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

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[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/ypgf-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)

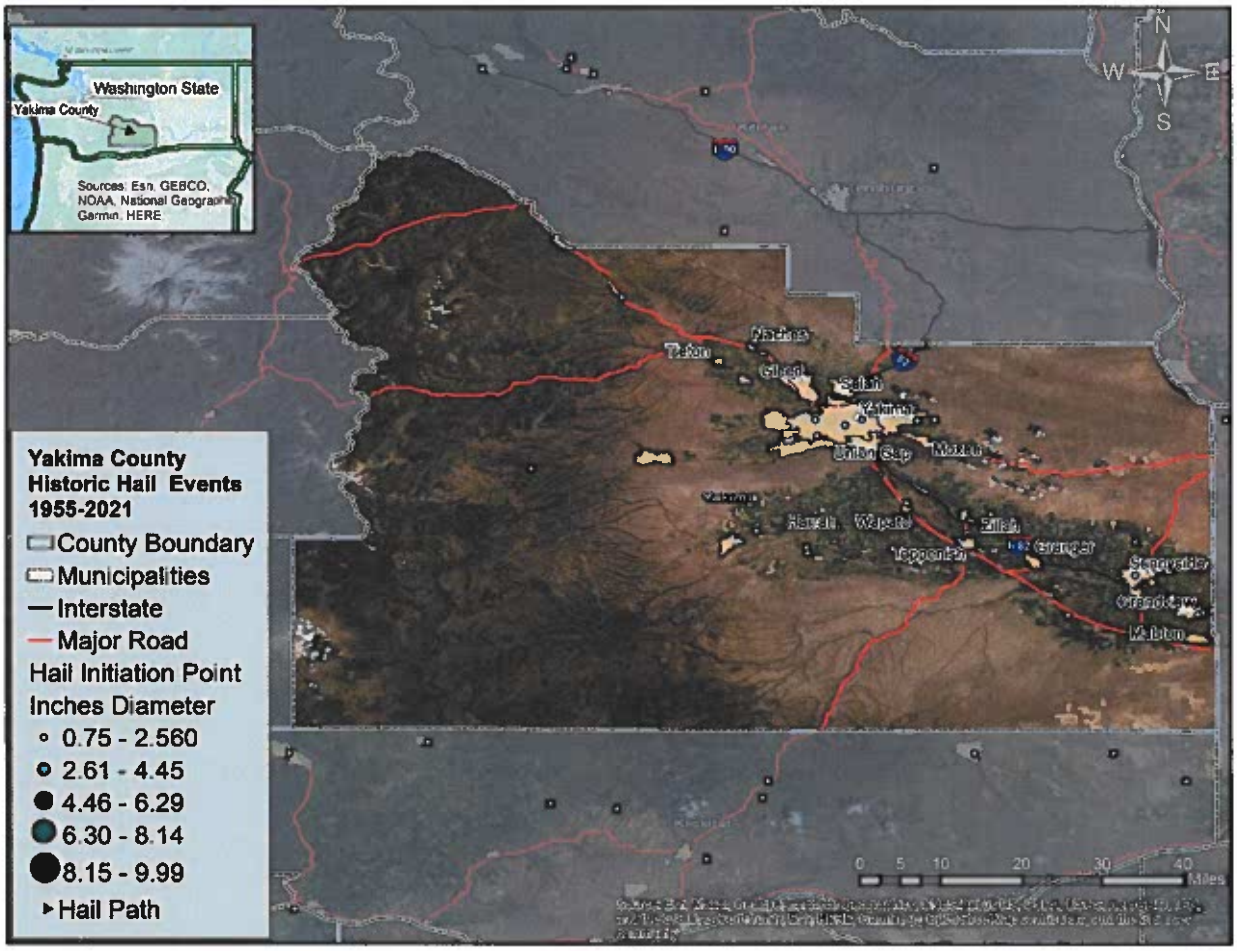


Figure 3.18. Historic Wind Events, Yakima County (1955-2021)

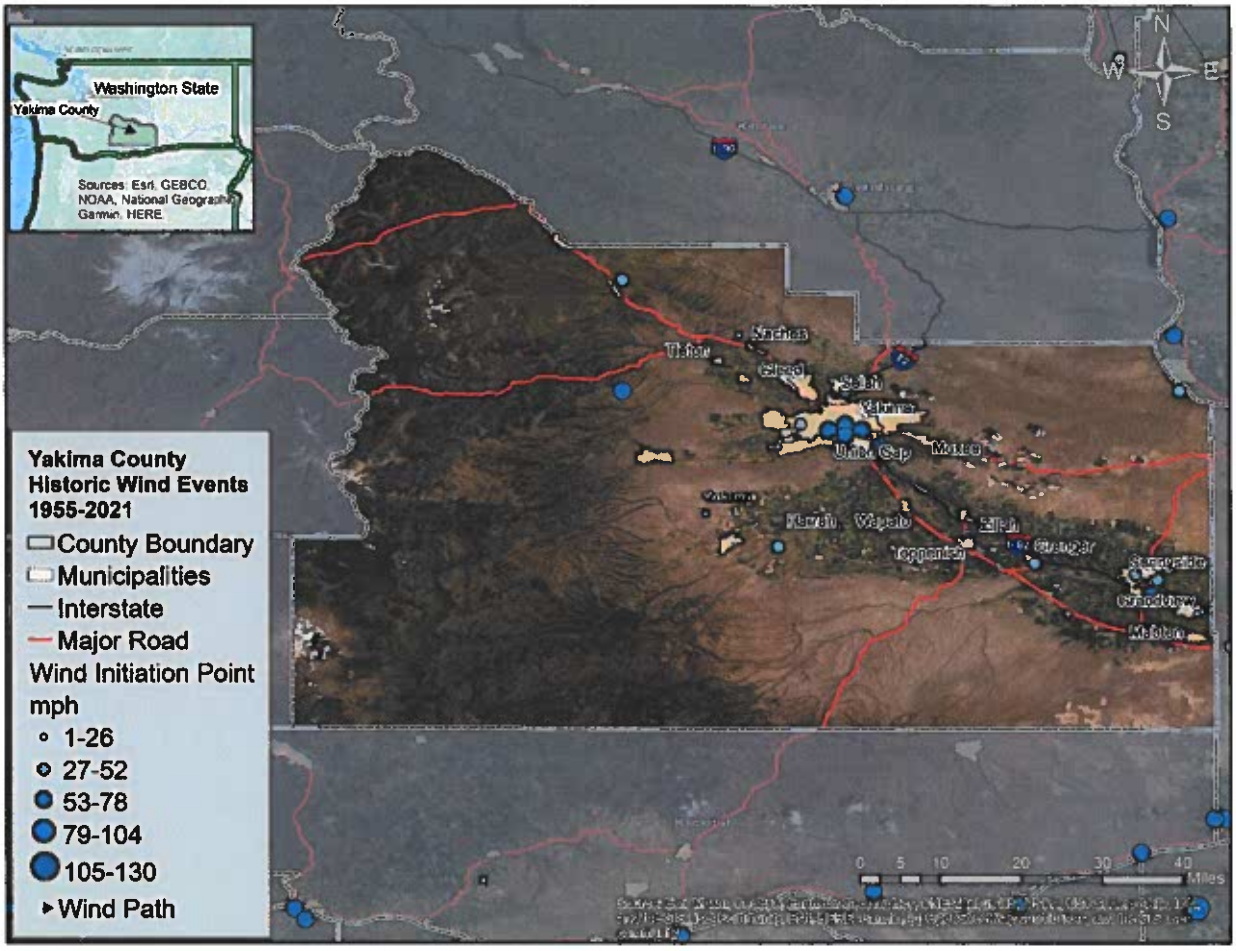
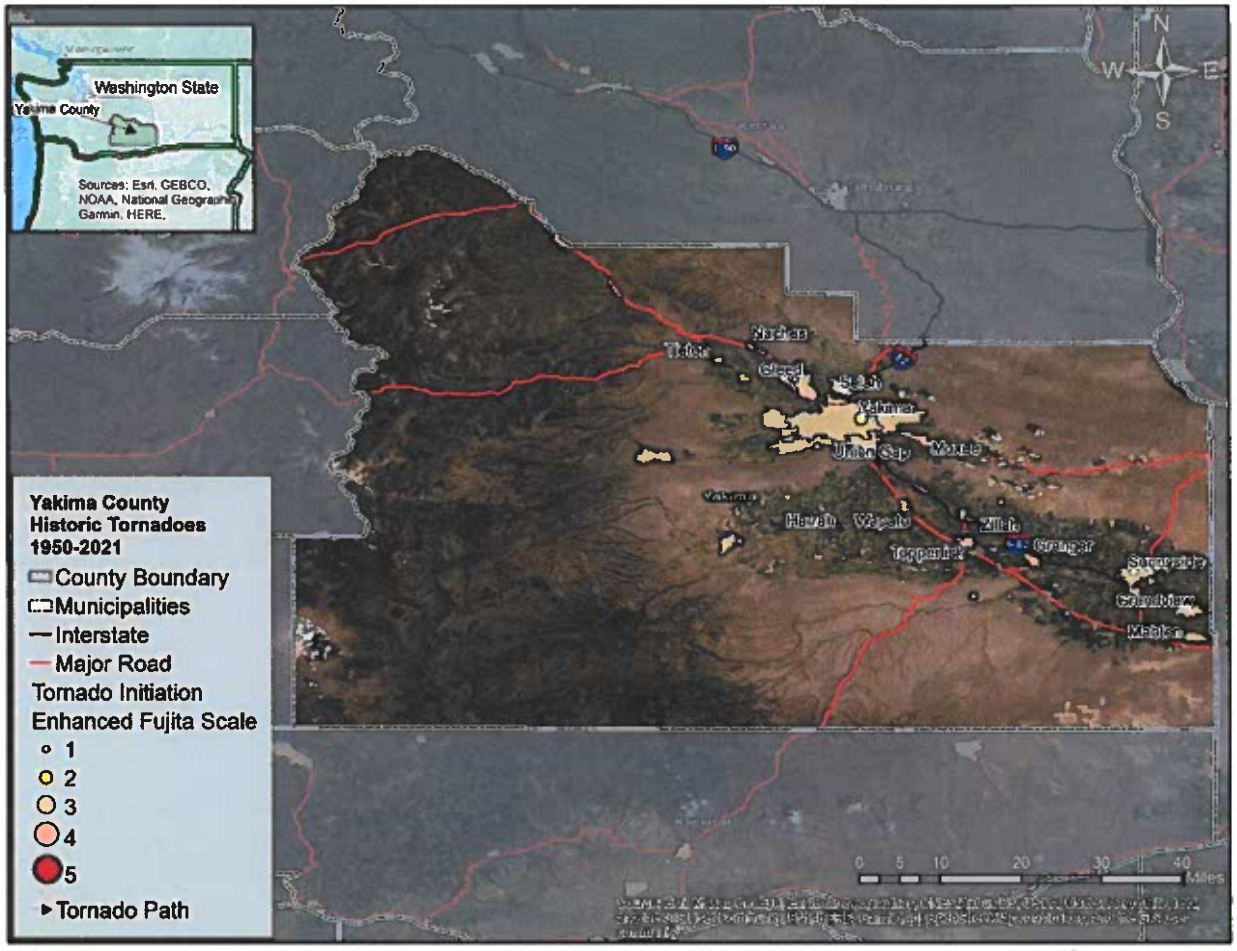


Figure 3.19. Historic Tornadoes, Yakima County (1950-2021)



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

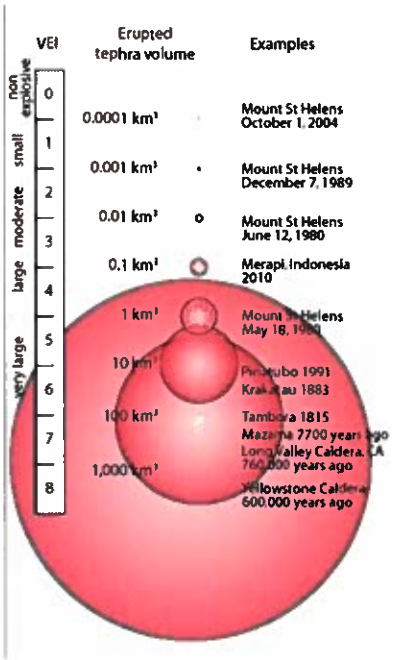


Figure 3.21. Volcano Threat Potential

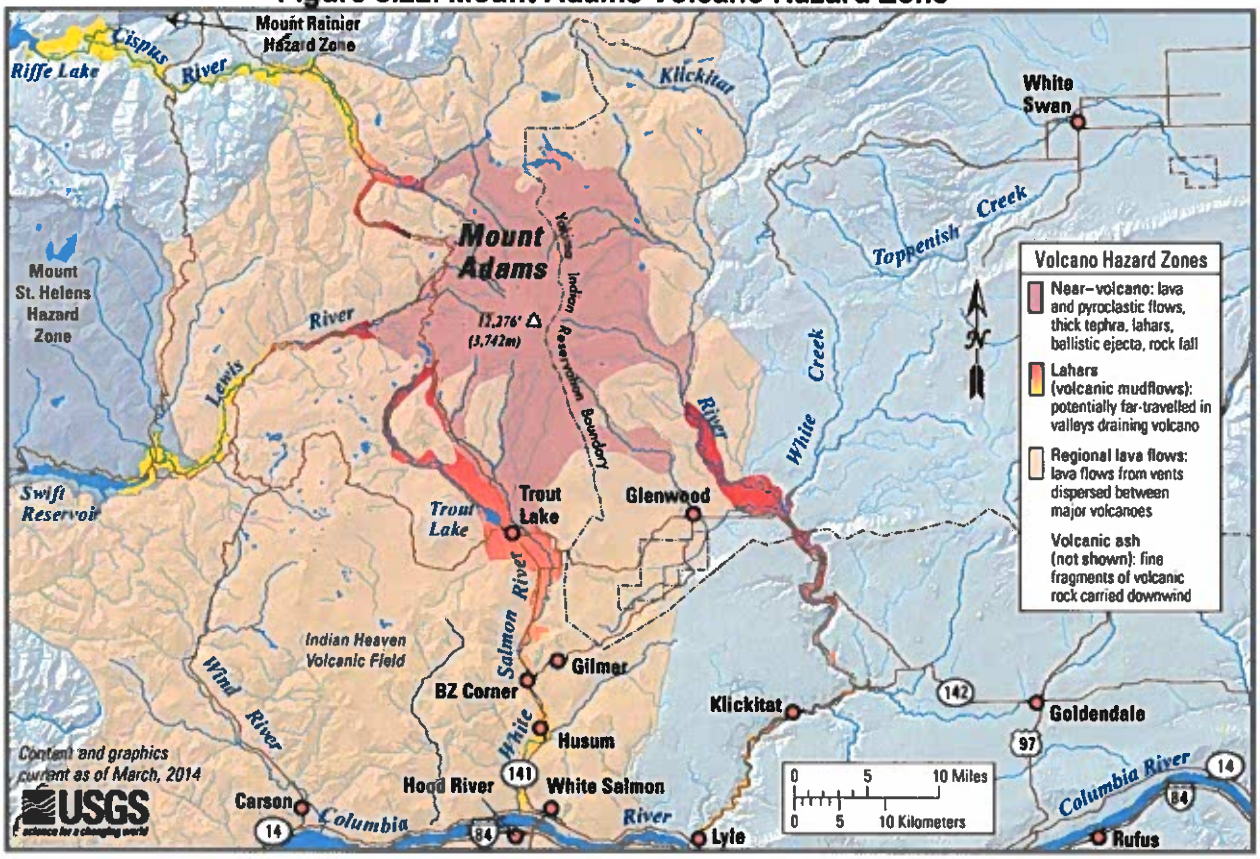
[99] National Park Service. Volcanic Explosivity Index (VEI). Accessed from: https://www.nps.gov/subjects/volcanoes/volcanic-explosivity-index.htm#:~:text

[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.

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[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:

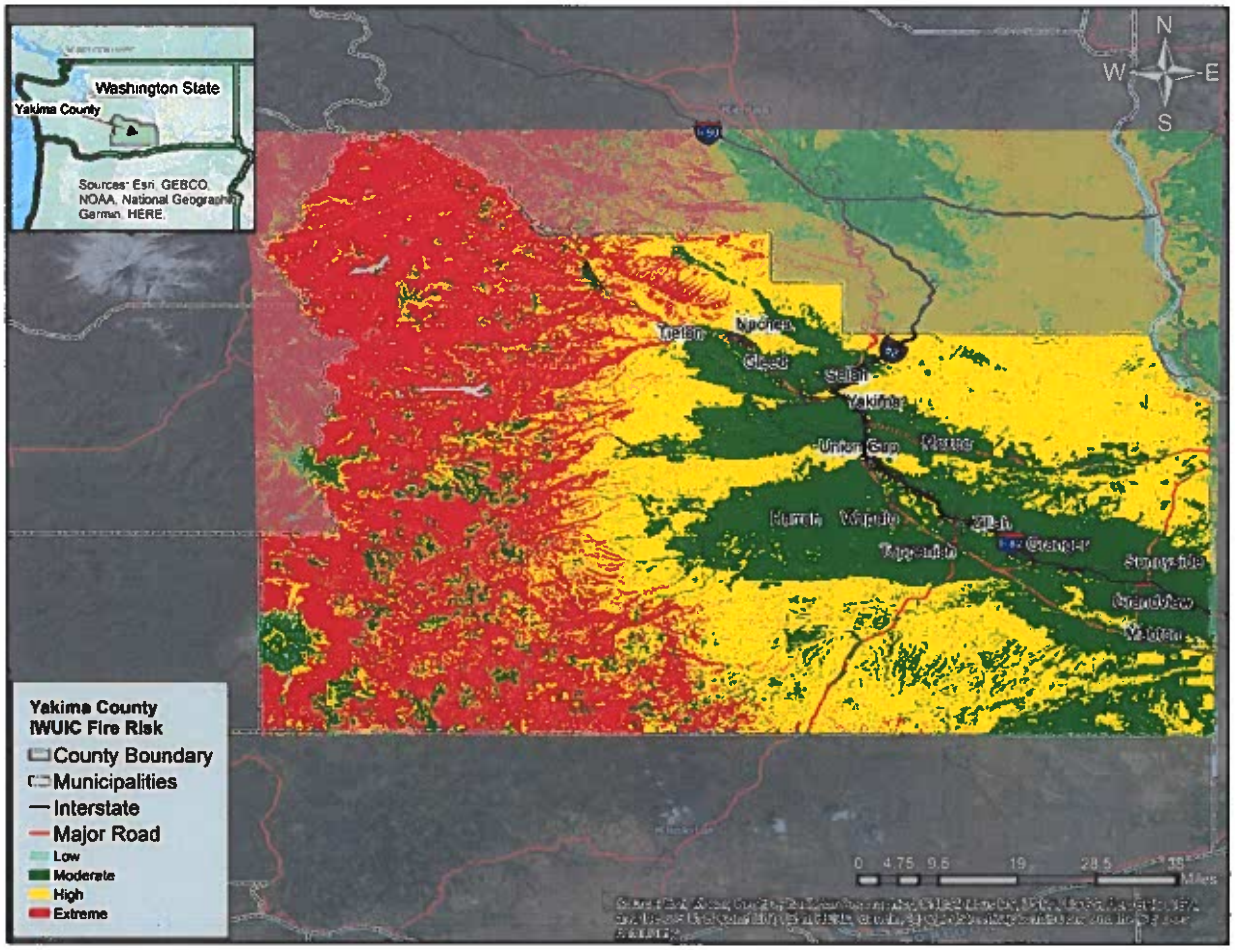
- City of Grandview
- City of Granger
- City of Moxee
- City of Selah
- City of Sunnyside

[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)

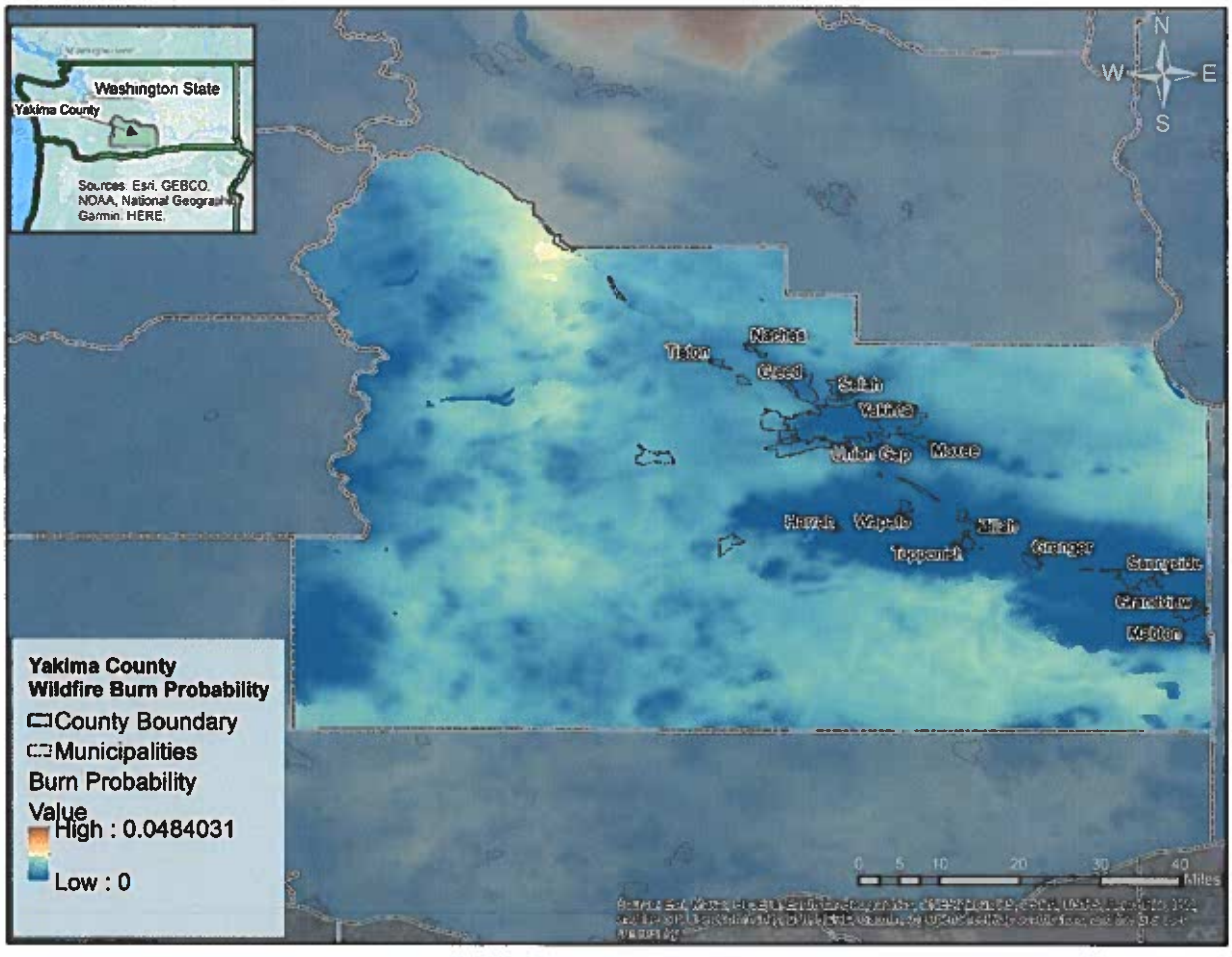
Table 3.50. Past Wildfire Occurrences, Yakima County (2015-2021)[107]			
Fire Name	**Date**	**Acres**	**Narrative**
Glade Creek	09/08/2018	12,735	Located 7 mi SE of Mabton
Meninick Pass	08/16/2018	5,537	Located 5 mi S of White Swan
Hawk	08/10/2018	700	**Presidential Disaster Declaration DR-5269,** started 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

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[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

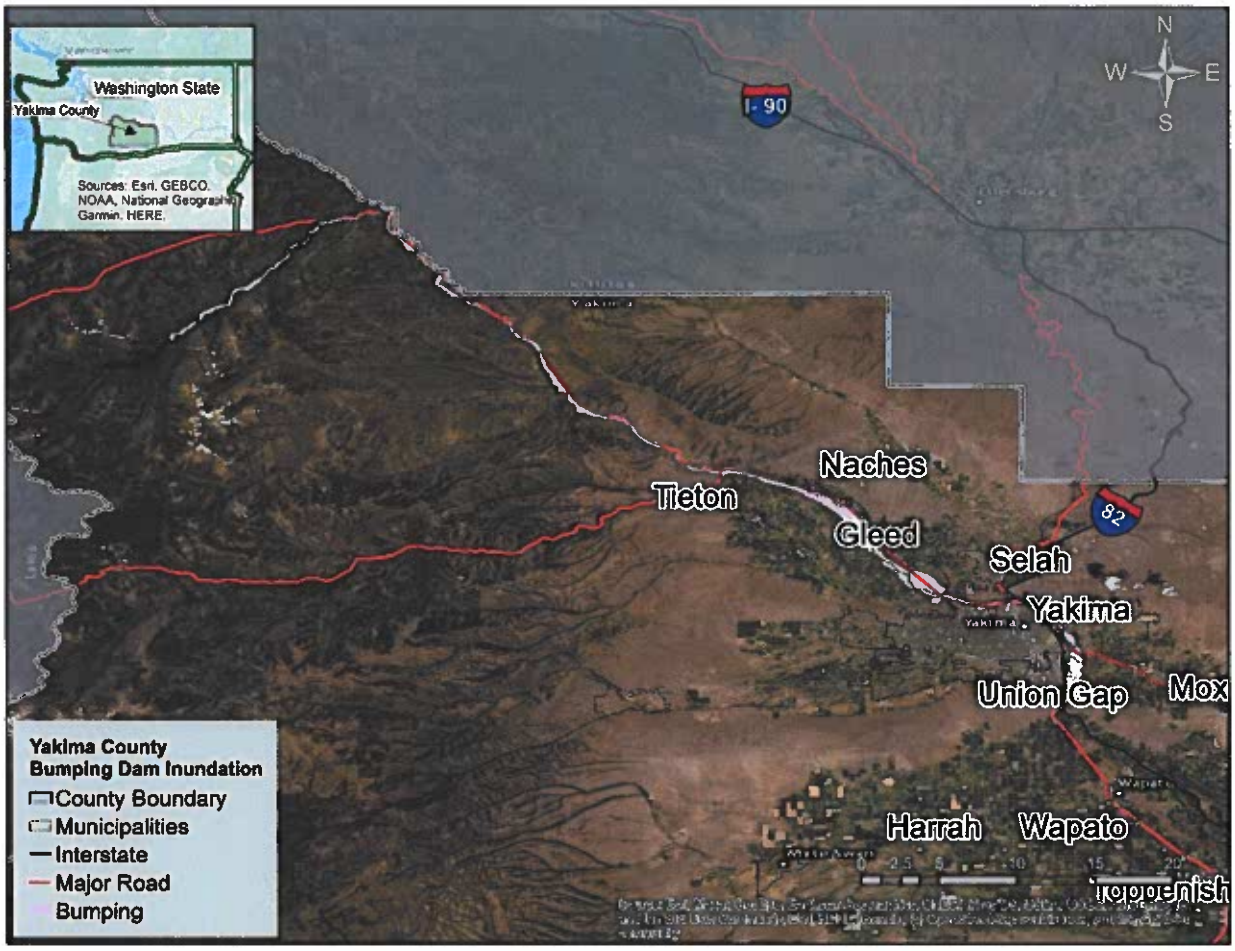


Figure 3.27. Cle Elum Dam Inundation Area

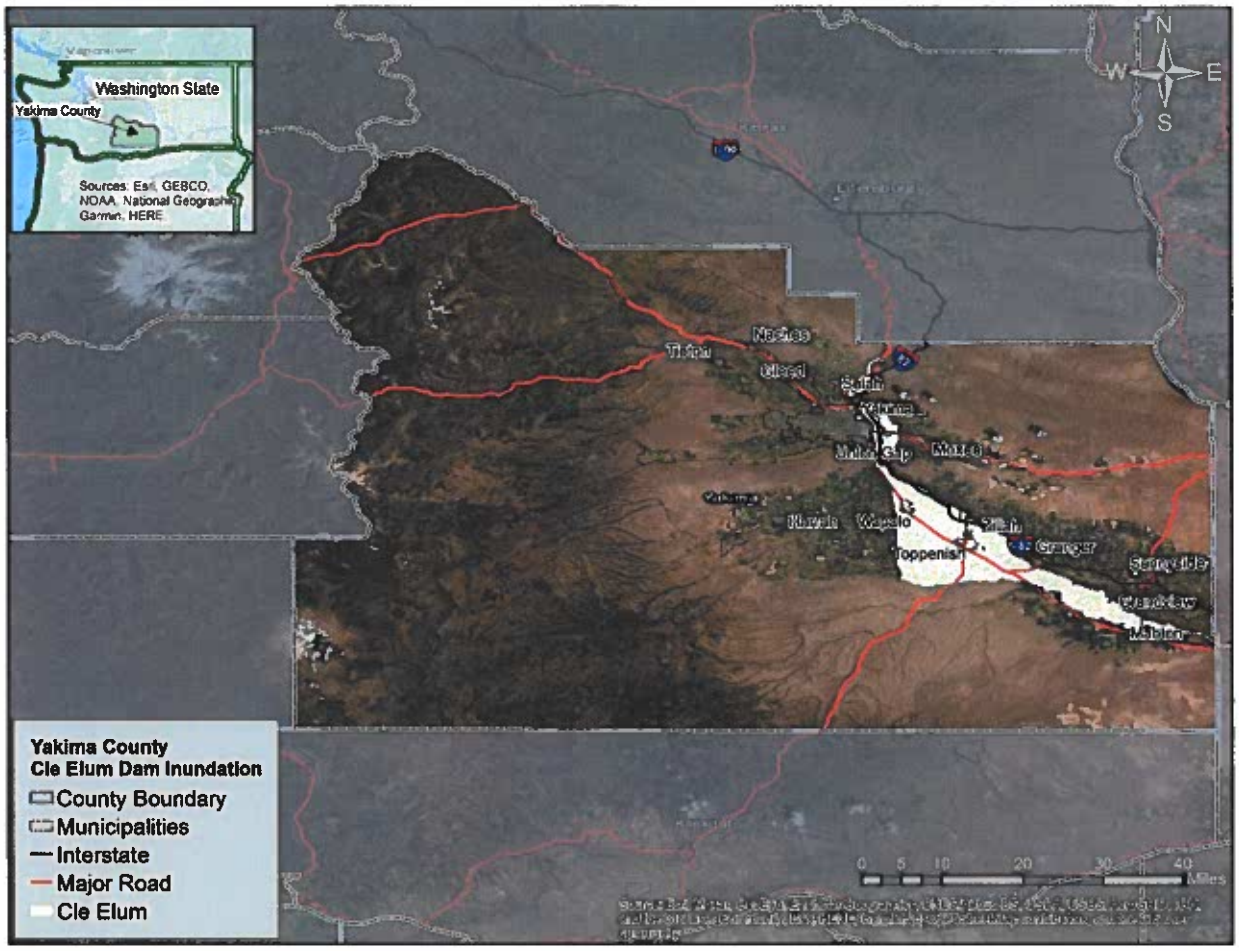


Figure 3.28. Keechelus Dam Inundation Area

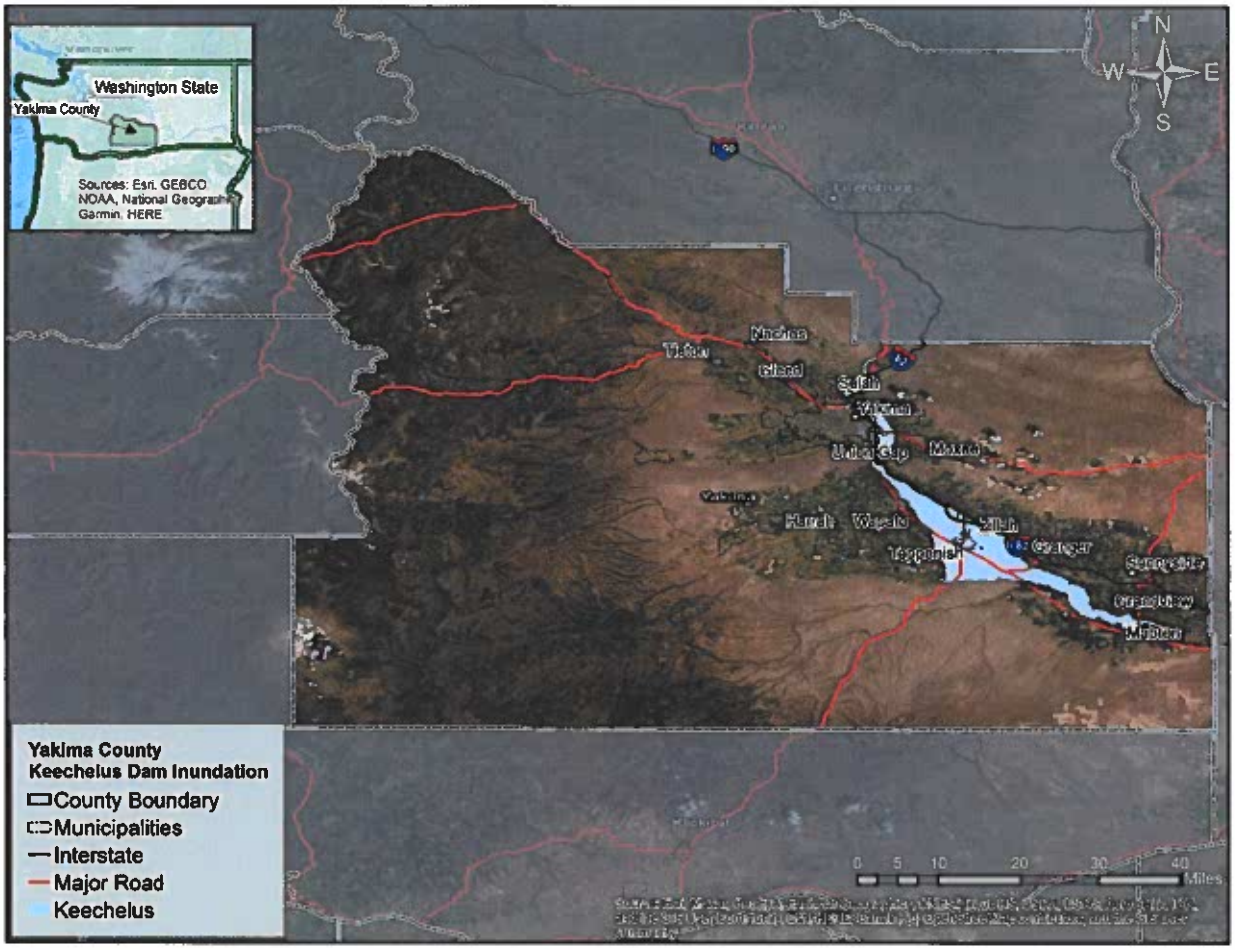


Figure 3.29. French Canyon Inundation Area

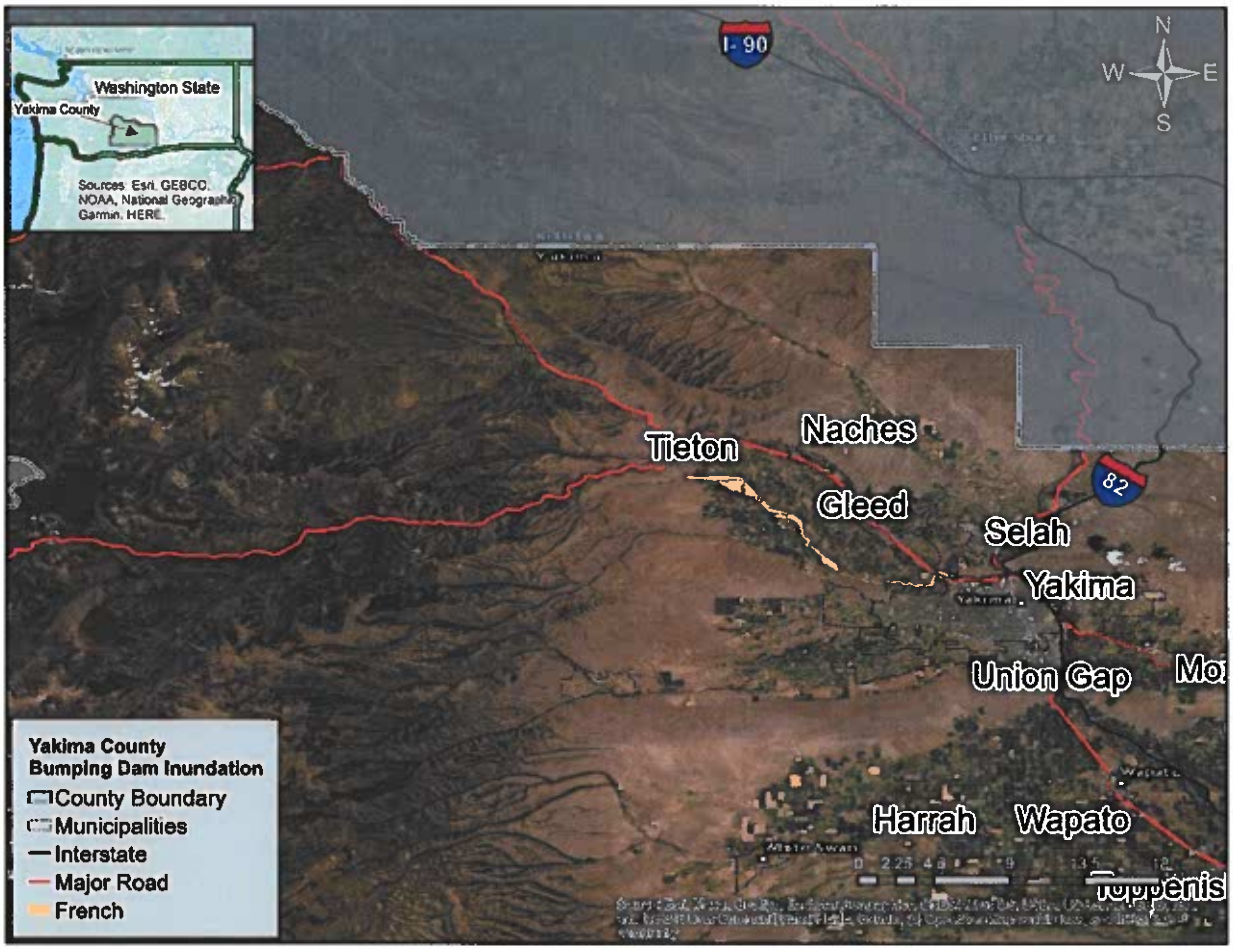
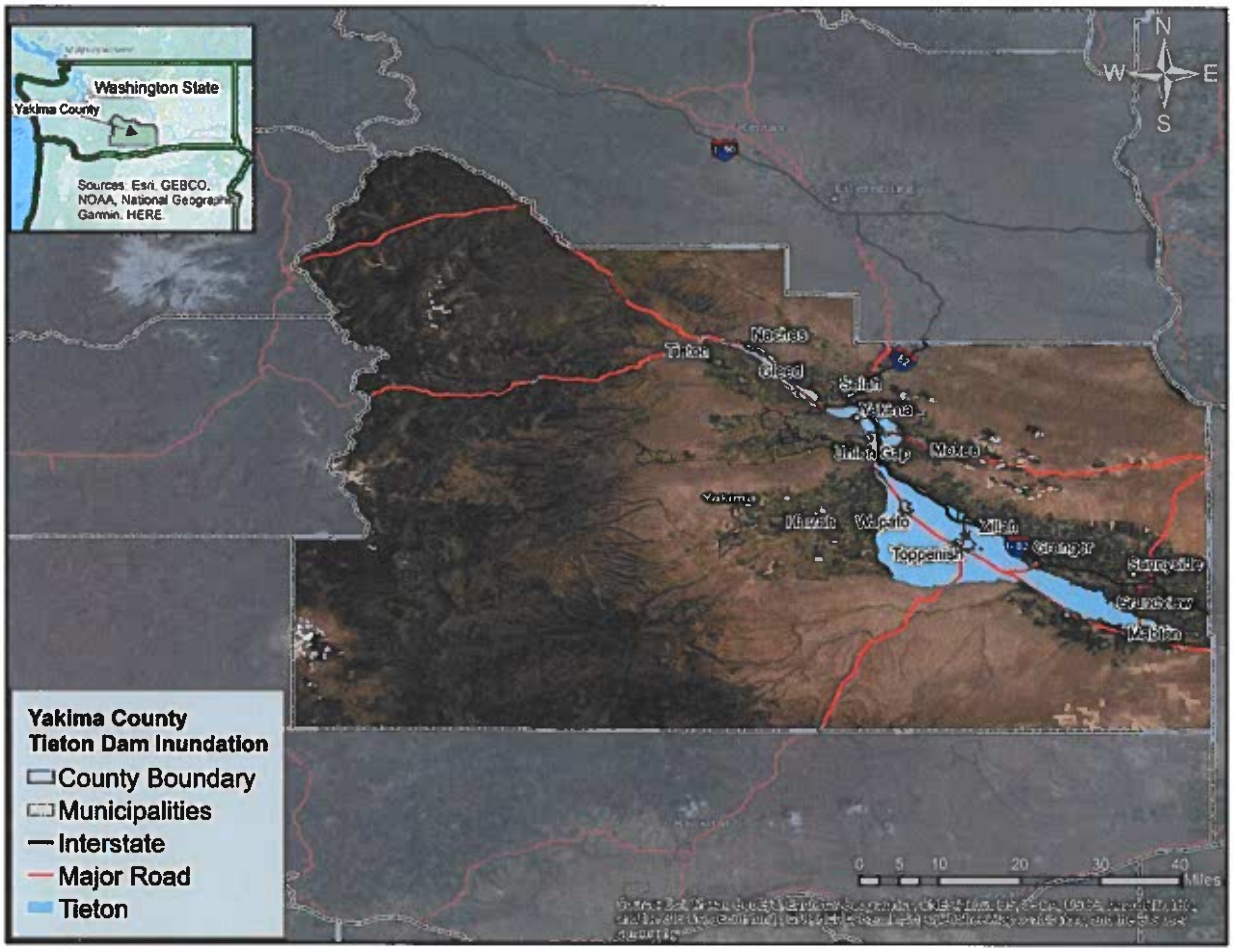
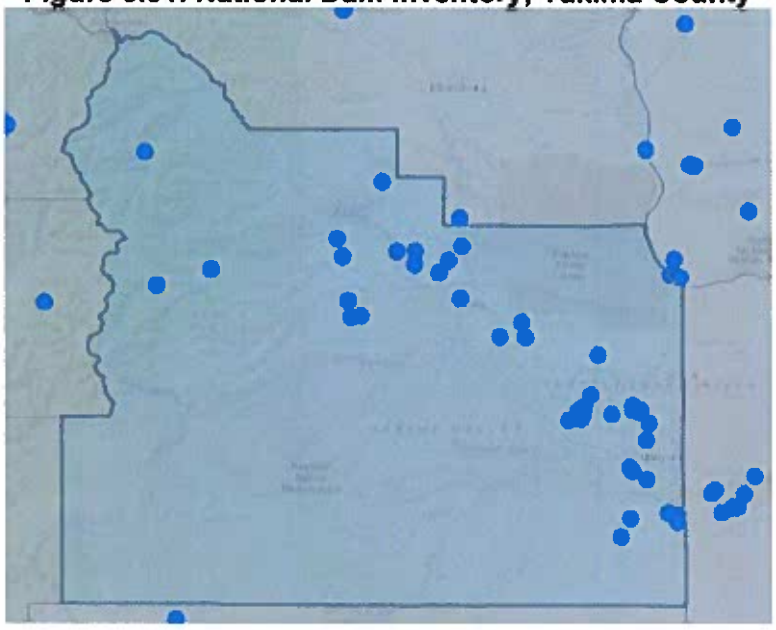


Figure 3.30. Tieton Dam Inundation Area



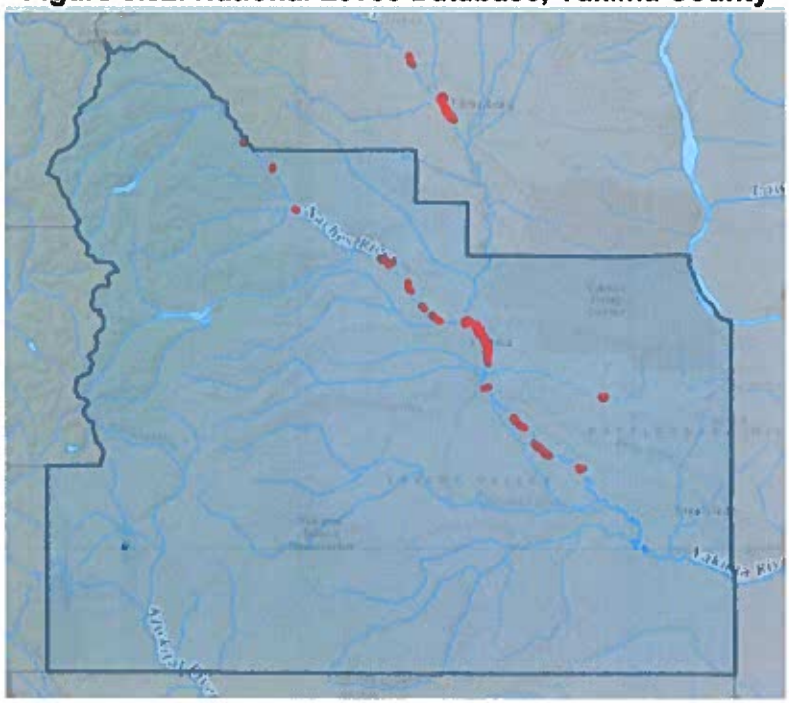
In addition to these High Hazard Potential Dams, dams are found all throughout the county as indicated in **Figure 3.31** below.

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.

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[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

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[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

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[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.