism	Develop, install, and operate surveillance and monitoring/security devices, practices, and technology to reduce risk and improve response to critical events at event facilities (including Sozo Sports Complex, Valley Mall, and Yakima Fairgrounds and SunDone) that may occur during private and public events within and around the facility and grounds.	Yakima County Sheriff's Office	Yakima Valley Emergency Management	HIGH
63	Multi-Hazard	Increase use of the Yakima County Council of Governments (YCOG) Countywide Travel Demand Model to improve modeling for emergency response planning.	Yakima County Council of Governments	Yakima Valley Emergency Management, Yakima County Planning	MODERATE
64	Multi-Hazard	Identify sustainable funding sources to increase staffing for planning, mitigation, and public awareness programs, including participation in StormReady Certification.	Yakima Valley Emergency Management		MODERATE
65	Multi-Hazard	Identify, improve, and sustain collaborative programs focusing on the real estate and insurance industries, public and private sector organizations, and individuals to avoid activity that increases risk to natural and technological hazards.	Yakima County Public Services/ Permit Services		MODERATE
66	Multi-Hazard	Develop public and private partnerships to foster hazard mitigation program coordination and collaboration in Yakima County.	Yakima Valley Emergency Management		MODERATE

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
67	Multi-Hazard	Develop, enhance, and implement education programs aimed at mitigating hazards and reducing the risk to residents, public agencies, private property owners, businesses, and schools.	Yakima Valley Emergency Management	Yakima County Flood Control Zone District, Yakima County Public Services, City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Harrah, Town of Naches, Yakima County	HIGH
68	Multi-Hazard	Use technical knowledge of natural ecosystems and events to link natural resource management and land use organizations to mitigation and technical assistance.	Yakima County Public Services		HIGH
69	Multi-Hazard	Provide training and technical assistance for jurisdictions and emergency services providers to create Continuity of Operations Planning (COOP) planning programs. Integrate IT and cyber considerations within COOP resources.	Yakima Valley Emergency Management	Yakima County IT, City of Yakima IT, Yakima County Flood Control Zone District, Yakima County Fire Districts, City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union Gap, City of Yakima, Town of Harrah, Town of Naches, Yakima County	HIGH
70	Multi-Hazard	Support jurisdictions in updating and/or developing Continuity of Government (COG) Plans.	Yakima Valley Emergency Management	City of Grandview, City of Granger, City of Moxee, City of Selah, City of Sunnyside, City of Tieton, City of Toppenish, City of Union	HIGH

Table 4.1. 2022 Hazard Mitigation Strategy					
Action	**Hazard**	**Action Items**	**Coordinating Organization**	**Participating Jurisdictions and Supporting Agencies**	**Priority**
				Gap, City of Yakima, Town of Harrah, Town of Naches, Yakima County	
71	Multi-Hazard	Conduct tabletop exercises for high impact incidents in the City of Yakima, including flooding, active shooter, and civil unrest incidents.	Yakima Fire Department; Yakima Valley Emergency Management	City of Yakima	MODERATE

4.4. Review of 2015 Action Plan

The mitigation strategy presented in the 2022 HMP update reflects progress by Yakima County communities in advancing mitigation efforts across many jurisdictions and agencies. Many of the action items from the 2015 HMP continue to apply in 2022 and beyond as long-range ongoing actions, thus the HMP Committee chose to retain those action items. Additionally, some action items were removed because they have been completed, are no longer relevant, or were amended to reflect new information and supporting efforts. **Table 4.2** contains a summary of action items from the 2015 HMP that were not carried forward into this plan update.

Table 4.2. 2015 Hazard-Specific Mitigation Strategy – Completed and Removed Actions

Hazard	Action Items	Lead Responsibility	Summary of Revisions to 2015 Action Items
Earthquake	Adopt and Enforce Building Codes. Yakima County will adopt the IBC 2015.	Yakima County Building Official/Code Enforcement	**Completed**. Yakima County adopted the 2018 update to the International Building Code.
Flood	Update Special Subject Flood Response Plan to the 2014 CEMP	Yakima Valley Office of Emergency Management	**Completed.** The 2019 Update to the CEMP includes a Flood Emergency Response Plan Annex.
Severe Wind Storm	Adopt and Enforce Building Codes. Yakima County will adopt the IBC 2015.	Yakima County Planning; Yakima County Building Official/Code Enforcement	**Completed**. Yakima County adopted the 2018 update to the International Building Code.
Severe Winter Storm	Adopt and Enforce Building Codes. Yakima County will adopt the IBC 2015.	Yakima County Planning; Yakima County Building Official/Code Enforcement	**Completed**. Yakima County adopted the 2018 update to the International Building Code.
Wildfire	Incorporate Wildfire Mitigation in the Comprehensive Plan	Yakima County Planning	**Completed.** Horizon 2040, the 2017 Yakima County Comprehensive Plan, includes Wildfire as one of several priority hazards.
Wildfire	Review and adopt the 2012 edition of the IWUIC in 2015	Yakima County Building and Safety Division	**Completed**. Yakima County adopted the 2018 International Wildland Urban Interface Code.
Avalanche	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.

Table 4.2. 2015 Hazard-Specific Mitigation Strategy – Completed and Removed Actions			
Hazard	**Action Items**	**Lead Responsibility**	**Summary of Revisions to 2015 Action Items**
Dam/Levee Failures	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.
Drought	Plan for drought	Yakima County Planning	**Remove**. This action was replaced with a more specific mitigation action related to the Yakima Basin Integrated Plan, which outlines drought and water management resilience strategies for the entire region.
Extreme Temperatures	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.
Flood	Protect and Restore Natural Flood Mitigation Features	Yakima County Planning	**Remove**. This generic action item is replaced with specific, priority mitigation actions to restore natural flood mitigation features.
Flood	Conduct Regular Maintenance for Drainage Systems and Flood Control Structures	County Road Maintenance Division	**Remove.** This generic action item is replaced with specific, priority mitigation actions to construct and maintain flood control structures. Regular maintenance is generally not considered for mitigation project funding.
Flood	Protect Infrastructure	County Engineer and City Engineers	**Remove.** This generic action item is replaced with specific, priority mitigation actions to protect infrastructure.
Flood	Construct Flood Control Structures	County Engineer and City Engineers	**Remove.** This generic action item is replaced with specific, priority mitigation actions to construct and maintain flood control structures.

Table 4.2. 2015 Hazard-Specific Mitigation Strategy – Completed and Removed Actions			
Hazard	**Action Items**	**Lead Responsibility**	**Summary of Revisions to 2015 Action Items**
Flooding	Improve Flood Risk Assessment	Yakima County FCZD and Local Planning Department	**Remove**. This action item was replaced with more specific efforts to improve risk assessments for flood hazards in specific watersheds.
Flooding	Form Partnerships to Support Floodplain Management	Yakima County FCZD and Local Planning Department	**Remove.** This generic action item is replaced with specific actions to form partnerships.
Hail	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.
Lightning	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.
Severe Wind Storm	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.
Severe Winter Storm	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.
Tornado	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.

Table 4.2. 2015 Hazard-Specific Mitigation Strategy – Completed and Removed Actions			
Hazard	**Action Items**	**Lead Responsibility**	**Summary of Revisions to 2015 Action Items**
Volcanic Eruption	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.
Animal Crop Plan Disease Infestation	Planning and preparedness activities, response actions, post disaster actions, recovery activities.	WSU Extension	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.
Dam Safety	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.
HazMat - Fixed Facility	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.
HazMat - Transportation	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.
HazMat - Pipeline	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.
Communicable Disease	Basic mitigation measures include:	Yakima Health District	**Remove.** This is a general action item that encompasses

Table 4.2. 2015 Hazard-Specific Mitigation Strategy – Completed and Removed Actions			
Hazard	**Action Items**	**Lead Responsibility**	**Summary of Revisions to 2015 Action Items**
	childhood and adult immunization programs; health education in the schools and on a community level to address disease transmission and prevention; targeting the mechanism of transmission, such as drug usage for diseases like HIV infection and Hepatitis B; maintaining strict health standards for food service employees and eating establishments; maintaining strict health standards for food products; and utilizing accepted and recommended infection control practices in medical facilities		many mitigation strategies for public health emergencies. It will be removed from the 2022 Update and replaced with more narrow, specific action items.
Terrorism	County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima County Sheriff's Office	**Remove.** This is a generic action item that was repeated for several hazards. It will be removed from the 2022 Update and replaced with more specific actions that are relevant to the hazard.
Erosion	Manage short-term erosion resulting from periodic natural events.	Yakima County Planning	**Remove.** This is a generic action item to be clarified and replaced with more specific actions.
Multi-Hazard	Integrate the goals and action items from the Yakima County Hazards Mitigation Plan into existing regulatory documents	Hazard Mitigation Steering Committee	**Remove.** This action is more appropriate as a part of the implementation strategy, rather than a mitigation action.

Table 4.2. 2015 Hazard-Specific Mitigation Strategy – Completed and Removed Actions			
Hazard	**Action Items**	**Lead Responsibility**	**Summary of Revisions to 2015 Action Items**
	and programs where appropriate.		
Multi-Hazard	Identify and pursue funding opportunities to develop and implement local and county mitigation activities.	Yakima Valley Office of Emergency Management	**Remove.** This action is more appropriate as a part of the implementation strategy, rather than a mitigation action.
Multi-Hazard	Establish a formal role for the Yakima County Hazard Mitigation Steering Committee to develop a sustainable process for implementing, monitoring, and evaluating countywide mitigation activities.	Hazard Mitigation Steering Committee	**Remove.** This action is more appropriate as a part of the implementation strategy, rather than a mitigation action.
Multi-Hazard	Emergency preparedness education programs for schools	Yakima Valley Office of Emergency Management	**Remove.** This action item was removed for lack of specificity. Specific preparedness programs are included in other action items.
Multi-Hazard	Drills, exercises in homes, workplaces, classrooms, etc.	Yakima Valley Office of Emergency Management	**Remove.** This action item was removed for lack of specificity. Specific preparedness programs are included in other action items.
Multi-Hazard	Distribution of severe weather guides, homeowner's retrofit guide, etc.	Yakima Valley Office of Emergency Management	**Remove.** This action item was removed for lack of specificity. Specific preparedness programs are included in other action items.
Multi-Hazard	Preparedness handbooks, brochures.	Yakima Valley Office of Emergency Management	**Remove.** This action item was removed for lack of specificity. Specific preparedness programs are included in other action items.
Multi-Hazard	Strengthen emergency services preparedness and response by linking emergency	Yakima Valley Office of Emergency Management	**Remove.** This is part of the Mitigation Goals, rather than a distinct action.

Table 4.2. 2015 Hazard-Specific Mitigation Strategy – Completed and Removed Actions			
Hazard	**Action Items**	**Lead Responsibility**	**Summary of Revisions to 2015 Action Items**
	services with hazard mitigation programs and enhancing public education on a countywide scale.		

4.5. Analysis and Prioritization

This section is not intended to provide a comprehensive description or analysis, nor is it intended to provide the details of economic analysis methods that can be used to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

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

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

Benefit/Cost Analysis

Benefit/cost analysis is a key mechanism used by WaEMD, FEMA, and other state and federal agencies in evaluating hazard mitigation projects and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Benefit/cost analysis is used in hazard mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity should assist Yakima communities in determining whether a project is worth undertaking now, to avoid disaster-related damages later.

In benefit/cost analysis, costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented (i.e., if net benefits exceed net costs, the project is worth pursuing). A project must have a benefit/cost ratio greater than 1 to be funded.

The benefits of proposed actions were weighed against multiple factors as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Building Resilient Infrastructure and Communities (BRIC) grant program. A less formal approach was used because some actions may not be implemented for several years, and associated costs and benefits could change dramatically in that time.

Estimated Cost

While the preference is to provide definitive costs for each mitigation action, this is not possible for every mitigation action. Therefore, the estimated costs for the mitigation initiatives identified in this Plan were summarized across five categories.

- **Very Low:** Less than $10,000
- **Low:** $10,000 to $25,000
- **Medium:** $25,001 to $100,000
- **High:** $100,001 to $250,000
- **Very High:** Greater than $250,000

Potential Benefit

Potential benefit for each action item is assigned as **Low, Medium, or High** using a qualitative framework that considers the following factors:

- Eliminates Repetitive Loss
- Greatest Economic Impact
- Greatest Good for Most People
- Least Expensive Option
- Funding Is Secure or Easy to Obtain
- Can Fund Sooner
- Has Greater Public and Political Support
- Benefits More Than One Jurisdiction
- Addresses Two or More Goals
- Local Ability to Perform Project

Prioritization

Prioritization is based on the combination of several factors – Timeframe, Estimated Cost, and Potential Benefit, as well as the well-established STAPLEE (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) criteria, described in **Table 4.3**. Mitigation actions with the highest STAPLEE scores, when combined with the cost and benefit parameters, represent those mitigation measures that represent the highest priority. The detailed mitigation strategy with each of these parameters listed is included as **Appendix E**.

Table 4.3. STAPLEE Prioritization Table	
Item	**Score**
Social: Do you agree or disagree that the mitigation action is more likely to: be acceptable to the community; does not adversely affect a particular segment of the population; does not cause relocation of lower income people, and is compatible with the community's social and cultural values.	• Strongly Agree = 5 • Agree =4 • Neither Agree or Disagree = 3 • Disagree = 2 • Strongly Disagree = 1
Technical: Do you agree or disagree that the mitigation action is technically effective in providing a long-term reduction of losses and has minimal secondary adverse impacts.	
Administrative: Do you agree that your jurisdiction/organization has the necessary staffing funding to carry-out this mitigation action.	
Political: Do you agree or disagree that the mitigation action has the support of the public and stakeholders who have been offered an opportunity to participate in the planning process.	
Legal: Do you agree or disagree that the jurisdiction or implementing agency has the legal authority to implement and enforce the mitigation action.	
Economic: Budget constraints can significantly deter the implementation of mitigation actions. Do you agree or disagree that the mitigation action is cost-effective, as determined by a cost-benefit review, and is possible to fund.	
Environmental: Do you agree or disagree that the mitigation action is sustainable and does not have an adverse effect on the environment, complies with federal, state, and local environmental regulations, and is consistent with the community's environmental goals.	
TOTAL	**Total Maximum Score is 35**

As the HMP Committee decides to move forward with mitigation actions, the department or agency responsible for implementing the measure will be responsible for taking further action. If the mitigation grant is from the FEMA, a full benefit-cost analysis that meets FEMA's requirements may be necessary.

SECTION 5. MITIGATION STRATEGY IMPLEMENTATION AND PLAN INTEGRATION

This section describes Yakima County's capacity and capability to implement the mitigation strategy outlined in **Section 4**. The essential components for successful implementation are funding, resource allocation, and organizational capacity. The multi-jurisdictional mitigation strategy identifies the principal Yakima County and municipal agencies and departments that are responsible for implementing each identified action item. The strategy also considers other jurisdictions and state or federal partner agencies for collaboration.

FEMA requires the evaluation of existing hazard management policies, programs, and capabilities that exist and could be used to implement the mitigation strategy. Many Yakima County departments, programs, and collaborative groups can help reduce losses from emergencies and disasters. The capability of participating jurisdictions to implement mitigation activities is described briefly in each **Jurisdiction Annex.**

5.1. Existing Policies and Programs

This section describes the legal, regulatory, and programmatic mechanisms in place in Yakima County to support effective implementation of mitigation actions. The information is summarized in **Table 5.1** below, which includes key indicators of legal and regulatory capability to implement mitigation projects.

Table 5.1. Yakima County Legal and Regulatory Capability Assessment

Indicator	Comments
Codes and Ordinances	
Building Code	Chapter 13 of the Yakima County Code serves as the adopted County Building Code. The Code includes the 2018 International Building Codes with certain amendments ad adopted by the State of Washington. Relevant sections include structural design, roof snow load, wind design, earthquake design, flood design, and fire protection systems.
Zoning	The Yakima County Planning Division manages and enforces the Unified Land Development Code, last updated in 2022.
Hazard-Specific	Chapter 16C of the Yakima County Code includes hazard-specific policies and enforcement, including flood hazard areas, wetlands, and geologically hazardous areas. Chapter 16D adopts the Shoreline Master Program, which protects critical areas within shoreline jurisdiction. Yakima County has also adopted the 2018 International Wildland-Urban Interface Code (Chapter 13.12) with certain amendments.
Subdivisions	The Yakima County Zoning and Subdivision Division manages subdivision permitting and development as outlined in Yakima County Code Chapter 19.34.
Stormwater Management	Yakima County and the cities of Selah, Sunnyside, and Union Gap make up the Yakima Regional Stormwater Group. This interagency group reviews regional stormwater policies and

Table 5.1. Yakima County Legal and Regulatory Capability Assessment	
Indicator	**Comments**
	permitting processes. Stormwater management is addressed in Chapter 12 of the Yakima County Code.
Growth Management	The Washington State Growth Management Act (RCW Chapter 36.70A) directs growth management and comprehensive planning for Washington cities and counties.
Public Health and Safety	Yakima County Code Chapter 6 addresses health, welfare, and sanitation ordinances. Chapter 6.04 creates the Yakima County Health District, which is responsible for implementing public health programs.
Environmental Protection	The Washington State Yakima River Conservation Area (RCW 79A.05.750) establishes a protected river corridor from Selah Gap to Union Gap. The intent of this legislation is to preserve river wetlands in their natural state and manage development along the conservation river corridor.
Community Planning	
Comprehensive	The Horizon 2040 Comprehensive Plan was adopted by the Yakima County Commissioners in 2017. The plan includes a natural hazards element that outlines goals and policies resulting in development that minimizes loss of life and property from disasters.
Environmental Protection	Yakima County government includes a Water Resources Division and an Environmental and Natural Resources group. The Water Resources Division manages various plans to protect environmental resources, including watershed and water storage studies, flood hazard reduction plans, and groundwater management. The Environmental and Natural Resources Planning Section is responsible for implementing policies that protect natural resources as a part of development projects. Yakima County and various municipalities are parties to the Yakima Basin Integrated Water Management Plan, which is a collaborative effort to address fishery, habitat, and climate variability challenges in the Yakima River Basin.
Transportation	The Yakima Valley Conference of Governments manages the Yakima Valley Metropolitan and Regional Transportation Plan, last updated in 2020.
Response/Recovery Planning	
Comprehensive Emergency Management Plan (CEMP)	Yakima County last updated its CEMP in 2019. This plan is maintained by Yakima Valley Emergency Management.
Comprehensive Flood Hazard Management Plans (CFHMP)	The Yakima Countywide Flood Control Zone District manages four CFHMPs – Upper Yakima River, Lower Yakima River, Naches River, and Ahtanum-Wide Hollow. These plans identify mitigation strategies and regulatory needs for flooding in Yakima County.
Community Wildfire Protection Plan (CWPP)	The Yakima County CWPP was last updated in 2014 and was undergoing revisions at the time of HMP development (2022).

Table 5.1. Yakima County Legal and Regulatory Capability Assessment	
Indicator	**Comments**
	The CWPP will become an annex to the HMP as of 2022 and will be maintained by YVEM moving forward. Additionally, there are three community specific CWPPs in the County, including Highway 410, Highway 12, and Cowiche Mountain.
Continuity of Operations Plan (COOP)	Yakima County does not have a COOP or Continuity of Government plan in place currently.

Yakima Valley Emergency Management

YVEM is responsible for the full spectrum of emergency management in Yakima County and 14 other member jurisdictions, including maintaining and updating the CEMP and HMP. The CEMP was last updated in 2019 and includes the City of Yakima's CEMP as an annex. The CEMP also includes a Flood Emergency Response Plan. YVEM also manages the Community Preparedness Program, which includes training based on the Community Emergency Response Team (CERT) curriculum. Finally, YVEM manages the Local Emergency Planning Committee to provide coordination and oversight of hazardous materials in the county.

Yakima Countywide Flood Control Zone District

The Flood Control Zone District (FCZD) was established in 1998 to address flood management needs in Yakima County. The FCZD is responsible for flood planning, flood proofing and elevation of structures, flood warning and emergency response, and identifying and implementing other flood-related mitigation projects and regulations. FCZD maintains CFHMPs for the Upper Yakima River (2018), Naches River (2006), and Ahtanum-Wide Hollow (2012).

Yakima County Planning Division

The Yakima County Planning Division is responsible for community development service activities related to subdivision, zoning, environmental, long-range comprehensive planning, and other intergovernmental projects. The Environmental Section administers the Yakima County Critical Areas Ordinance, Regional Shoreline Master Program, and Washington State Environmental Policy Act. The Zoning and Subdivision Section implements the County Comprehensive Plan and other development regulations. The Long-Range Planning Section is responsible for the maintenance of the County Comprehensive Plan and formulating plans and policies for county land use in alignment with the Washington State Growth Management Act

Yakima County Building and Fire Safety Division

The Building and Fire Safety Division is responsible for managing and issuing building permits in alignment with the Building Code. The Yakima County adopted building code includes the 2018 International Building Code and Title 13 Amendments. Various sections of the building code relate to hazard-specific building requirements, as well as opportunities to reduce hazard vulnerability. Examples include the 2018 International Wildland-Urban Interface Code, roof snow loads, flood, wind, and earthquake design, required fire protection systems, and more.

5.2. Plan Integration

Plan integration is the process by which communities look critically at their existing planning framework and align efforts to build a more resilient community. Plan integration involves a two-way exchange of information and incorporation of ideas and concepts between the MJHMP and other community plans. Specifically, plan integration involves the incorporation of hazard mitigation principles and actions into community plans and community planning mechanisms.

Table 5.2 summarizes this two-way exchange of information, detailing existing plans that were integrated within the MJHMP and opportunities where the MJHMP may inform ongoing or future planning efforts. This table is not inclusive of every relevant planning effort, but rather the priority items for integration.

Table 5.2. Plan Integration Strategy

Year	Plan Name	HMP Plan Integration	Future Integration Potential
2006 - 2018	Comprehensive Flood Hazard Management Plans (CFHMP)	Three CFHMPs describe vulnerabilities and priority actions to reduce the risk of flood hazards in the Upper Yakima, Naches, and Ahtanum-Wide Hollow watersheds. These plans served as the basis for flood hazard mitigation actions.	Updates to current CFHMPs and supporting Risk Reports, as well as the development of a Lower Yakima Valley CFHMP are included in the mitigation strategy.
2013	Yakima Basin Integrated Plan	The Integrated Plan outlines priority projects related to flood, drought, and dam/levee infrastructure risk reduction as coordinated by a multi-agency stakeholder group. This Integrated Plan is the basis for some action items within the MJHMP and characterizes the existing capacity in the region to advance collaborative mitigation efforts.	The Integrated Plan working group may consider mitigation actions identified in MJHMPs across the Basin and incorporate projects into future phases.
2016	Climate Adaptation Plan for the Territories of the Yakama Nation	This climate change adaption plan provides relevant data and describes the potential impacts to water resources, plant and aquatic species, human health in the Yakima Basin. Relevant impacts are incorporated into the wildfire, drought, flood, and other hazard profiles.	The MJHMP may provide context and data for future updates to this climate change adaption plan, or creation of a similar plan for Yakima County.

Table 5.2. Plan Integration Strategy			
Year	**Plan Name**	**HMP Plan Integration**	**Future Integration Potential**
2017	Yakima County Horizon 2040 Comprehensive Plan	The Yakima County Horizon 2040 Comprehensive Plan outlines future land use and development trends and needs which were incorporated into the Community Profile. This plan also informed the mitigation strategy and includes a Natural Hazards element with specific development actions for flooding, wildfire, and geologic hazards.	Future Comprehensive Plan updates should include a review the risk assessment results and direct future growth into areas that are not likely to be damaged in a hazard event. Additionally, the plan should Include the mitigation plan goals in the future vision.
2018	Washington State Hazard Mitigation Plan	The Washington HMP was used as a primary resource for hazard identification and risk assessment section.	The State uses local mitigation plans for each HMP update and will complete a review of the 2022 Yakima County MJHMP.
2019	Yakima County Comprehensive Emergency Management Plan (CEMP) and City of Yakima Annex	The CEMP provides a baseline to assess potential implementation mechanisms for the mitigation strategy. Necessary CEMP updates were considered for the mitigation strategy.	All mitigation actions should be reviewed and incorporated within future CEMP updates. The MJHMP may inform the development of future Incident Annexes and hazard-specific response plans.
2020	Yakima Valley Metropolitan and Regional Transportation Plan	Planned transportation investments are considered within the risk assessment and mitigation strategy to avoid building infrastructure that may be damaged during a hazard event.	• Include hazard vulnerabilities in the decision to invest in extending or building new roads and utilities. • Include prioritization or budgeting requirements that new community infrastructure be resistant hazards. Priorities should include improvement and support of emergency preparedness planning, mitigation, response, and recovery such as evacuation and critical logistics supply routes.

Table 5.2. Plan Integration Strategy			
Year	**Plan Name**	**HMP Plan Integration**	**Future Integration Potential**
2022	Community Wildfire Protection Plan (CWPP) - Draft	The CWPP is incorporated within the wildfire hazard profile, including hazard description, vulnerability, and geographic location. Additionally, updates to CWPPs for communities were considered for the mitigation strategy. Relevant action items outlined in the 2022 CWPP Update are included in the mitigation strategy.	Future updates of all wildfire and wildland-urban interface plans should consider the MJHMP mitigation strategy.
2022	Regional Stormwater Management Program	The Management Program outlines priorities to mitigate flood hazards through maintenance and improvements to stormwater infrastructure. Additionally, the Program is referenced as a strategy for mitigation implementation.	Future updates of stormwater management programs should consider the MJHMP mitigation strategy.
2022	Yakima County Code and Zoning Ordinances	Relevant zoning codes were incorporated within the Existing Policies and Procedures section to characterize the capability of Yakima County to implement mitigation actions. Updates to hazard-specific codes were also reviewed for various mitigation actions.	• Include zones that limit development in areas identified as facing hazard impacts • Include requirements about keeping flood- or other hazard-prone areas as open space

5.3. Funding

There are several current and potential grant programs that help jurisdictions implement hazard mitigation projects. FEMA administers many of the grant programs listed below.

FEMA is not the only source of funding for mitigation assistance. There are other agencies involved in funding projects that can also serve to reduce risks from disasters and emergency events. These agencies include but are not limited to the Department of Homeland Security, the US Army Corps of Engineers, the Environmental Protection Agency, and the US Department of Agriculture. Many of the potential sources of funds that can be used for mitigating hazards are identified below.

Federal Emergency Management Agency Grant Programs

The following grant programs are made available through the Stafford Act:

Building Resilient Infrastructure and Communities (BRIC)

FEMA has developed the Building Resilient Infrastructure and Communities (BRIC) program through the Disaster Recovery Reform Act to address National Public Infrastructure Pre-Disaster Hazard Mitigation. BRIC replaced the Pre-Disaster Mitigation (PDM) program. BRIC supports states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency.

Hazard Mitigation Grant Program (HMGP)

FEMA's Hazard Mitigation Grant Program (HMGP) was created in November 1988 under the authority of the Stafford Act, Section 404. The HMGP assists states and local governments to implement long-term hazard mitigation measures following a Presidential major disaster declaration. Initially, the federal cost share for projects 75% of a project's total eligible costs. Objectives of HMGP include:

- Preventing loss of lives and property due to disasters
- Implementing state and local hazard mitigation plans
- Enabling mitigation measures to be implemented during immediate recovery from a disaster
- Providing funding for previously identified mitigation measures that benefit the area

Public Assistance (PA)

The objective of FEMA's Public Assistance (PA) Grant Program is to aid states, tribes, local governments, and certain nonprofit organizations to alleviate suffering and hardship resulting from major disasters or emergencies declared by the President. Through the PA Program, FEMA provides supplemental Federal disaster grant assistance for the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain Private Non-Profit (PNP) organizations. The Federal share of assistance is not less than 75% of the eligible cost for emergency measures and permanent restoration.

National Flood Insurance Act Grant Programs

The following grant programs are available under the National Flood Insurance Act.

Flood Mitigation Assistance Program

The overall goal of the Flood Mitigation Assistance (FMA) Program is to fund cost-effective measures that reduce or eliminate the long-term risk of flood damage to buildings,

manufactured homes, and other National Flood Insurance Program (NFIP) insurable structures. This specifically includes:

- Reducing the number of repetitively or substantially damaged structures and the associated flood insurance claims
- Encouraging long-term, comprehensive hazard mitigation planning
- Responding to the needs of communities participating in the NFIP to expand their mitigation activities beyond floodplain development activities and permitting
- Complementing other federal and state mitigation programs with similar, long-term mitigation goals

There are three types of FMA Program grants:

- Planning grants to assist the state and communities in developing flood mitigation plans
- Project grants to fund eligible flood mitigation projects that will greatly reduce or eliminate the risk of flood damage - “non-structural” hazard mitigation measures such as the elevation, relocation, or acquisition of flood-prone structures are encouraged
- Technical assistance grants provide guidance to applicants in applying for the program or in implementing approved projects

All FMA Program grants are offered on a cost-share basis requiring 25% non-federal match.

Repetitive Flood Claims

The Repetitive Flood Claims (RFC) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108–264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al). Up to $10 million is available annually for FEMA to provide RFC funds to assist States and communities reduce flood damages to insured properties that have had one or more claims to the National Flood Insurance Program (NFIP).

Severe Repetitive Loss

The Severe Repetitive Loss (SRL) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004, which amended the National Flood Insurance Act of 1968 to provide funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss (SRL) structures insured under the National Flood Insurance Program (NFIP). SRL properties are residential properties that have:

- At least four NFIP claim payments over $5,000 each, when at least two such claims have occurred within any ten-year period, and the cumulative amount of such claims payments exceeds $20,000; or
- For which at least two separate claims payments have been made with the cumulative amount of the building portion of such claims exceeding the value of the property, when two such claims have occurred within any ten-year period.

Aspects of the SRL program are as follows:

- Purpose: To reduce or eliminate claims under the NFIP through project activities that will result in the greatest savings to the National Flood Insurance Fund (NFIF).
- Eligible flood mitigation project activities: Floodproofing (historical properties only), Relocation; Elevation; Acquisition; Mitigation reconstruction (demolition rebuild); and Minor physical localized flood control projects.

- Federal / Non-Federal cost share: 75 / 25 %; up to 90 % Federal cost-share funding for projects approved in States, Territories, and Federally recognized Indian tribes with FEMA-approved Standard or Enhanced Mitigation Plans or Indian tribal plans that include a strategy for mitigating existing and future SRL properties.

Other Federal Grant Programs

U.S. Army Corps of Engineers: Eligible projects include levee rehabilitation and repair of flood control works damaged by floods. Technical engineering assistance is also available.

U.S. Environmental Protection Agency

- **Wetland Protection, Restoration, and Stewardship Discretionary Funding Program:** This program provides support for studies and activities related to implementation of Section 404 of the Clean Water Act for both wetlands and sediment management. Projects can support regulatory, planning, restoration, or outreach issues.

USDA - Rural Development Agency: Develop essential public facilities in rural areas and towns of less than 20,000 people. Construct, enlarge, or improve community facilities for health care, public safety, and public service.

USDA - Natural Resources Conservation Service

- **Wetlands Reserve Program:** This program offers landowners the opportunity to receive payments for restoring and protecting wetlands on their property. Landowners are provided cost-share funds to restore wetlands.
- **Wildlife Habitat Incentives Program:** This program is a voluntary program for people who want to develop and improve wildlife habitat primarily on private lands. It provides both technical assistance and cost-share payments to help establish and improve fish and wildlife habitat.

U.S. Small Business Administration Loan Program

Through its Office of Disaster Assistance (ODA), the SBA is responsible for providing affordable, timely and accessible financial assistance to homeowners, renters and businesses following a disaster. Financial assistance is available in the form of low-interest, long-term loans.

SBA's disaster loans are the primary form of federal assistance for the repair and rebuilding of non-farm, private sector disaster losses. For this reason, the disaster loan program is the only form of SBA assistance not limited to small businesses.

Infrastructure Investment and Jobs Act

In 2022, the federal legislature based on the Infrastructure Investment and Jobs Act (IIJA) to invest in the modernization of transportation, drinking water, and wastewater infrastructure. The bill provides $550 billion in spending on infrastructure over five years, including $47 billion for resilient infrastructure and $48 billion for water infrastructure. Funding will be distributed across many federal agencies and programs, but many mitigation projects should be eligible for funding under the following strategies: Flood Mitigation (including Army Corps of Engineers priorities and FEMA Flood Mitigation Assistance Grants), Wildfire Management, Wildfire Risk Reduction, Drought, Cybersecurity, FEMA BRIC Grants, Waste Management, and more.

Other Sources

Other agencies to contact regarding possible grants to help implement hazard mitigation plans are the Department of Homeland Security and U.S. Fire Administration.

Federal agencies are not the only sources for funds. The state of Washington and other nongovernmental organizations may also be able to assist in the implementation of hazard mitigation measures by providing technical assistance, grants, or additional resources. It may be possible to add a mitigation component to specific projects or complete a grant project that also proves to help reduce the impacts from the identified hazards even if that is not the project's main objective.

SECTION 6. PLAN MAINTENANCE, MONITORING, AND EVALUATION

The plan maintenance, monitoring, and evaluation section details the formal process that will ensure that the HMP remains an active and relevant document. The process includes a schedule for monitoring and evaluating the HMP annually and producing a plan revision every five years. Plan maintenance will be the overall responsibility of YVEM.

6.1. Plan Adoption

YVEM will be responsible for facilitating the adoption of the HMP in coordination with participating jurisdictions. The Yakima County Board of County Commissioners (BOCC) will be responsible for adopting for the county, city councils for the cities/towns, and governing bodies for the special districts. These governing bodies have the authority to promote sound public policy regarding natural, technological, and human-caused hazards. Once the plan has been reviewed and approved by the HMP Committee, YVEM will be responsible for submitting it to the Mitigation Officer at WaEMD. WaEMD will then submit the plan to FEMA for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. FEMA will designate the HMP as “Approved Pending Adoption”, giving each governing body up to 12 months to formally adopt the plan. Upon local adoption, Yakima County and the participating jurisdictions will gain eligibility for Hazard Mitigation Grant Program funds. YVEM and each participating jurisdiction will maintain documentation of local plan adoption.

6.2. Plan Maintenance

The HMP will be reviewed on an annual basis to determine the effectiveness of programs, and to reflect changes in land development or mitigation priorities. The YVEM Director or their designee will serve as a ***facilitator*** to convene meetings of the HMP Committee. Plan implementation and evaluation will be a shared responsibility among the jurisdictions, but YVEM is responsible for plan maintenance.

The facilitator, or designee, will be responsible for contacting the HMP Committee and participating jurisdictions and organizing the annual meeting. Jurisdictions will be responsible for monitoring and evaluating the progress of the mitigation strategies in the HMP based upon their area of expertise.

Annual review of the plan allows for "mid-course" corrections to the plan and consider additional funding opportunities. Evaluation of the plan provides the opportunity to:

- Incorporate new information and updated scientific data about hazards
- Coordinate mitigation efforts with local, state, and federal agencies
- Modify the plan's goals
- Devise new hazard mitigation actions that more effectively address the identified risks
- Engage the public in hazard mitigation and preparedness

Yakima County HMP Committee

The HMP Committee will be responsible for coordinating implementation of plan action items and undertaking the formal review process for mitigation issues covering the entire county.

The choice of these county departments as the core group of committee members is based upon county-wide planning initiatives (e.g., Flood Control Zone District and Wildland Fire) which involve other jurisdictions as well as special districts.

This HMP Steering Committee will consist of the following departments and agencies:

- Yakima County Departments/Agencies
    - Yakima Valley Office of Emergency Management
    - Public Services
    - Environmental Services
    - Flood Control Zone District/Water Resources Division
    - Environmental/Natural Resources
    - Subdivision/Zoning
    - Building & Fire Safety
    - Code Enforcement
    - Geographic Information Systems
    - Technology Services
    - Facilities
- Local Emergency Planning Committee (LEPC) Representative
- Community Wildfire Protection Plan (CWPP) Representative

Cities and Towns

YVEM will use the existing city/town emergency organization structure to facilitate the review, solicit public feedback and coordinate the promulgation of the Yakima County HMP. YVEM has established within each city and town an emergency structure consisting of the Mayor, City Manager/Administrator, City Attorney, City Clerk, Fire Chief, Police Chief, Public Works Director,

School Superintendent, Code Enforcement, and others selected by the Mayor/City Manager. YVEM has created an Emergency Operations Center for emergency/disaster response in each of the thirteen cities and towns.

These existing emergency networks within the unincorporated areas of the county as well as the incorporated cities and towns will continue to function as part of the HMP Committee.

Special Districts

A benefit of the mitigation planning process conducted by YVEM is an increased awareness by special districts of the importance of emergency planning beyond the typical response to an incident. These special jurisdictions are becoming aware of mitigation as a proactive element of emergencies. Special districts (i.e., schools, fire, and irrigation) will be encouraged to annex into the plan and it will become a work in progress for their emergency planning efforts. The challenge facing YVEM will be to encourage districts to become an active partner in their community's efforts to mitigate the impact of major disasters. However, these special districts will use the HMP as a stand-alone document in support their jurisdiction's planning.

YVEM will continue to provide information and solicit comment from fire and law enforcement association meetings and utilize the ESD #105 to reach out to the school districts.

Plan Revisions

During annual plan review meetings, the HMP Committee representatives responsible for the various action items will report on the status of the projects, the success of various implementation processes, difficulties encountered, the success of coordination efforts, and which strategies should be revised or removed. Each annual mitigation meeting must be documented, including the plan evaluation and review of mitigation actions.

YVEM ensures that necessary changes and revisions to the plan are prepared, coordinated, published, and distributed. YVEM will submit updates to WaEMD as needed.

The plan will undergo revision whenever:

- Any other condition occurs that causes conditions to change
- Local government structure changes
- Community situations change
- FEMA requirements change

6.3. Continued Public Involvement

Yakima County jurisdictions are dedicated to involving the public directly in the continual review and updates of the HMP. The public will also have the opportunity to provide feedback on the HMP annually. The HMP will be posted to the YVEM website along with any proposed changes. This site will also contain an email address and phone number to which people can direct their comments and concerns.

A public meeting will also be held after each annual evaluation or when deemed necessary by the steering committee. The meeting will provide the public a forum for which they can express their concerns, opinions, or ideas about the Plan. YVEM will utilize local resources to publicize annual public meetings and maintain public involvement through the webpage, and newspapers.

6.4. Five Year Formal Review Process

As part of the hazard mitigation planning process, FEMA expects plans to be monitored, evaluated, and re-submitted to FEMA for review and approval. All updates or amendments to this Plan must be submitted to FEMA for review and approval. This entire HMP must be updated and reapproved within 5 years from the plan's original adoption date.

Below is a recommended five-year action plan for YVEM and the HMP Committee to follow five years following the adoption of this HMP, and then every five years thereafter. It should be noted that the schedule below can be modified as necessary and does not include any meetings and/or activities that would be necessary following a disaster event. The HMP Committee should reconvene within 90 days of a disaster or emergency to determine what mitigation projects should be prioritized during the community recovery. If an emergency meeting of the HMP Committee occurs, this proposed schedule may be altered to fit any new needs.

Year 0:

- **April – September 2022:** Update Hazard Mitigation Plan, including a series of planning team meetings & public meetings. Submit 2022 Hazard Mitigation Plan for WaEMD and FEMA approval.
- **October 2022 - December 2022:** Obtain WaEMD and FEMA approval; formally adopt the Plan by resolution. Work on mitigation actions. As mitigation actions occur, lead agencies/departments will report on project status and progress to YVEM and/or the HMP committee.

Year 1:

- **January – March 2023:** Prepare for and promote the first annual plan review and public meetings. Departments will provide a status update for each mitigation action/project.
- **April 2023**: Reconvene HMP Committee for first annual mitigation meeting. Introduce the concept of mitigation plan integration with other planning documents. Host first annual public meeting.
- **May – December 2023:** Work on mitigation actions. As mitigation actions occur, lead agencies/departments will report on project status and progress to YVEM and/or the HMP committee. Encourage plan integration efforts.

Year 2:

- **January – March 2024:** Prepare for and promote second annual plan review and public meetings. Departments will provide a status update for each mitigation action/project.
- **April 2024:** Reconvene HMP Committee for annual mitigation meeting. Review plan integration efforts. Host annual public meeting.
- **May – December 2024:** Work on mitigation actions. As mitigation actions occur, lead agencies/departments will report on project status and progress to YVEM and/or the HMP committee. Encourage plan integration efforts.

Year 3:

- **January – March 2025:** Prepare for and promote annual plan review and public meetings. Departments will provide a status update for each mitigation action/project.
- **April 2025:** Reconvene HMP Committee for annual mitigation meeting. Review plan integration efforts. Host annual public meeting.

- **May – December 2025:** Work on mitigation actions. As mitigation actions occur, lead agencies/departments will report on project status and progress to YVEM and/or the HMP committee. Encourage plan integration efforts.

Year 4:

- **January – March 2026:** Prepare for and promote annual plan review and public meetings. Departments will provide a status update for each mitigation action/project.
- **April 2026:** Reconvene HMP Committee for annual mitigation meeting. Review plan integration efforts. Host annual public meeting.
- **May – December 2026:** Work on mitigation actions. As mitigation actions occur, lead agencies/departments will report on project status and progress to YVEM and/or the HMP committee. Encourage plan integration efforts.

Year 5:

- **January – December 2027:** Update 2022 Hazard Mitigation Plan, including a series of mitigation planning team meetings and public meetings.
- Submit 2027 Hazard Mitigation Plan for WaEMD and FEMA approval. Repeat.

6.5. Procedures for Additional Jurisdictions to the HMP

Jurisdictions and special districts not included in the 2022 HMP Update may choose to annex into the plan at any time. The procedure for adding jurisdictions was developed by YVEM in cooperation with the WaEMD.

1. A jurisdiction not included in this update and wishing to join the plan contacts YVEM with the request to become a participant of the plan.
2. YVEM provides the jurisdiction with a copy of the approved plan, planning requirements and any other pertinent data.
3. The jurisdiction reviews the plan and develops the portions of the plan that are specific to the jurisdiction as directed by YVEM staff. The portion of the plan must meet the requirements of the most recent version of FEMA's Local Mitigation Planning Handbook.
4. The new jurisdiction submits its portions of the plan to YVEM, and the new jurisdiction plan is forwarded to the State Hazard Mitigation Program Manager for review and compliance with current Local Multi-Hazard Mitigation Planning Guidance.
5. The State Hazard Mitigation Program Manager reviews the new jurisdiction plan for compliance with current Local Multi-Hazard Mitigation Planning Guidance in conjunction with the Yakima County Multi-Jurisdictional Hazard Mitigation Plan. If the new jurisdiction does not meet the required standard, the State Hazard Mitigation Program Manager will work with the jurisdiction to resolve issues until it does.
6. The State Hazard Mitigation Program Manager forwards the new jurisdiction plan to FEMA Region X for review and comment. Upon approval from FEMA Region X, the new jurisdiction is considered part of the Yakima County Multi-Jurisdictional Hazard Mitigation Plan and will comply with the update schedule of the plan.

APPENDIX A. ACRONYMS

Acronym	Definition
AIDS	Autoimmune Deficiency Syndrome
BAER	Burned Area Emergency Response
BFE	Base Flood Elevations
BOCC	Board of County Commissioners
BRIC	Building Resilient Infrastructure and Communities
CBRN	Chemical, Biological, Radiological, and Nuclear
CDC	Centers for Disease Control
CEMP	Comprehensive Emergency Management Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERT	Community Emergency Response Team
CFHMP	Comprehensive Flood Hazard Management Plan
CFR	Code of Federal Regulations
CGS	Columbia Generating Station
CID	Community Identifier
CNG	Compressed Natural Gas
COG	Continuity of Government
COOP	Continuity of Operations
CRS	Community Rating System
CSZ	Cascadia Subduction Zone
CWPP	Community Wildfire Protection Plan
DHS	Department of Homeland Security
DNR	Department of Natural Resources
DOE	Department of Energy
DOL	Department of Licensing
DOT	Department of Transportation
EAP	Emergency Action Plan
EMD	Emergency Management Department
EMS	Emergency Medical Services
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
ESD	Education Service District
EV	Electric Vehicle
FCZD	Flood Control Zone District
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
FMA	Flood Mitigation Assistance
FRCC	Fire Regime Condition Class

Acronym	Definition
FTA	Federal Transportation Authority
GDP	Gross Domestic Product
GIS	Geographic Information Systems
HIV	Human Immunodeficiency Virus
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
IBC	International Building Code
IIJA	Infrastructure Investment and Jobs Act
IT	Information Technology
LEPC	Local Emergency Planning Committee
MJHMP	Multi-Jurisdictional Hazard Mitigation Plan
MMI	Modified Mercalli Intensity
MPH	Miles per hour
NE	Northeast
NFIP	National Flood Insurance Program
NID	National Inventory of Dams
NOAA	National Oceanic & Atmospheric Administration
NW	Northwest
NWS	National Weather Service
ODA	Office of Disaster Assistance (SBA)
OR	Oregon
OSHA	Occupational Safety and Health Administration
PA	Public Assistance
PDM	Pre-Disaster Mitigation
PNP	Private Nonprofit
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
RFC	Repetitive Flood Claims
SBA	Small Business Administration
SE	Southeast
SPC	Storm Prediction Center
SVI	Social Vulnerability Index
SW	Southwest
TB	Tuberculosis
UGA	Urban Growth Area
URM	Unreinforced Masonry
US	United States
USDA	U.S. Department of Agriculture
USDM	U.S. Drought Monitor

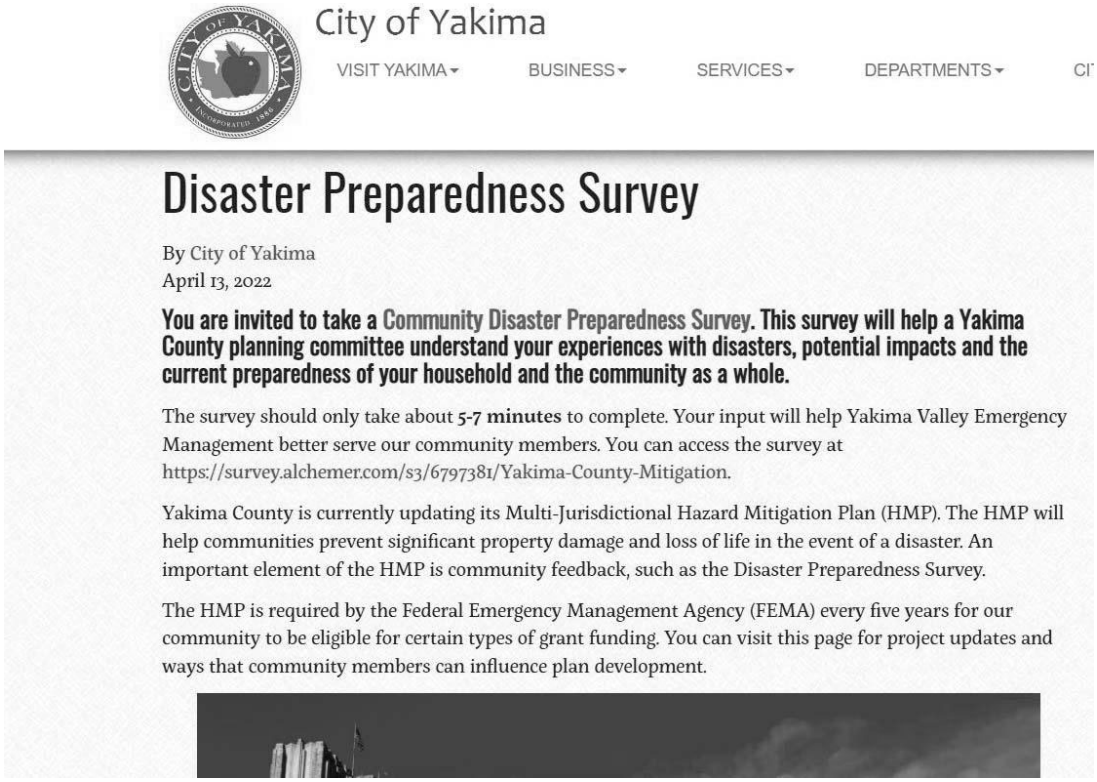
Acronym	Definition
USDOT	U.S. Department of Transportation
USGS	U.S. Geological Survey
VEI	Volcanic Explosivity Index
WSDOT	Washington State Department of Transportation
WSU	Washington State University
WUI	Wildland-Urban Interface
YCOG	Yakima Council of Governments
YVEM	Yakima Valley Emergency Management

APPENDIX B. PLANNING PROCESS AND PUBLIC INVOLVEMENT

This appendix provides detailed supporting documentation and evidence of the six-month plan update process for the 2022 Yakima County Multi-Jurisdictional Hazard Mitigation Plan (HMP). Documentation includes efforts to engage the public in plan review (press releases, social media posts, website information, etc.) as well as engagement from planning committee members (meeting attendance, etc.)

Community Preparedness Survey

The Community Preparedness Survey was distributed in both English and Spanish for more than four months. Distribution included two press releases, email distribution through the Yakima County Commissioners listserv, posting to the Yakima Valley Emergency Management (YVEM), Yakima County, and City of Yakima websites, and posting to social media (Facebook). Screenshots of this distribution are included below.



City of Yakima

VISIT YAKIMA ▾ BUSINESS ▾ SERVICES ▾ DEPARTMENTS ▾ CI

Disaster Preparedness Survey

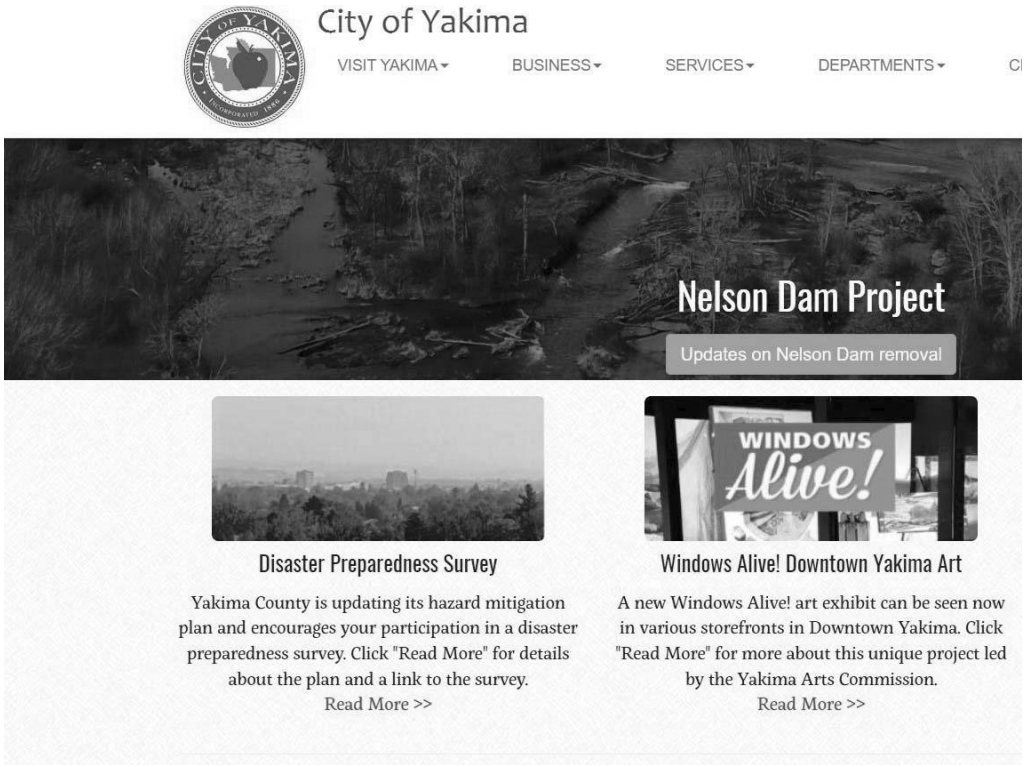
By City of Yakima
April 13, 2022

You are invited to take a Community Disaster Preparedness Survey. This survey will help a Yakima County planning committee understand your experiences with disasters, potential impacts and the current preparedness of your household and the community as a whole.

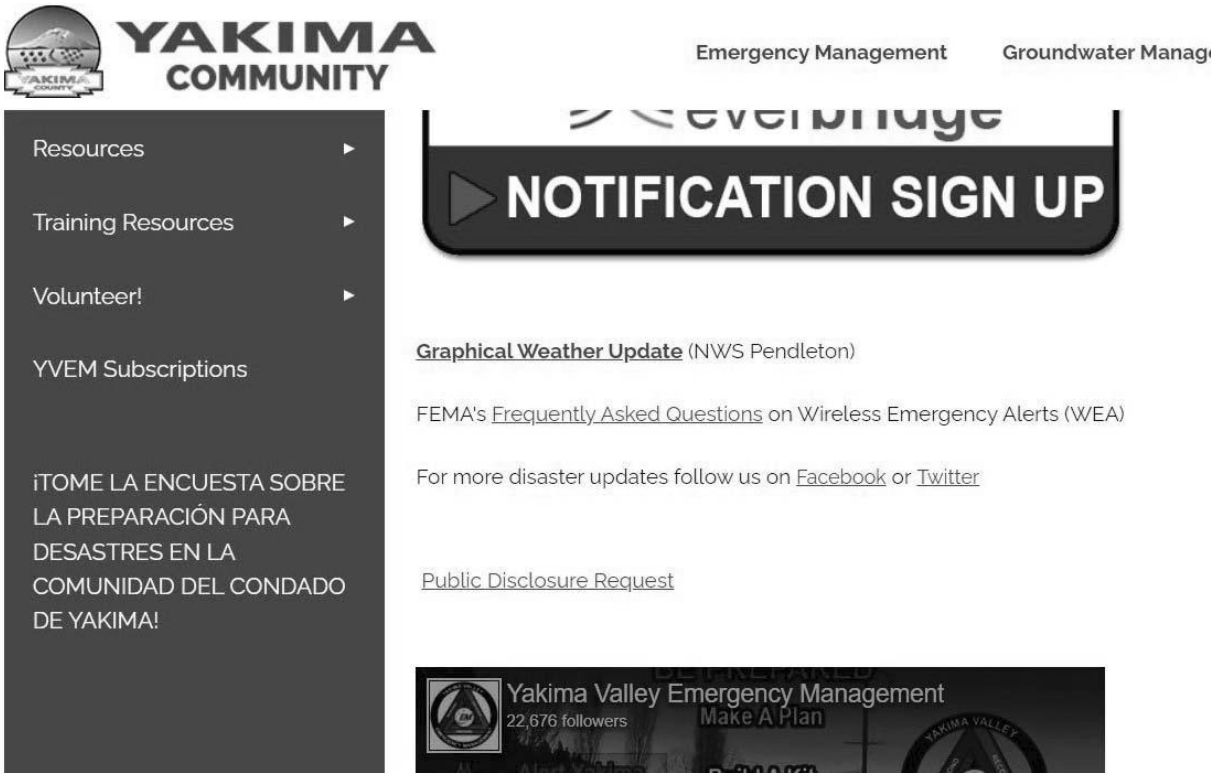
The survey should only take about **5-7 minutes** to complete. Your input will help Yakima Valley Emergency Management better serve our community members. You can access the survey at https://survey.alchemer.com/s3/6797381/Yakima-County-Mitigation.

Yakima County is currently updating its Multi-Jurisdictional Hazard Mitigation Plan (HMP). The HMP will help communities prevent significant property damage and loss of life in the event of a disaster. An important element of the HMP is community feedback, such as the Disaster Preparedness Survey.

The HMP is required by the Federal Emergency Management Agency (FEMA) every five years for our community to be eligible for certain types of grant funding. You can visit this page for project updates and ways that community members can influence plan development.


City of Yakima
VISIT YAKIMA
BUSINESS
SERVICES
DEPARTMENTS
Nelson Dam Project
Updates on Nelson Dam removal
Disaster Preparedness Survey
Yakima County is updating its hazard mitigation plan and encourages your participation in a disaster preparedness survey. Click "Read More" for details about the plan and a link to the survey.
Read More >>
WINDOWS Alive!
Windows Alive! Downtown Yakima Art
A new Windows Alive! art exhibit can be seen now in various storefronts in Downtown Yakima. Click "Read More" for more about this unique project led by the Yakima Arts Commission.
Read More >>


The City of Yakima
Intro
Yakima is located in the heart of Central Washington. Yakima is a full-service city.
Page · Government organization
(509) 575-6000
cityofyakima.socialmedia@yakimawa.gov
yakimawa.gov
Closing Soon
Photos
See all photos
April is National Volunteer Month
Like
Comment
Share
Write a comment...
The City of Yakima
7h
Yakima County has a #disaster preparedness survey and needs to hear from you. What are you doing to prepare for emergencies? Where do you get #emergency info? Let'em know at http://ow.ly/ZxfJ50IJkfR
Photo from Sept 2020, wildfire smoke in #DowntownYakima
2
3 Shares
Thank You!
April is National Volunteer Month


YAKIMA COUNTY
Emergency Management
Groundwater Manag
Resources
Training Resources
Volunteer!
YVEM Subscriptions
¡TOME LA ENCUESTA SOBRE LA PREPARACIÓN PARA DESASTRES EN LA COMUNIDAD DEL CONDADO DE YAKIMA!
NOTIFICATION SIGN UP
Graphical Weather Update (NWS Pendleton)
FEMA's Frequently Asked Questions on Wireless Emergency Alerts (WEA)
For more disaster updates follow us on Facebook or Twitter
Public Disclosure Request
Yakima Valley Emergency Management
22,676 followers
Make A Plan

Public Meetings

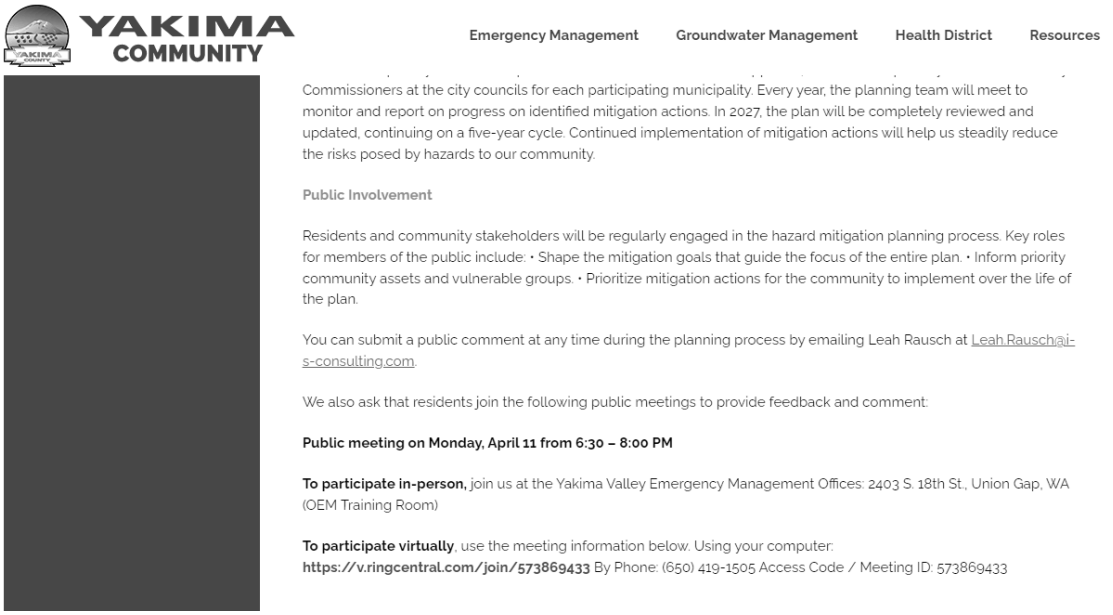
The planning team hosted two public meetings for the HMP plan update process, one at the beginning of the process and one during the final plan review period. The kick-off public meeting in April 2022 was a hybrid, in-person and virtual opportunity, while the final meeting in August was virtual only. Public meeting information was distributed through YVEM, Yakima County and City of Yakima websites, social media, press releases to the Yakima Herald and YakTri News, and through various listservs. Screenshots of this distribution are included below.

About Us
Alert Yakima
County Emergency Plans
LEPC
Preparing for Disasters
Prevention

Home › Community › Emergency Management › Public Meetings

Public Meetings

Event	Date/Time	Location	Call in Number	Conference ID
Executive Board Meeting	February 16th, 2022 09:30am	2403 S. 18th St., Union Gap, WA OEM Training Room	(206) 485-3656	557055931#
Hazard Mitigation Meeting for Public Comment (In-person or virtual)	April 11th, 2022 06:30pm-08:30pm	2403 S. 18th St., Union Gap, WA OEM Training Room	(650) 419-1505	573869433



YAKIMA COMMUNITY

Emergency Management | Groundwater Management | Health District | Resources

Commissioners at the city councils for each participating municipality. Every year, the planning team will meet to monitor and report on progress on identified mitigation actions. In 2027, the plan will be completely reviewed and updated, continuing on a five-year cycle. Continued implementation of mitigation actions will help us steadily reduce the risks posed by hazards to our community.

Public Involvement

Residents and community stakeholders will be regularly engaged in the hazard mitigation planning process. Key roles for members of the public include: • Shape the mitigation goals that guide the focus of the entire plan. • Inform priority community assets and vulnerable groups. • Prioritize mitigation actions for the community to implement over the life of the plan.

You can submit a public comment at any time during the planning process by emailing Leah Rausch at Leah.Rausch@i-s-consulting.com.

We also ask that residents join the following public meetings to provide feedback and comment:

Public meeting on Monday, April 11 from 6:30 – 8:00 PM

To participate in-person, join us at the Yakima Valley Emergency Management Offices: 2403 S. 18th St., Union Gap, WA (OEM Training Room)

To participate virtually, use the meeting information below. Using your computer: **https://v.ringcentral.com/join/573869433** By Phone: (650) 419-1505 Access Code / Meeting ID: 573869433


Yakima Valley Fire Adapted Communities Coalition
@YVFACC · Non-Governmental Organization (NGO)
Send message
Hi! Please let us know how we can help.
Home
Videos
Photos
About
More
Like
About
See all
The purpose of the yvfacc is
499 people like this
512 people follow this
http://fireadaptedyakima.org/
Send message
Non-Governmental Organization (NGO)
Photos
See all
Videos
See all
Create post
Photo/video
Check in
Tag friends
Yakima Valley Fire Adapted Communities Coalition
1h ·
PUBLIC
MEETING
NOTICE
Yakima Valley Emergency Management
March 31 at 2:54 PM ·
YAKIMA COUNTY HAZARD PLANNING EFFORT SEEKING PUBLIC COMMENT
Yakima County has experienced several natural and human-caused disasters in recent years – landslid... See more
Like
Comment
Share

YAKTRINEWS.COM NEWS SPORTS WEATHER MORE Yakima 42°

SEVERE WEATHER ⚠ Winter Weather Advisory (Moderate) - Washington: East S

Yakima County needs input on hazard mitigation plan

Posted: April 7, 2022 4:29 PM
by Emily Goodell

12A • WEDNESDAY, APRIL 6, 2022 YAKIMA HERALD-REPUBLIC • YAKIMAHERALD.COM

Legals

Public Notices

BOARD OF YAKIMA COUNTY COMMISSIONERS NOTICE TO BIDDERS

NOTICE IS HEREBY GIVEN that the Board of Yakima County Commissioners will, pursuant to law, open bids on **Wednesday, April 27, 2022**, or as soon thereafter as possible in the 4th Floor Conference Room, County Courthouse, Yakima, Washington, for the **Asphalt Emulsion for the Yakima County 2022 Bituminous Surface Treatment Program.**

Bids must be:

(1) Sealed

(2) Plainly marked: Bid– Asphalt Emulsion 2022 Bituminous Surface Treatment Program

(3) Addressed to: Yakima County Roads Attention Melissa Vantrease 128 North 2nd Street, 4th Floor Yakima, Washington 98901

(4) Bids must be in the office of Yakima County Public Services on or before bid time of 2:00 p.m., April 27, 2022.

Specifications for said bid are on file in the office of the County Engineer, 128 North 2nd Street, 4th Floor County Courthouse, Yakima, Washington 98901.

The Board reserves the right to reject any or all bids, or parts thereof.

DONE this 5th day of April 2022

ATTEST: Julie Lawrence – Clerk of the Board

(26755) April 6 and 13, 2022

Public Notices

NOTICE OF PUBLIC MEETING

YAKIMA COUNTY HAZARD MITIGATION PLAN

A meeting will be held Monday, April 11th from 6:30 PM – 8:00 PM to discuss updates to the Yakima County Hazard Mitigation Plan. This plan is updated every five years in coordination with the Yakima County and the cities within the County.

Residents and community stakeholders are invited to engage in the hazard mitigation planning process. Community members will inform what threats and hazards are the top priorities, shape the mitigation goals that guide the focus of the entire plan, and identify community assets and vulnerable groups to protect.

You can participate **in-person** at the Yakima Valley Emergency Management Office, located at 2403 S. 18th Street, Suite 200, in Union Gap or participate **virtually**. An additional public meeting will take place in September 2022 when the draft plan is ready for review.

For more infromation or to register for the public meeting, please visit: https://www.yakimacounty.us/2147/Public-Meetings

(26754) April 6 and 10, 2022

OFFICIAL NOTICE FOR NOMINATION OF MEMBERS TO THE WASHINGTON MINT COMMISSION

Pursuant to chapter 15.65 RCW, notice is given that a call-in meeting will be held from 1:00 p.m. – 2:00 p.m. on **April 19, 2022** to nominate candidates for positions 1 and 2 on the Washington Mint Commission. During the meeting, nominations may be made by calling (360) 902-

Garage Sales

Union Gap
Yard Sale/Indian Taco
4201 3rd St
Saturday, 9am-4pm
Lots of fabric, more.

Yakima
80+ Years of Stuff for Sale
6902 Postma Rd
April 9th and 10th
8am to 4pm
80+ years of stuff... farm equipment, pipe and sprinkler stuff, tons of tools including hand and power tools, small appliances, furniture, dishes, and much more.

Yakima
BAZAAR
1000 S. 72nd Ave/West Valley, Wide Hollow Elementary
Saturday, 9am-4pm
Come support your local vendors (over 40) craft & direct sales. Grab some lunch (ribs, pulled pork, Red Bull, hotdogs, mini donuts, more), and don't forget to say hello to the Easter Bunny.

Yakima
Colossol Sale/Indoor
7809 Tieton
Friday-Saturday,
8am-3pm
Proceeds support missions, no early birds! Mount Olive Lutheran Church

Sell it here. 509.452.7355 (509) $$$ CLASSIFIEDS

ITEMS UNDER $100

Place your ad at yakimaherald.com/classifieds or email us at classads@yakimaherald.com

5 pairs of men's boots, variety of color/condition, size 9.5-10.5, $25/ea. 509-966-3576

Card table and metal shelf 9 ½ x 60 x 24 and 2 tall faucets, $45.00 for all, 509-829-5715/No Sat.

Metal mailbox and wood Del Monte toolboxes $37.50 for all. 509-829-5715/No Sat.

5-light chandelier and Sears sewing machine $35.00 for both. 509-829-5715/No Sat.

Closed salon, all new items, nail/foot, some nice jewelry, less than 1/2 price for all. 509-697-6823

Plano pistol carry/storage case. NEW condition. $10. 509-965-8016.

Blankets, men's jacket, chairs, and 18" bicycle $30.00 for all. 509-829-5715. No. Sat.

Ladies jeans Size 32 and 600 feet of small rope $15.00 for all. 509-829-5715/No Sat.

Seasoned apple wood, $40/bin, 509-966-1174

We have it. 509.452.7355 (509) CLASSIFIEDS

Women's SAS sandals. Huggycaramel, size 7. Like new. $75. 509-379-4105.

The Yakima Police Dept. needs a swing shift maintenance specialist w/ 2 years exp. performing building maintenance, cleaning and repair work. Exp. in carpentry, construction, plumbing, electrical, and HVAC is preferred. Must be able to pass a background investigation.

View the complete job posting & apply www.yakimawa.gov/jobs

Closes 4/19/22
EOE

We have it. 509.452.7355 (509) CLASSIFIEDS

evaluation metric, because the scope of work is minimal and not complicated.

The City invites all interested fencing contractors to apply. No unlawful discrimination or preferential treatment will occur. Minorities, minority-owned entities and disadvantaged business enterprises will be afforded a full and fair opportunity to apply and an equal evaluation.

For more information, contact Rocky Wallace, Public Works Director (phone 509-696-7365).

Dale Novobielski
City Clerk/Treasurer

(27051) April 10, 2022

00493-39 SERVED BY PUBLICATION- TO: DAMARIS JAEL MENDOZA, Mother; an order for protection was granted on April 7th, 2022. On behalf of Constantino Mendoza, Father and two minor children. Obtain a copy at Yakima County Courthouse- 3rd floor, 128 N. 2nd Street/ Yakima WA. 98901.

(26997) April 10, 2022

We have it. 509.452.7355 (509) CLASSIFIEDS

You can participate **in-person** at the Yakima Valley Emergency Management Office, located at 2403 S. 18th Street, Suite 200, in Union Gap or participate **virtually**. An additional public meeting will take place in September 2022 when the draft plan is ready for review.

For more infromation or to register for the public meeting, please visit: https://www.yakimacounty.us/2147/Public-Meetings

(26754) April 6 and 10, 2022

Sell it here. 509.452.7355 (509) $$$ CLASSIFIEDS

Thursday, April 14, 2022 to conduct the annual review of the Title VI Indian Education Grant Application. The public hearing will begin at 6:00pm as part of the Indian Education Parent Meeting in the Wapato High School Library.

(26962) April 10 and 13, 2022

We have it. 509.452.7355 (509) CLASSIFIEDS

2E • SUNDAY, APRIL 10, 2022 YAKIMA HERALD-REPUBLIC • YAKIMAHERALD.COM

Employment

GROUNDSKEEPER/LABORER

The Yakima Housing Authority is seeking a Full Time as well as a Seasonal Groundskeeper/Laborer. Position is responsible for maintenance of grounds including general lawn care; litter control; sprinkler irrigation/maintenance; snow/ice removal; operation of various motor-operated equipment. Valid Washington State driver's license required. Employment Applications available at www.yakimahousing.org on the 'About Us' tab in the 'Employment' section. Your completed application and resume may be e-mailed to employment@yakimahousing.org, faxed to 509-214-6311, or dropped off at the YHA office, 810 N. 6th Avenue in Yakima.

CONTRACT ATTORNEY RECRUITMENT
Yakima County Prosecuting Attorney's Office
Criminal and Civil Divisions
Monthly Compensation Negotiable, DOQ

The Yakima County Prosecuting Attorney's Office has immediate openings for Contract Attorneys at all levels. Case assignment is at the discretion of the Prosecutor in both the criminal and civil divisions. Criminal cases may include juvenile, district court, general felony, or special assault work. ITA experience is preferred for one specialized area of assignment.

- Membership in the Washington State Bar Association is required.
- Work can be performed in the office and/or remotely, as needed.
- Flexible hours based upon availability.

Must have:
- personal computer/laptop;
- the ability to drive personal vehicle, and travel to Courthouse when needed.

Please send an interest email, noting your preference for criminal or civil work to:
Deborah Clausing, Operations Manager, Prosecuting Attorney's Office
deborah.clausing@co.yakima.wa.us
or call 509-574-1309

Naches Valley SCHOOL DISTRICT

Naches Valley School District is hiring for:

High School Principal
Salary Range: $127,930.00 - $138,510
Start Date: July 1, 2022
Position Closes: April 12th
To apply: www.nvsd.org

ADMINISTRATIVE ASSISTANT: Full time for busy law office. Benefits included; Salary DOQ. Contact mthomas@hnw.law. Visit Halversonnw.com for more information.

Construction Laborer-Wishram, WA
The Construction Laborer reports to the Special Projects Manager, Construction Superintendent, and Construction Lead Laborer. Shall assist in activities of new construction; modernizing single family dwelling units; tax credit new and renovation projects; and, other types of construction projects, such as sanitation facilities, well renovation projects and projects other than HUD housing. The responsibility shall be consistent with applicable YNHA policies, NAHASDA Regulations, Federal requirements, and Tribal ordinances. More information visit www.ynha.org/employment

Public Health Technician
Starting Salary: $19.26 - $25.13 per hour + Benefits

The Yakima Health District is hiring for a Temporary Public Health Technician position. Work includes gathering relevant information needed to prepare records, tracking of patient care, entering all information into the appropriate data system, and screening patients to obtain medical and risk history. Anyone who is interested should send a cover letter and resume to HealthDistrictHR@co.yakima.wa.us. For more information about the job posts or the Yakima Health District, please visit www.yakimahealthdistrict.org.

CITY OF YAKIMA
BUILDING MAINTENANCE SPECIALIST
M – F 1:00 PM – 9:00 PM

Employment

Naches Valley SCHOOL DISTRICT

Naches Valley School District is hiring for:

Middle School Long Term Sub -Art
HS/MS Long Term Sub - Choir
Para Educator -Transitional Bilingual
Bus Driver - 3 Routes
Sub Bus Drivers

To apply: www.nvsd.org

Small dental office looking for experienced Dental Assistant full time M-F with benefits call 509-965-3235

Announcements

Announcements

Yakima Bonsai Society

Beginner's Workshop
Learn about styles of bonsai, get pre-bonsai in a nursery container, & guided instruction
Sat. 4/16/22 10am-1pm, $60 which covers tree, wiring, and instruction
Located at: 102 Naches Ave, Naches, WA

Call (509)594-6565 for more info

Found

Found: 2 small dogs 3/30 in Grandview proof of ownership 509-731-0581

Found: Dog in Terrace Heights. Proof of ownership. 1(509)823-0614

Found: March 1, young Boxer on IB2, outside of Yakima, 509-588-3480

Found: Med. size dog in Terrace Heights. Must have proof of ownership. 1(509)823-0614

Legals

Public Notices

Abandoned Vehicle Auction

1312 S. 18th Street Yakima WA.
Auction for APRIL 14TH AND APRIL 19TH @ 9AM
8 AM viewing of vehicles 1 hour prior to auction.
The auction will be held at 9:00 am.

(26980) April 10, 2022

ADDENDUM TO CONTRACT PROVISIONS

City of Selah
115 W. Naches Avenue
Selah, WA 98942

The City of Selah desires to hire a fencing contractor to install a new Athletic Field Fence at Wood Field at Carlon Park.

The engagement would occur pursuant to a simple "Contract for Athletic Field Fence", which will be signed between the parties. An electronic copy of the to-be-used Contract and Specifications is available at no cost via the City's website of www.selahwa.gov.

The Contract specifies the scope of work, the precise location, and the required performance schedule May 9, 2022 to May 31, 2022. This work will be subject to prevailing wage laws.

To be considered, an applicant must have or acquire (a) a City of Selah business license/registration, (b) a UBI number, (c) an LNI registration number, (d) an "Intent to Pay Prevailing Wage Affidavit" or its equivalent from LNI, (e) a federal EIN number, (f) liability insurance, and (g) auto insurance. In addition, a personal guarantee will be required for any business entity. An ADDENDUM has been posted to the City's website of www.selahwa.gov

All bidders shall acknowledge receipt of the ADDENDUM on the proposal form prior to bid opening.

The deadline to apply is 9:00 a.m. Wednesday, April 13, 2022. Price will be the primary

Legals

City of Yakima
NOTICE TO INTERESTED PARTIES
RFQ 12214Q

Notice is hereby given by the undersigned that Statements of Qualifications (SOQ) will be accepted by the City Clerks' Office until the hour of 11:00:00 AM PDT on **April 29, 2022**. SOQs will be publicly opened in Yakima City Hall, Council Chambers, 129 N. 2nd Street, Yakima, Washington 98901. At such time, Respondents names will be publicly read for: **Martin Luther King Jr. Park Pool Design Services**.

The City of Yakima reserves the right to reject any & all RFPs. The City hereby notifies all Proposers that it will affirmatively ensure compliance with WA State Law Against Discrimination (RCW chapter 49.60) & the Americans with Disabilities Act (42 USC 12101 et set.). The awarded firm will be in compliance with the applicable provisions of the Americans with Disabilities Act of 1990, and will be an equal opportunity employer as defined in Title VII of the Civil Rights Act of 1964, and applicable Washington State law.

Dated April 8, 2022.

(26946) April 8 and 10, 2022

NOTICE OF INTENT TO SOLE SOURCE

The City of Yakima intends to establish a sole source contract with **Alfa Laval, Inc., 5400 International Trade Drive, Richmond, VA. 23231**, to provide:
The Wastewater Treatment Plant intends to sole source replacement of a failed 1991 Alfa Laval spiral heat exchanger for primary digester No. 1, with a new Alfa Laval spiral heat exchanger. Sole Source is due to standardization with other units in operation and eliminates modifying existing inlet/outlet plumbing and exchanger concrete pedestal. Sole Source to include future purchases of Alfa Laval heat exchangers. WWTP has 3 primary digesters that rely on 5 Alfa Laval heat exchangers to generate Class B biosolids for beneficial use. These heat exchangers have reached or are near the end of their useful life and need to be replaced on a case by case basis.
Firms who believe they can compete for this requirement are required to email a brief statement of their intent to compete and/or any related questions to Susan Knotts, Buyer II at: Susan.Knotts@YakimaWA.Gov **by April 25, 2022 at 12:00 pm.**
The City of Yakima does not guarantee that firms responding to this notice will be rendered a request to tender an offer for this procurement. In addition, the City of Yakima does not guarantee that any solicitation will occur for this procurement, but reserves the right to solicit proposals.
Firms who have not already done so, should register as a vendor at: www.publicpurchase.com
Also, visit our website for instructions on how to register and to view advertised bids at: www.yakimawa.gov/services/purchasing.

Dated this 10th day of April, 2022
Susan Knotts, Buyer II

(26914) April 10 and 13, 2022

NOTICE OF ORDER FOR PROTECTION

SUPERIOR COURT of WASHINGTON for YAKIMA COUNTY. NOTICE OF ORDER FOR PROTECTION by publication: No. 22-2-

ITEMS UNDER $100
Place your ad at yakimaherald.com/classifieds or email us at classads@yakimaherald.com

Bargin Bin

6) cobalt cups and saucers, swirl pattern, $90, (509)972-9002

Almost new walker. Used 3 weeks indoor only. $25. 509-248-9528.

Bunny basket, ears form handle, very rare, $99, (509)972-9002

We have it. 509.452.7355

Favorite Applique Patterns. Vol. 1-6, from Old Country Store. NEW. $30. SOLD

Flextone Of Faithful glass turkey call w/wood striker. NEW condition. $20. 509-965-8016.

Heavy 8" tall tortoise shell glass purse, clear handle, $90, (509)972-9002

Heavy Cobalt pitcher, clear applied handle, polished pontil, $75, (509)972-9002

ANSWER TO TODAY'S PUZZLE

M	E	L	O	N	S		A	R	A	C	K		F	R	I		S	R	A
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4/10/22

Public Notices

NOTICE OF ZOOM AND IN-PERSON COUNCIL MEETING
CITY OF UNION GAP, WASHINGTON

NOTICE IS HEREBY GIVEN that on Monday, April 11, 2022 at 6:00 p.m., the Union Gap City Council will conduct their regular Council Meeting in-person in the Union Gap Council Chambers, located at 102 W. Ahtanum Road, Union Gap, WA. This meeting will also be accessible via Zoom using the information below.

Those who are interested in attending the meeting virtually via ZOOM can use the information below at 6:00 p.m. on April 11, 2022. For questions on accessing this virtual meeting, please call me at 509-249-9216 **prior to 5:00 p.m. on 04/11/2022.**

04/11/2022 Council Meeting

Mon, April 11, 2022; 6:00 PM

To Join the ZOOM meeting click the link below and use the Meeting ID and Passcode:

https://us02web.zoom.us/j/86459903443?pwd=NXZ0UNXVFMyNmV0cXVNL0xVMTVLdz09

Meeting ID: 864 5990 3443

Passcode: 549261

Or by telephone:

1 253 215 8782 or 1 669 900 6833

DATED this 5th day of April 2022.

/s/ Karen Clifton, City Clerk

(26775) April 8 and 10, 2022

NOTICE OF PUBLIC MEETING

YAKIMA COUNTY HAZARD MITIGATION PLAN

A meeting will be held Monday, April 11th from 6:30 PM – 8:00 PM to discuss updates to the Yakima County Hazard Mitigation Plan. This plan is updated every five years in coordination with the Yakima County and the cities within the County.

Residents and community stakeholders are invited to engage in the hazard mitigation planning process. Community members will inform what threats and hazards are the top priorities, shape the mitigation goals that guide the focus of the entire plan, and identify community assets and vulnerable groups to protect.

Public Notices

SOLICITATION FOR BIDS

City of Selah
115 W. Naches Avenue
Selah, WA 98942

The City of Selah desires to hire a fencing contractor to install a new Athletic Field Fence at Wood Field at Carlon Park.

The engagement would occur pursuant to a simple "Contract for Athletic Field Fence", which will be signed between the parties. An electronic copy of the to-be-used Contract and Specifications is available at no cost via the City's website of www.selahwa.gov.

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To be considered, an applicant must have or acquire (a) a City of Selah business license/registration, (b) a UBI number, (c) an LNI registration number, (d) an "Intent to Pay Prevailing Wage Affidavit" or its equivalent from LNI, (e) a federal EIN number, (f) liability insurance, and (g) auto insurance. In addition, a personal guarantee will be required for any business entity.

The deadline to apply is 9:00 a.m. Wednesday, April 13, 2022. Price will be the primary evaluation metric, because the scope of work is minimal and not complicated.

The City invites all interested fencing contractors to apply. No unlawful discrimination or preferential treatment will occur. Minorities, minority-owned entities and disadvantaged business enterprises will be afforded a full and fair opportunity to apply and an equal evaluation.

For more information, contact Rocky Wallace, Public Works Director (phone 509-698-7369).

Dale Nowobielski
City Clerk/Treasurer

(26325) April 3 and 10, 2022

Sell it here. $$$ 509.452.7355

Notice of Public Hearing
April 14, 2022

WAPATO SCHOOL DISTRICT NO. 207

Title VI Public Hearing

Wapato Public Schools will hold a Public Hearing on


To learn more visit: www.co.yakima.wa.us/OEM
Yakima Valley Emergency Management
22K followers • 355 following
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Learn More
Posts
About
Mentions
Followers
Photos
Videos
More
Intro
Emergency updates, disaster news,& readiness information posted by the Valley's original Office of
Page · Government organization
https://twitter.com/YakimaOEM
(509) 574-1900
co.yakima.wa.us/350/Emergency-Management
Photos
See all photos
Posts
Filters
Yakima Valley Emergency Management
18h ·
YAKIMA COUNTY HAZARD PLANNING EFFORT SEEKING PUBLIC COMMENT
Yakima County has experienced several natural and human-caused disasters in recent years – landslides, flooding, smoke from wildfires, and of course the COVID-19 pandemic.
Every five years, Yakima County and local cities update our Hazard Mitigation Plan to identify the greatest threats and hazards facing our community, and how we can best mitigate the impacts. Hazard Mitigation is any effort to reduce or eliminate... See more
PUBLIC
MEETING
NOTICE
5
2 Shares
Like
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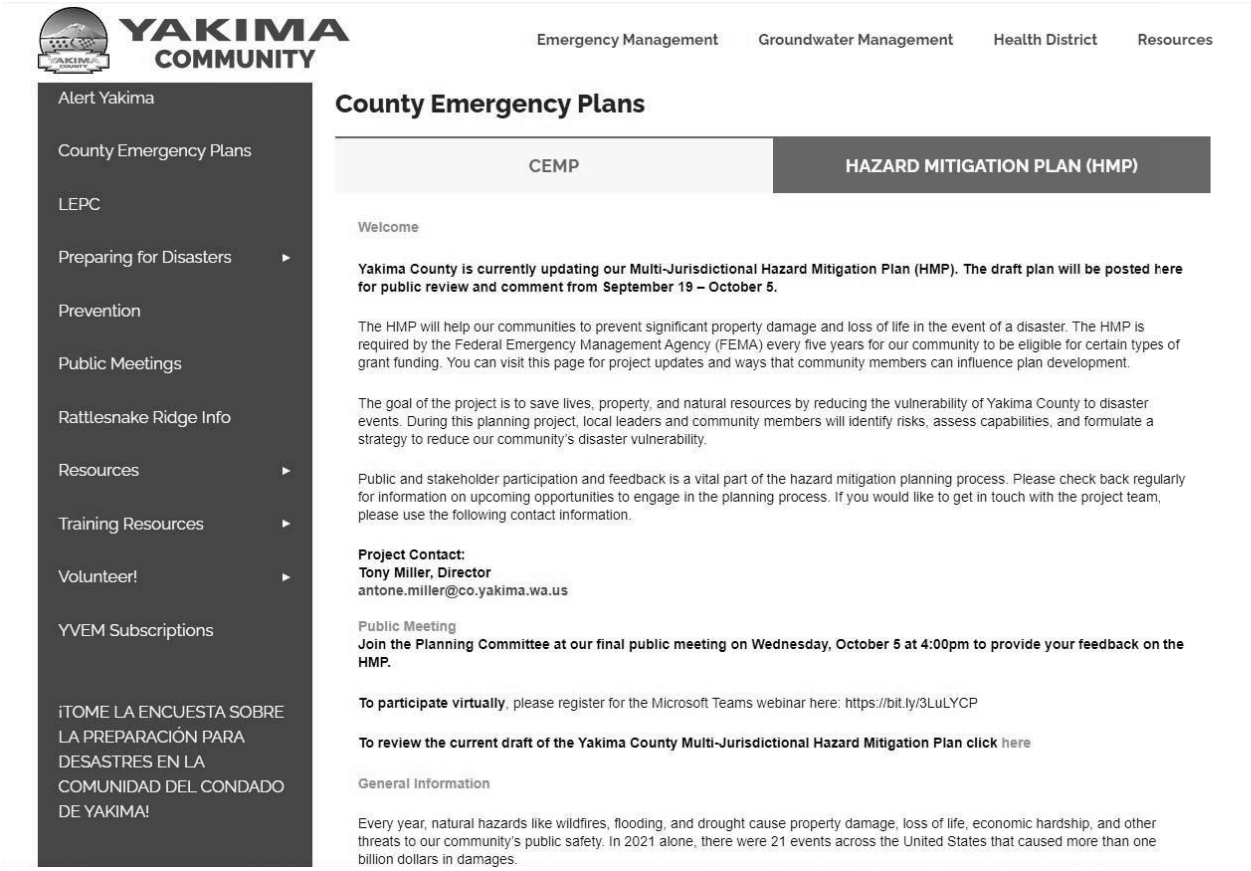
Most relevant
Write a comment...
Most Relevant is selected, so some comments may have been filtered out.

Plan Review Period

The draft Yakima County MJHMP was available for public comment and review for a two-week period between September 19 and October 5. The plan was available on the YVEM website and notification of the opportunity was shared through social media, press release, email, and public meeting forums. Screenshots of these platforms are included below.



YAKIMA COUNTY

Government Services Law & Justice Community How Do I?

Home › News Flash

Public Services

Posted on: September 21, 2022

FINAL OPPORTUNITY TO COMMENT ON YAKIMA COUNTY HAZARD PLAN

Yakima County has experienced several natural and human-caused disasters in recent years – landslides, flooding, smoke from wildfires, and of course the COVID-19 pandemic.

Every five years, Yakima County and local cities update our Hazard Mitigation Plan to identify the greatest threats and hazards facing our community, and how we can best mitigate the impacts. Hazard Mitigation is any effort to reduce or eliminate the long-term risk to human life and property.

Residents and community stakeholders are invited to provide your feedback on the final draft of the Hazard Mitigation Plan. Community members help to shape our strategy for mitigation and ensure thoughtful investments and projects.

Join the project team for our final public meeting on Wednesday, October 5 at 4:00pm as we review the final plan and provide your feedback! Participation is open to members of the public virtually through a Microsoft Teams webinar.

For more information or to register for the public meeting, please visit:
https://www.yakimacounty.us/1815/County-Emergency-Plans

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- Commissioners Office
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- Public Services

Planning Committee Participation

The Yakima County HMP Update was led by a committee representing various agencies involved in mitigation projects, as well as representatives from each participating jurisdiction. Additionally, subject matter experts and neighboring jurisdiction representatives were invited to participate in committee meetings which served as Mitigation Strategy Workshops. Sign-in sheets for the planning committee meetings are available as a supplement to this document.