MEMORANDUM

August 5,August 25, 2025

To: Chad Bala, Kittitas Community Development Director,
Jeremy Johnston, Kittitas Long Range Planner
Kittitas County, Washington

From: Heidi Rous
Climate Director, Kimley-Horn

RE: SUMMARY OF POTENTIAL CLIMATE IMPACTS/RISKS/VULNERABILITIES & POTENTIAL OPPORTUNITIES, CLIMATE ELEMENT AND RESILIENCY SUB-ELEMENT 2025 COMPREHENSIVE PLAN UPDATE, KITTITAS COUNTY

Background

Under HB 1181 (2021), the Growth Management Act (GMA) requires the County to adopt a climate and a resiliency sub element which shall address the following:

- Identify, protect, and enhance community resiliency to climate change impacts, including social, economic, and built environment factors, that support adaptation to climate impacts consistent with environmental justice; and
- Address natural hazards created or aggravated by climate change, including sea level rise, landslides, flooding, drought, heat, smoke, wildfire, and other effects of changes to temperature and precipitation patterns; and
- Identify, protect, and enhance natural areas to enhance resiliency to climate impacts, as well as areas of vital habitat for safe passage and species migration.

The analysis used in determining climate impacts and climate-exacerbated hazards must be the best available science and scientifically credible climate projections and impact scenarios (RCW 36.70A.070(9)(e)(i)).

Definitions

Asset: People, resources, ecosystems, infrastructure, and the services they provide. Assets are the tangible and intangible things that people or communities value. (US Climate Resilience Toolkit)

Climate-exacerbated Hazard: A hazard where future climate conditions will increase severity of the hazard such as increased temperature and length of heat waves or higher water levels in floods.

Exposure: Where assets and hazards overlap (US Climate Toolkit)

Hazard: An event or condition that may cause injury, illness, or death to people or damage to assets. Examples include drought, wildfires, flooding, and extreme heat.

Sensitivity: The degree to which a system, population, or resource is or might be affected by hazards. (US Climate Resilience Toolkit)

Adaptive Capacity: The ability of a person, asset, or system to adjust to a hazard, take advantage of new opportunities, or cope with change. (US Climate Resilience Toolkit)

Vulnerability: The propensity or predisposition of assets to be adversely affected by hazards. Vulnerability encompasses exposure, sensitivity, potential impacts, and adaptive capacity. (US Climate Resilience Toolkit))

Magnitude: The measure of consequences — for example, high, medium, or low — for an asset that is impacted by a climate-exacerbated hazard. (US Climate Resilience Toolkit)

Risk: The potential for negative consequences where something of value is at stake. In the context of the assessment of climate impacts, the term risk is often used to refer to the potential for adverse consequences of a climate-related hazard. Risk can be assessed by multiplying the probability of a hazard by the magnitude of the negative consequence or loss. (US Climate Resilience Toolkit)

Purpose

This memorandum summarizes potential impacts of climate-exacerbated hazards on Kittitas County assets, prioritizing assets owned or operated by the County, identifies policy gaps or opportunities in existing plans to address climate impacts, and assesses County assets' vulnerable to climate-exacerbated hazards. The memorandum further informs the new Climate Element and Resiliency Sub-Element, consistent with GMA.

Scope

This scope of this memo is to summarize the methodology and findings from work undertaken to analyze climate-exacerbated hazard's impact on County Assets. Assets are people, resources, ecosystems, infrastructure, and the services they provide located within Kittitas County. Assets evaluated in this assessment are derived from County plans and local staff and community input and assessed for vulnerability and risk to prioritize climate hazards (see "Analysis" section below). The analysis first looks at what hazards most frequently impact Kittitas County followed by what assets are impacted by those hazards. The analysis then characterizes the exposure of each asset to a climate hazard ("sensitivity") along with how frequent the hazard will occur ("probability") to determine the vulnerability of the asset, how adaptive the asset is to disturbances ("adaptive capacity"), and how significant functional and physical costs would be ("magnitude"). This memorandum strives to describe the findings and provides a basis for developing goals and policies that make up the Climate Element and Resiliency Sub-Element.

Identifying local assets owned or managed by non-County entities provides an opportunity to coordinate with responsible agencies and protect critical facilities and communities against climate hazards.

Methodology

Guidance from the Washington State Department of Commerce's Intermediate Planning Guidance and Climate Element Workbook in completing is shown in the following steps:

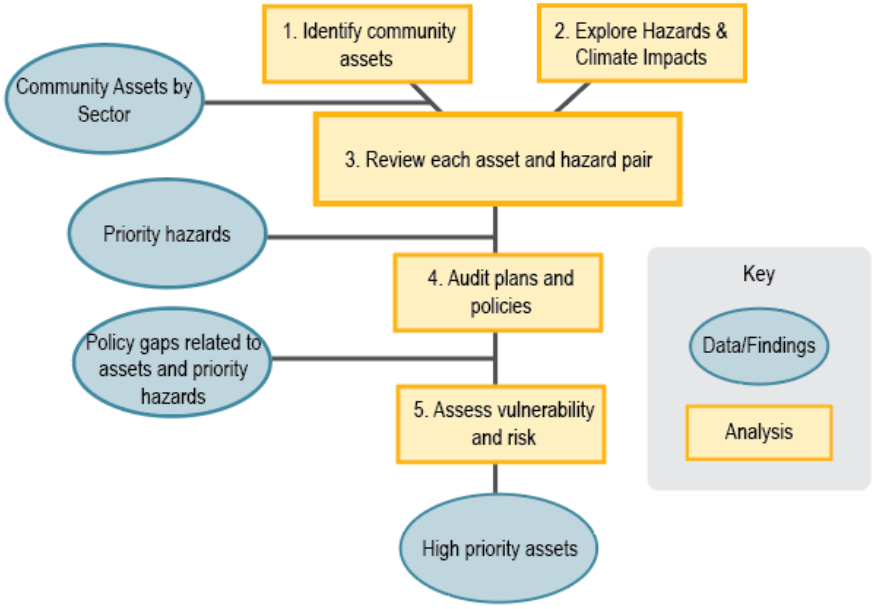

Figure 1. Climate and Resilience Element Existing Conditions Methodology

1. **Step 1: Inventory County Assets (Workbook S2 1.2)**
   List social, economic, and environmental assets that County or community values and wants to protect. In this context, the term "asset" is defined under "Definitions."

   (i) Existing reports, documents, and the County Website were used to gather relevant data pertaining to each hazard and identify community assets. Existing reports and documents include, but are not limited to:

   List 1. Data and Documents

   a. 2019 Hazard Mitigation Plan
   b. 2024 Draft Hazard Mitigation Plan
   c. 2021 Kittitas County Comprehensive Plan
   d. USDA NWCC model on historical snowpack reductions
   e. Kittitas PUD Wildfire Mitigation Plan
   f. Kittitas County Code
   g. CMRW Tool (UW Climate impacts Group)
   h. 2022 Transportation Management Plan
   i. Yakima River Corridor Plan
   j. 2018 Countywide Planning Policies
   k. FEMA National Flood Layer (GIS)
   l. USFS Wildfire Exposure and Burn Probability Model (GIS)
   m. 2016 PROS Plan
   n. 2014 USGS Report on the Upper Yakima River Basin
   o. 2021 Kittitas County Recreation and Tourism Plan

2. **Step 2: Explore Climate Impacts & Hazards**
   Review available, relevant data and climate projections under RCP8.5 climate scenario to understand the frequency, magnitude, and location of climate-exacerbated natural hazards and what assets they impact.

3. **Step 3: Pair Assets and Hazards**
   Pair every asset identified in step 1 with each climate-influenced hazard that could affect it identified in step 2.

4. **Step 4: Audit Plan and Policies**
   Using the data and documents in step 1, Kimley-Horn reviewed existing County plans to understand how current hazards are mitigated, how assets are being protected, and the degree existing policies address the threats of climate-exacerbated hazards. Identify opportunities to strengthen policies and/or improve implementation.

5. **Step 5: Assess Vulnerability and Risk**
   b. Assess sensitivity – assess the degree of sensitivity of assets to the hazards they are impacted by (step 3).
   c. Assess adaptive capacity – assess the existing ability of the assets to respond to the hazard in a manner that mitigates the hazard's impacts.
   d. Characterize vulnerability – Using the exposure (step 2), sensitivity, and adaptive capacity attributes, determine the overall vulnerability of the asset to a given hazard. Parameters for characterizing vulnerability is provided below.
      (i) Using data and documents in step 1, the sensitivity and adaptive capacity for each asset-hazard pair were determined based on a low, medium, and high rating according to the appropriate indicators. In accordance with DOE guidance, indicators are identified to qualitatively rank the sensitivity and adaptive capacity of each asset. **Table 1: Sensitivity and Adaptive Capacity Definitions** describes examples of key indicators that exhibit low, medium, and high sensitivity and adaptive capacity.

Table 1 Sensitivity and Adaptive Capacity Definitions

Example Key Indicators of "Sensitivity"		**Example Key Indicators of "Adaptive Capacity"**	
Low	• Minor repairs and accommodations required. • Slight inconveniences and temporary loss of services. • Minor disruption to business continuity and minimal loss of revenue and wages. • Little to no increase in costs and demands to respond to emergency events.	**Low**	• Adaptive solutions are innovative but costly. • Adaptive solutions may require coordination with multiple agencies to implement, leading to disruptions in service and longer implementation times. • Solutions require a change in lifestyle or changes in political decisions. • Ability to avoid damage is limited.
Medium	• Temporary loss of food production, transportation, and distribution. • Temporary loss of functionality and operations closure of emergency response services. • Moderate repairs and replacements required. • Moderate increase in costs and demands to respond to emergency events.	**Medium**	• Impacts can be reduced or mitigated to a certain extent; however, adaptive solutions are only feasible for limited assets. • Some assets may face difficulties in adapting in terms of cost and implementation. • Coordination with third party agencies may be necessary for adaptivity measures.

			• Solutions require some change in systematic operations but are somewhat executable.
High	• Significant impact requiring reconstruction of parts or an entirety of an asset. • Extensive rehabilitation of assets resulting in long-term or permanent loss of functionality or operations closure. • Significant impact to vulnerable populations due to flooding and extreme precipitation-related deaths and illnesses, population displacement, or migration. • Permanent loss of species not able to adapt to weather events exacerbated by climate change.	**High**	• Assets can adapt with little to no difficulty. • Direct influence on the implementation of strategies or solutions for the asset is apparent. • Adaptive solutions are highly feasible for most, if not all assets with affordable costs. • Solutions are implemented immediately and face little to no resistance.
Sources*: *Orange County Transportation Authority; Kimley Horn 2023.			

e. Characterize risk – Consider the likelihood of the hazard occurring and impacting the asset (step 2) and the overall magnitude the hazard will impact the asset with to determine the asset's risk.
   (i) Similar to the Vulnerability Characterization described above, the same resources were used to determine the probability and magnitude ratings for each asset-hazard pair. The definitions for a low, medium, and high probability and magnitude rating are shown in **Table 2: Probability and Magnitude Definitions**.

***Table 2 Probability and Magnitude Definitions*[1]**			
Probability		**Magnitude**	
Low	Very limited historic events recorded. Frequency of hazardous events to occur is periodic with likelihood of future events to occur episodically. For example, the likelihood of hazardous event(s) to occur once in 20 years.	**Low**	Minimal destruction to applicable assets with adequate functionality. In addition, minimal injuries, and functionality to daily livelihood. Applicable assets may be easily repaired with available resources within a short duration of time without complications.
Medium	Limited, but some available historic events recorded. Frequency of hazardous events to occur is somewhat periodic. For example, likelihood of hazardous event(s) to occur once in 5 to 20 years.	**Medium**	Moderate destruction to applicable assets with decreased functionality. Injuries and functionality to daily livelihood are moderately heightened. Applicable assets may have increased difficulty for repair and functionality due to increased restoration times and complications. Health concerns are also a higher likelihood with strong suggestions for evacuation plans.
High	Recent, multiple historic events recorded. Hazardous events occur frequently. For example, the	**High**	Extreme destruction to applicable assets with little to no functionality. Injuries and functionality to daily livelihood are extremely heightened.

	likelihood of hazardous event(s) to occur within 5 years.		Applicable assets will have significant challenges for repair and elongated periods of construction before functionality can be resumed. Health concerns are at an extreme likelihood with strong coercion for evacuation plans.

[1]. Definitions for low, medium, and high probability and magnitude were derived from the U.S. Climate Resilience Toolkit, https://toolkit.climate.gov/steps-to-resilience/assess-vulnerability-risk. Accessed July 2024.

Analysis

Step 1. Identify Community Assets

191 assets were identified through review of data and documents listed in the methodology and through coordination with County staff. All 191 assets were assigned a sector or category that best represents the asset's position in economic or industry sectors. Identifying sector for assets will assist in reviewing potential policy impacts in the community. Commerce encourages jurisdictions to assign sectors to any identified assets to help ensure that any new policies established provide mutual benefits across sectors[1].

The 11 sectors listed below were provided by the Department of Commerce and the assets were categorized according to Commerce guidance.

Table 3 Kittitas County Community Assets by Sector

Sectors	Assets
Agriculture & Food	Farms
Buildings and Energy	County administrative buildings, Electric facilities (i.e., substations, transmission lines), Wind farm, Natural gas pipelines
Cultural Resources & Practices	Exhibits (i.e., libraries, historical museums, Armory), Nature preserve (community forest), Farms
Economic Development	Event centers (i.e., Armory), Resorts, Railway, Farms, Military facility
Ecosystems	Parks
Emergency Management	Police stations, Fire stations and houses, Dams/Levees, Radio towers
Health and Well-being	Parks, Hospitals/clinics (i.e., urgent care facilities)
Transportation	Roads (i.e., signs), Bridges, Maintenance facilities (i..e, shops, storage, parking lots), Airports, Transit
Water Management	Solid waste facilities (i.e., transfer stations, dump stations)
Water Resources	Water systems (i.e., supply, distribution pipes, pump stations), Wastewater treatment facilities, Stormwater devices (i.e., culverts), Irrigation facilities
Zoning and Development	Schools, Urban developments, Fiber optic/wireless

Steps 2 & 3. Explore Climate Impacts: Asset Exposure and Frequency Results

Steps 2 and 3 utilize the RCP8.5 "business-as-usual" scenario from the Climate Mapping for Resilient Washington (CMRW) tool, in addition to Federal and State scientific sources to determine the climate-exacerbated hazards affecting Kittitas County. Exposure of assets to the seven main hazards were determined by combining these models and research with a list of County assets and anecdotal data from the 2024 Draft HMP. **This analysis yielded 91 asset-hazard pairs.** The asset hazard pair indicates that the asset is exposed to its hazard pair, non-climate stressors that may exacerbate climate impacts, and past/future consequences of previous factors that are specific to the County asset.

The following summarizes climate projections under RCP8.5 scenarios through mid-century:

- Drought/Reduced snowpack, flooding, extreme precipitation, extreme heat, and wildfires were the most recurring hazards when paired with assets. These constitute the priority hazards which are assessed in **Table 3.**
- Extreme precipitation events from large storms are projected to increase in frequency.
- Flooding due to peak stream flows are anticipated to increase overall.

[1] Washington Department of Commerce, Intermediate Planning Guidance, 2024

  - Urban and rural development and the assets within them along the Yakima River north of the unincorporated community of Thrall are exposed to flooding. These areas are projected to experience an increase in frequency and magnitude over the next 25 years.
  - Critical facilities such as water and wastewater treatment plants, landfills, stormwater infrastructure, etc. are located on flood plains/landslide prone hazard areas and are more likely to experience a significant loss of operations and physical damage to the structures.

- Drought occurs as snowpack droughts (reduced snowpack) or rainfall droughts, with the former typically occurring during winter months and the latter in the summer. The USDA's snowpack monitors within the county have shown a 20-30% decrease over the past 70 years[2]. and are anticipated to further decrease, thus impacting reservoir levels and water supply countywide.
- Wildfire is the hazard with the largest number of exposed assets, as expressed by asset-hazard pairs. Assets in the wildland urban interface (WUI) are especially exposed to wildfires as they are located in areas where urban development overlaps with high burn probability. Smoke and low air quality are secondary effects of wildfire affecting areas across the County.

After review of climate data provided by the CMRW tool against assets that may be exposed to the seven hazards, 6 priority hazards were identified:

- Extreme Heat
- Extreme precipitation
- Flooding
- Wildfire
- Drought/reduced snowpack

The Climate & Resilience Element is required to have one (1) goal and supportive policy for each climate-exacerbated hazard which is relevant to the County, as required by FEMA and HB 1181. Recommendations include new measures that enhance beneficial opportunities among the eleven sectors which are not typically included in a FEMA-approved hazard mitigation plan.

Step 4. Policy Gaps and Opportunities

Kimley-horn reviewed the data and documents listed in the methodology noted which climate-related policies address hazards and impacts and where existing policies appeared insufficient in adequately mitigation or adapting from climate-related impacts. Additionally, Kimley-horn identified policies and practices that could worsen community vulnerability to climate change, for example, development patterns that placed neighborhoods in wildfire-prone areas or created obstacles to implementing future resilience strategies. As part of the analysis, Kimley-Horn identified where within the comprehensive plan it would be most appropriate to integrate new goals and policies focused on climate resilience. These documents were reviewed for applicable goals, objectives, strategies, actions, and recommended projects that could be adapted or incorporated into the updated comprehensive plan.

A total of 58 potential policies were identified that may contribute to the overall resilience for Kittitas County or can be revised to help address mitigation and adaptation from potential climate-related hazards. From the Comprehensive Plan, 33 policies were identified.

These policies provide a starting point of establishing policies where existing actions or progress toward climate-resilience has already been made. New policies may be introduced through the plan drafting phase as the County continues to coordinate with local stakeholders, Planning Commissioners, state and regional agencies, and the Board of County Commissioners.

[2] USDA, 2025. https://nwcc-apps.sc.egov.usda.gov/imap/ https://nwcc-apps.sc.egov.usda.gov/imap/

Table 4 Comprehensive Plan Policies Related to Hazards and Assets		
Comprehensive Plan Element	**Number of Policies Identified**	**Topics from identified policies**
Land Use	6	Improve diverse uses, renewable energy resources, protection or resource lands and limitation of urban sprawl and urban densities.
Housing	0	
Transportation	5	Promote multi-modal transportation to increase community resilience and provide more opportunities to vulnerable population. Improve transportation data collection.
Capital Facilities	3	Evaluation of and funding for existing County facilities which may be vulnerable to climate-exacerbated hazards.
Utilities	1	Electric and natural gas energy facilities.
Rural & Resource Lands	10	Protection of shorelines and critical areas, protection of residential development from flooding and other hazards, promote proper stewardship of natural resource land including forest lands.
Recreation, Parks, Open Space, and Natural Environment	6	Protection of natural habitat, geologic hazard mitigation, and environmental data collection

Step 5. Vulnerability Assessment Results

A total of 91 asset-hazard pairs from steps 2 and 3 were analyzed for sensitivity and adaptive capacity using a qualitative rating system (Low, Medium, and High). Ratings were determined based on indicators such as age, asset condition, physical design, social assets, economic costs, etc. Based on the sensitivity and adaptive ratings, a vulnerability risk rating (Low, Medium, High) was determined. For example, low sensitivity and low adaptive capacity resulted in medium vulnerability for an asset-hazard pair. Of those 91 asset-hazard pairs, 43 received a medium or high vulnerability rating. These pairs were analyzed for future risks, which are the probability of hazard occurrence and the magnitude of potential losses/consequences. Risk was determined using a low, medium, and high rating were based on indicators such as location, impact to social services, potential revenue loss, operational disruptions, and community safety. Although certain assets may not be exposed to a particular climate hazard, they may be affected by secondary climate hazards such as landslides and mudflows resulting from bank destabilization following wildfires and large precipitation events. Secondary hazards have been considered for each asset-hazard pair during the vulnerability and risk assessment.

The final composite risk rating was determined by combining probability and magnitude ratings. Based on the composite risk rating, a decision of “Take Action” or “Accept Risk” was identified for each asset-hazard pair. For example, a high probability with a medium magnitude for an asset would indicate a high composite risk rating; thus, a “Take Action” decision was indicated. “Take Action” varies and means coordinating with other agencies, including programs in future capital improvement plans, and/or creating or modifying policies, goals, or ordinances. Implementation is typically tailored to the jurisdiction depending on existing programs and is further developed during the drafting of the climate element process.

Error! Reference source not found.Error! Reference source not found. summarizes the findings from step 5, showing the risk rating for community assets for each of the four priority hazards. An asset-hazard pair which received a composite risk rating of medium or high are denoted with color scales associated with low (yellow), medium (orange),

and high (red) ratings. Composite risk is comprised of an asset's level of vulnerability to a climate hazard and the probability and magnitude of impact to the asset from a climate hazard. Thus, asset-hazard pairs with a red rating suggest the highest levels of risk and are recommended to the County for immediate action. A summary of asset vulnerability and climate hazard risks to critical infrastructure within the County is further provided below. Additional details can be found in **Appendix A**.

Table 5 Asset Vulnerability and Climate Hazards Risks

		Priority Climate Hazards			
	Assets	Flooding	Drought/Reduced Snowpack	Wildfire	Extreme Heat
Community Assets	Farms				
	County Administrative Buildings				
	Electric Facilities				
	Resorts				
	Roads				
	Bridges				
	Water Systems				
	Stormwater Devices				
	Irrigation Facilities				
	Urban Developments				
	Police/Fire Stations				
	Hospitals				
	Parks				
	Railways				
	Kittitas Event Center				
	Nature Preserves				
	Airports				
	Forests				

1. Composite risk ratings are based on a low (yellow), medium (orange), and high (red). Boxes that are grey were not analyzed because of a low or lack of data and/or non-variable data from the CMRW tool.

Vulnerability

- ***Sensitivity:*** Events from primary climate hazards such as extreme precipitation, flooding, drought & reduced snowpack, extreme heat, and wildfire are anticipated to increase in severity and intensity by mid-century throughout the County. Remote and rural households with mobility challenges, pre-existing health challenges, low-income, lack of access to private vehicles, and language barriers are most sensitive to climate hazards.
    - *Extreme Precipitation*: Places with exceptional sensitivity to extreme precipitation include areas with steep slopes where landslides become more likely during extreme precipitation events. Burn scars increase sensitivity as slope stabilizing vegetation is removed. Stormwater systems are vulnerable to extreme precipitation if the storm magnitude is beyond their design capacity.
    - *Flooding*: The majority of County administrative buildings and other essential public facilities such as museums are located in downtown Ellensburg within the 0.2% probability, or 500-year floodplain (as defined by FEMA)[3]. As the frequency of extreme precipitation increases, surface water along rivers is anticipated to experience higher stream flows that increases the chances of large flood events. Floods

[3] FEMA, 2025. https://msc.fema.gov/nfhl (Accessed via ESRI ArcGIS Pro)

of this magnitude are expected to increase in frequency over the next century[4], putting assets at risk of damage and loss of functionality. Assets that are located along the Yakima River and larger tributaries are exposed to 100-year and 500-year flood zones. Existing soil conditions, building design standards, and existing flood mitigation measures also contribute to an asset's level of sensitivity.

- *Drought & Reduced Snowpack*: In Kittitas County, drought occurs as snowpack droughts (reduced snowpack) or rainfall droughts, with the former typically occurring during winter months and the latter in the summer. Agricultural sectors such as farms, tourism, and ecological habitats are most exposed to changes in drought conditions. Factors influencing the degree of sensitivity for farms include the type or crop of livestock produced, workforce, size of farm and/or company size, and access to water. The County has already begun to see the impacts of reduced snowpack. Tourism revenue from snow-parks and resorts who depend on annual snowpack for tourism and recreation have high sensitivity to reduced snowpack as it will lead to lower capacity to host winter recreation activities.
- *Extreme Heat*: Severity of heat waves vary based on location (elevation), weather conditions (e.g., temperature, humidity, cloud cover), and time of year[5]. Exceptionally sensitive populations include individuals with cardiovascular disease, elderly populations, and/or youth, and those living in buildings with limited HVAC capabilities. Assets where outdoor activities are common such as parks, maintenance facilities, and farms where outdoor work is necessary, and schools place populations using those assets at higher risk from health complications due to heat[6]. Furthermore, infrastructure such as roads can become damaged during heat waves, with the type of pavement influencing the sensitivity of the asset to heat[7].
- *Wildfire*: The chances of more frequent and severe wildfire events occurring are anticipated to increase. Wildfire smoke is also anticipated to increase, impacting anyone outdoors or in spaces with poor ventilation, with those having pre-existing cardiovascular and lung conditions most impacted. Existing conditions for burn probability have the largest impact on sensitivity where areas with large amount of fuels and poor forest management are more likely to burn. Assets located in the WUI are most sensitive to wildfire impacts.

- ***Adaptive Capacity:*** The County utilizes land use controls such as zoning codes, development standards, and specific area plans to address adaptive capacity of assets. Memorandums, agreements, contracts, and programs are also utilized to engage with special districts, consortiums, non-profits, and private landowners on site-specific adaptation. Examples of adaptive capacity in Kittitas County include:
  - Kittitas PUD's Wildfire Mitigation Plan provides electrical facilities with planning and inventory for exposed facilities. It also details a concentrated effort to reduce and mitigate against the ignition of wildfires caused by the utility district. This plan gives the PUD's facilities adaptive capacity as they are inspected for areas where wildfires are more likely to ignite and maintenance is prioritized in those areas. Furthermore, the plan's monitoring and metrics section provides information on how effective the PUD is at preventing wildfire ignitions and adapting its infrastructure to wildfire hazards.
  - Kittitas County's 2018 Community Wildfire Protection Plan provides policies and measures to reduce the chance of wildfires in the county and provides adaptation measures for the community. The plan outlines how residents can be prepared before, during, and after wildfires. It also proposes resilience measures and identifies officials who are integral to implementing resilience measures.

[4] Climate Mapping for a Resilient Washington (CMRW). University of Washington. Accessed in February 2025 at https://cig.uw.edu/resources/analysis-tools/climate-mapping-for-a-resilient-washington/ .
[5] 2024 HMP. https://www.co.kittitas.wa.us/uploads/documents/public-works/hazard-mitigation-plan/2024%20hazard%20mitigation%20plan/Vol%201%202024%20Kittitas%20County%20Hazard%20Mitigation%20Plan.pdf
[6] CDC, APA. ND. https://www.cdc.gov/climate-health/media/pdfs/EXTREME-HEAT-Final_508.pdf
[7] McQuate, University of Washington. 2024 https://www.washington.edu/news/2024/07/16/climate-change-roads-asphalt-concrete-uw-professors-research/

- Due to the high percentage of land in Kittitas County owned by other entities, mitigation plans developed by those entities provide a degree of adaptive capacity to their assets. These include the Washington DNR Wildfire Strategic Plan, and the Bureau of Reclamation's Yakima River Basin Integrated Water Resource Management Plan.
- In 2020, FEMA selected Kittitas County's Ellensburg Transfer Station for relocation out of the existing regulatory floodplain[8]. This project provided adaptive capacity against flooding for the facility and all waste processes depending on it.
- The Kittitas County Flood Control Zone District maintains a 6-year capital facility plan to maintain and improve existing flood mitigation infrastructure, thus increasing the adaptive capacity of infrastructure in floodplains[9].

Composite Risk Characterization

- ***Probability:*** The severity of priority climate hazards is anticipated to increase and become more extreme within the next 20 years.
  - Drought events have occurred approximately every three (3) years since 2013 including an ongoing multi-year drought. The median summer rainfall is expected to decrease an average of 12.5% by mid-century, increasing the probability of droughts. Kittitas County is expected to see an increase in consecutive days without precipitation and a decrease in total precipitation during this same period. There has already been a documented decrease in snowpack over the past 30 years, a trend which is projected to continue and even accelerate by mid-century[10].
  - The maximum amount of rainfall in 24-hours from a 2-year storm is expected to increase by 9%, and in 24-hours for a 25-year storm by 13%[11,12]. Precipitation severity is expected to increase the most in lower Yakima basin[13].
  - Flooding events from annual maximum stream flows are projected to increase by 10 to 30%[14]. As a result, peak stream flows for FEMA 100-year and 500-year floodplains are anticipated to increase overall.
  - Extreme heat is represented as heat index (ambient temperatures + humidity) and has a high likelihood of occurring each year. The current median summer temperature of 85°F is expected to increase an average of 5.2°F, a figure which varies by elevation and underlying climate. Future extreme heat events like the 2021 heat dome are anticipated to become more frequent and intense[15].
  - Wildfire likelihood is anticipated to increase in severity and duration. The conditions which increase the probability of wildfire occurring are expected to be exacerbated by more intense summer drought and lower surface and groundwater levels due to reduced snowpack.

[8] FEMA, Kittitas County, 2018, 2020: https://www.co.kittitas.wa.us/uploads/documents/solid-waste/Final-Site-Selection-Report-Kittitas_082118.pdf
[9] Kittitas County, 2022: https://www.co.kittitas.wa.us/uploads/documents/public-works/flood/FCZD_6_Year_Work_Plan_2023_2028.pdf
[10] CMRW tool. Accessed February 2025.
[11] WSDOT, 2006. https://www.wsdot.wa.gov/research/reports/fullreports/640-1.pdf.
[12] University of Washington, Climate Impacts Group. 2022. https://public.tableau.com/app/profile/univ.of.washington.climate.impacts.group/viz/Observation_Visualization_3_26_21_16370945503090/Dashboard1. Accessed on February 2025.
[13] CMRW tool. Accessed February 2025.
[14] Ibid.
[15] https://www.climatehubs.usda.gov/hubs/northwest/topic/2021-northwest-heat-dome-causes-impacts-and-future-outlook

- ***Magnitude:*** Assets facing medium to high magnitude impacts, as defined in Table 2, from climate-exacerbated are more likely to experience more substantial physical and economic damage. Listed below are examples of these potential hazard occurrences:
    - Drought has a severe impact on irrigation systems in the County. Record-setting heat wave and drought conditions in summer 2021 impacted availability of water, while the 2015 snowpack drought led to irrigation cuts, affecting farms countywide[16]. The 2015 drought forced the Kittitas Reclamation District to shut off water entirely and the State had to provide aid to the County to assist in recovery of both natural (fish habitat) and human (irrigation) water systems. With droughts expected to increase in severity and duration (up to 70% snowpack reduction by 2059), the County will need to plan for similar and more severe events to occur[17]. Future impacts of high magnitude droughts on water and irrigation systems include significant impacts to agricultural production resulting economic losses, cuts to drinking water, and shrinking or elimination of native fish habitat.
    - A decrease in snowpack and snowfall will have considerable impacts on tourism. Snowpack decreases will shorten the winter sport season and lower the quality of snow for activities, leading to less visitors and lower lodging tax revenue.
    - Vulnerable populations are more prone to heat-related illnesses and are anticipated to increase hospitalization rates as heat waves increase in frequency and intensity. The magnitude, in this case temperature, of heat waves in urbanized areas such as Downtown Ellensburg and Cle Elum, is enhanced by the urban heat island effect[18]. During heart waves, people in these areas will experience higher temperatures than surrounding areas, leading to higher risk to those living there, especially those without cooling mechanisms.
    - Much of the County's population is located along the Yakima River and its tributaries putting roads serving them at risk of flooding. The magnitude of floods is expected to increase over the next 20 to 50 years and are projected to damage more roads in the absence of mitigation projects. Frequently flooded roadways experience infiltration which damages and shortens the lifespan of roads and utilities[19]. Therefore, increased flood magnitude will increase capital costs of maintenance and repair for roads in floodplains.

[16] WA Dept of Ecology. 2016. https://apps.ecology.wa.gov/publications/documents/1611001.pdf
[17] Raymond, Rogers. 2022. https://cig.uw.edu/resources/analysis-tools/climate-mapping-for-a-resilient-washington/
[18] EPA, 2025. https://www.epa.gov/heatislands/learn-about-heat-island-effects
[19] NOAA, 2024. https://coastalscience.noaa.gov/news/model-predicts-resilience-of-roads-after-flood-events/#:~:text=Pavements%20are%20highly%20susceptible%20to,shortened%20life%20spans%20for%20roads.

Recommended Actions

This section is preliminary for discussion purposes only. Recommended actions are based on cumulative factors in the climate hazard analysis and are subject to change based on further discussions with the County and community members.

- Suncadia and much of the County's outdoor recreation and in turn lodging are based on winter sports. Due to the ongoing and expected decrease in snowpack, the County should consider the effects of a long-term drop-in lodging tax revenue as winter recreation becomes increasingly unprofitable and unfeasible. Furthermore, the county may want to pursue strategies or policies encouraging diversification of tourism beyond winter sports.

- Coordinate water system plans between agencies to consider climate change impacts to water storage and supply for irrigation and drinking water.

- Partner with local entities such as Central Washington University and the USFWS/DNR to determine the impacts of drought on local ecosystems, species, and water supplies. Incorporate findings into County plans where applicable.

- Integrate increased costs for road and utility maintenance into capital facilities plans in response to projected increases in flood frequency and extreme heat. Pursue grant funding and/or consider allocating additional funds in capital improvement plans for resilience measures to mitigate future cost increases.

- County Administration buildings are exposed to 500-year flood events. The County should review and consider updating design standards of County-owned buildings and facilities located in the 500-year floodplain. Outcomes in this review include the waterline level on buildings, expected flood damage, inventory of existing building design standards, and resilience measures.

- Partner with public transportation authorities, County departments, funding agencies, and other relevant agencies to provide evacuation services for vulnerable populations such as youth, elderly, lower income, and/or individuals experiencing ambulatory challenges, or anyone who may be at greater risk of isolation during hazard events exacerbated by climate change.

- Update CWPP and other wildfire plans to include policies and mechanisms for responding to and mitigating the increased likelihood and intensity of wildfires over the next century.

This memo does not attempt to replace the experience and knowledge of the people working and living on the land. Recommended actions are subject to change based on subsequent public input during the planning process. The memo aims to provide scientifically driven data and analyses that guide recommended courses of action. Kimley-Horn looks forward to collaborating with the County to identify potential opportunities to identify priority climate hazard impacts and increase resiliency among all sectors within the community.

Sincerely,

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On Behalf of:
County of Kittitas, Washington State