

MEMORANDUM

May 28, 2024

To: Mindy Brooks, Senior Long-Range Planner
Lewis County, Washington

From: Heidi Rous Climate Director, Kimley-Horn

RE: SUMMARY OF CLIMATE HAZARDS AND POLICY GAPS & OPPORTUNITIES, CLIMATE ELEMENT AND RESILIENCY SUB-ELEMENT 2025 COMP PLAN UPDATE, LEWIS COUNTY

Purpose

This memorandum summarizes potential climate impacts to Lewis County assets and potential policy opportunities to address climate impacts. The opportunities provide a basis for assessing current policy gaps and opportunities (provided under separate memo “Policy Gaps & Opportunities”) that support the County’s Comprehensive Plan update. The memo further informs the new Climate Element and Resiliency Sub-Element, consistent with House Bill 1181 (“HB 1181”) and Washington State’s Growth Management Act (GMA) . A memo summarizing climate vulnerability and risks of identified assets will be provided separately. Under HB 1181 and the GMA ([RCW 36.70A.070\(9\)](#)) for Lewis County, a resiliency sub element must, among other things, equitably enhance resiliency to, and avoid or substantially reduce the adverse impacts of, climate change in human communities and ecological systems through goals, policies, and programs consistent with the best available science and scientifically credible climate projections and impact scenarios [RCW 36.70A.070\(9\)\(e\)\(i\)](#).

Scope

Critical infrastructure located within the County are identified and assessed for exposure to climate hazard scenarios (see “Analysis” section below). Assets identified are located within Lewis County and are either owned and operated by the County, quasi-public agencies, or private entities. Assets include administrative buildings, historical sites, transportation infrastructure and facilities, airports, and radio communications that are owned and managed by the County. Other critical facilities operating under a special purpose district, public utility district, and private entities were assessed including educational institutions, railways, water, sewer, and energy facilities. 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. Other assets may include community groups, places, and services which will be identified through community stakeholder interviews in mid-June of this year. Other assets identified by stakeholders will be updated in the workbook and incorporated into Climate Element goals and policies.

Methodology

Under the Washington State Department of Commerce’s Intermediate Planning Guidance document, Section 3: Resilience Sub-element provides step-by-step guidance for developing a new climate and resiliency element, as shown below:

1. Explore Climate Impacts
2. Audit Plan and Policies
3. Assess Vulnerability and Risk
4. Pursue Pathways
 - a. Select and/or adapt existing goals and policies
 - b. Develop new goals and policies
 - c. Update and adopt hazard mitigation plan
5. Integrate Goals and Policies

Following the guidance document, the Climate Element Workbook was utilized (See **Appendix A: Lewis County Climate Element Workbook**). The intermediary tasks within Steps 1-5 are included below and are further detailed in the Analysis section.

1. Identifying and organizing County and community assets under specific sectors;
2. Identifying potential climate hazards per sector;
3. Pairing assets and hazards;
4. Describing potential climate impacts, asset exposure, non-climate stressors, and climate impact consequences of each asset-hazard pair;
5. Identifying priority climate hazards affecting the County; and
6. Reviewing existing plans for climate gaps and opportunities.

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 enhances beneficial opportunities among the eleven sectors which are not typically included in a FEMA-approved hazard mitigation plan.

Analysis

Identify Community Assets

Over 100 County assets were identified, including administrative and civic buildings, senior centers, parks, recreation facilities, historical sites, transportation infrastructure and facilities, airports, solid waste management facilities, water distribution infrastructure, radio communication infrastructure, shorelines, and other critical facilities co-managed with special districts i.e., fire stations, cemeteries, hydroelectrical dams, telecommunication facilities, etc. The assets were pulled from existing reports, documents, and the County website. Existing reports and documents include:

- 2021 Lewis County Comprehensive Plan
- 2021 Shoreline Master Program
- 2023 Public Safety Radio System Engineering Study Report
- 2023 Draft Comprehensive Solid and Hazardous Waste Management Plan
- 2023 Draft Hazard Mitigation Plan
- 2024 Economic Development Strategic Plan

- 2024-29 Transportation Improvement Program
- 2012 Washington State Department of Ecology “Preparing for a Changing Climate” Report
- Lewis County website
- ¹ <https://lewiscountywa.gov/departments/community-development/adopted-plans/>.

It is important to note that the 2023 Draft Comprehensive Solid and Hazardous Waste Management Plan and 2023 Draft Hazard Mitigation Plan, as mentioned above, are nearing the adoption stage; therefore, major changes to these plans are not anticipated and were utilized for this analysis. The community assets were thematically grouped and generalized under a singular term such as “buildings”, “transportation”, “utilities”, “parks”, and such. Each term was subsequently assigned a sector based on definitions provided in the Guidance document. One asset may be applicable in multiple sectors; for example, airports are applicable in economic development, emergency management, and transportation sectors.

Exploration of Hazards and Changes in the Climate

Hazards, climate indicators, and climate impacts specific to Lewis County were identified for each sector utilizing the Climate Mapping for a Resilient Washington (“CMRW”) webtool. The CMRW tool provided a long list of climate indicators within various sectors such as agriculture, buildings and energy, cultural resources and practices, economic development, ecosystems, emergency management, human health, transportation, waste management, water resources, and zoning and development. Within these sectors, hazards such as drought, extreme heat, extreme precipitation, flooding, reduced snowpack, sea level rise, and wildfire were analyzed under the higher greenhouse gas scenario (RCP 8.5) with its respective climate indicator. The RCP 8.5 scenario was utilized as compared to the lower greenhouse gas scenario (RCP 4.5) as the scenarios do not differ significantly prior to 2050. Selected climate hazards and indicators can be found in **Appendix A**.

Pairing Assets and Hazards

Approximately 75 asset-hazard pairs were identified by selecting the sector in the CMRW tool, which automatically populated select hazard data that would impact the sector. For example, buildings & energy sector yielded hazard data for extreme heat and wildfire, but not sea level rise, extreme precipitation, or drought. Assets were grouped with each hazard data; for example, County administrative buildings (identified within the buildings & energy sector) would be listed as “County buildings – Extreme Heat” and “County buildings – Wildfire”. Some pairs were listed several times as some assets had multiple hazards within various sectors. For example, Airports – Flooding was listed twice but were under two different sectors: economic development and emergency management. The asset-hazard pairs were then assessed for climate impacts focusing on how the hazard particularly impacted the asset, how each asset is exposed to the hazard, non-climate stressors that may exacerbate climate impacts, and past/future consequences of previous factors that are specific to the County asset. This exercise builds off the previous two exercises of identifying County assets and potential climate hazards.

Exposure, Impacts, Stressors, Consequences

Climate impacts to the appropriate County assets were assessed based on disruptions to the specific sector under the RCP 8.5 climate scenario.

¹ Lewis County Washington, *Adopted Plans*, [Adopted Plans \(lewiscountywa.gov\)](https://lewiscountywa.gov) Accessed April, 2024.

The following summarizes key take-aways:

- Extreme heat, wildfire, flooding, extreme precipitation, and reduced snowpack were the most recurring hazards when paired with assets.
- Lewis County is anticipated to experience an increased frequency of annual peak streamflow or “flooding” of 35.3% to 91.8% of stream segments. A return interval of 25-year peak streamflow is anticipated every 0-10 years rather than every 25 years.
- Risk of heat waves, drought, and sea level rise are relatively low.
- East Lewis County has a higher risk of wildfire. A combination of increased time delay interference in County radio communications, increased emergency responses, limited personnel, and more frequent wildfire events exposes eastern County residents to higher wildfire risks.
- Numerous County infrastructure are located in remote areas and are at higher risk of exposure to climate impacts, including roads, bridges, radio towers, transportation facilities, and utility substations.
- Damage to County infrastructure and assets are more likely to occur from secondary hazards such as frequently occurring avalanches from reduced snowpack, bank erosion from riverine flooding, and landslides from extreme weather events.
- Non-climate stressors such as increased impervious surfaces, housing and population increases, aging infrastructure, limited personnel and equipment capabilities, incompatible land uses, invasive species, development in WUI zones, and others can exacerbate climate impacts.
- Snowmelt is projected to shift 3 to 4 weeks earlier than the 20th century average, impacting wildlife migration patterns and hydroelectricity demands.
- Summer stream flows are expected to substantially diminish due to changing snowmelt patterns, shifting energy supply to other sectors or industries.

The list is non-exhaustive and may expand based on the best available science and community input. Future community engagement events may identify other assets such as community groups, places, and services that will be analyzed for climate hazard impacts provided in an updated workbook and memo. A community engagement plan and community engagement summary report will be provided as a separate appendix with the updated memo.

Identify Priority Climate Hazards

Priority climate hazards were identified based on the most common recurrences among asset-hazard pairs. Priority hazards were also identified based on the County’s existing plans and anecdotal information. The existing plans include the Comprehensive Plan, Shoreline Master Plan, 2023 Hazard Mitigation Plan, and Countywide Planning Policies. The climate hazards most relevant to the County include:

- Extreme Precipitation
- Flooding
- Reduced snowpack/Avalanche
- Wildfire

Other hazards such as earthquakes and volcanos are relevant to the jurisdiction. However, the impacts of climate change on earthquake and volcanic activity probability cannot be confirmed; thus, such hazards are not assessed for gaps and opportunities.

Policy Audit – Climate Gaps and Opportunities

Existing plans were reviewed to identify gaps, opportunities, and barriers to climate resiliency. Staff identified 60 goals or policies (“measure”) that implicit or explicit support climate resilience², including related sectors, climate indicators, hazards, climate impacts, and assets affected for each measure. The measure was assessed in the context of climate impacts as to whether the measure can be amended or supplemented to better address local climate hazards and impacts.

The existing measures needed specificity to better address climate hazards and impacts. Next steps were identified for each measure to amend, consolidate, add, or keep the existing measure. Staff recommends the following:

- Amend existing Comprehensive Plan measures to consider climate impacts and add amended measures to the new Climate Resiliency Element³.
- Amend existing Shoreline Master Plan measures to consider climate impacts or leave as-is and integrate into new climate resiliency element.
- No changes for Hazard Mitigation Plan measures recommended.

New Climate Element measures should remain consistent throughout the Comprehensive Plan. The recommendations include actions to enhance resiliency among all sectors and to advance environmental justice through economic development and land use while ensuring consistency with the Hazard Mitigation Plan, Shoreline Master Plan, and Countywide Planning Policies. A separate memo outlining current policy gaps and opportunities is provided.

Sincerely,

Heidi Rous,
Kimley-Horn

On Behalf of:
County of Lewis, Washington State

² Resilience is defined as "The on-going process of anticipating, preparing for, and adapting to changes in climate and minimizing negative impacts to our natural systems, infrastructure, and communities."

³ These amended measures can be found in the Lewis County Draft Policy Gap Analysis.

References:

1. Raymond, C., M. Rogers, 2022. Climate Mapping for a Resilient Washington. Prepared by the Climate Impacts Group, University of Washington, Seattle and Research Data & Computing Services, University of Idaho, Moscow.

Task 1.1: Identify community assets

Sectors	Assets
Agriculture & Food Systems	
Buildings & Energy	General government (County administrative buildings including maintenance sheds), utility substation, radio communications infra (radio towers), hydroelectrical facilities, Power plant, wind farm, natural gas pipelines
Cultural Resources & Practices	Historic buildings and sites (libraries, religious institutions, museums), etc.
Economic Development	Airports, fiber optics network, etc.
Ecosystems	Shorelines (under SMP): stream/rivers, lakes/reservoirs, water banks/beaches, open space, wetlands, urban tree canopy, etc.
Emergency Management	Public safety radio infrastructure & equipment, fire stations (w/in fire district), airports, etc.
Health & Well-being	Recreation areas (forests, shorelines, boat ramps, fishing, parks), senior centers, hospitals, etc.
Transportation	Airports, County roadways, bridges, Roadway appurtenant structures i.e., culverts, facilities/warehousing (road shops, pits and quarries, stockpiles, sand sheds), Railways, etc.
Waste Management	Solid waste transfer stations, dump station, sewer infrastructure i.e., mains, etc..
Water Resources	Water infrastructure i.e., distribution pipes, groundwater supplies (reservoirs, wells), water treatment facilities, etc.
Zoning & Development	Civic centers (i.e., senior centers, youth/community centers, public plazas, recreation facilities), Colleges, Cemeteries, etc.

Task 1.2: Explore hazards and changes in the climate

Sector (Use the CMRW webtool and other resources, as needed, to fill out this column.)	Climate Indicator (Use the CMRW webtool and other resources, as needed, to fill out this column.)	Hazard (Use the CMRW webtool and other resources, as needed, to fill out this column.)	Climate Impacts (Use the CMRW webtool's "Understanding the Importance" tab, Figure 5 of the climate element planning guidance, and other information sources to fill out this column.)	Notes (Note the emissions scenario(s) and time periods you explored. You may also wish to identify potential information gaps that might warrant further analysis.)
Agriculture	Increase in precipitation Drought	Drought	Increased likelihood of below normal summer precipitation indicates a greater likelihood of drought in any year. Reduction of the of water available for livestock and irrigation during the same time that warmer temperatures and longer growing seasons are expected to increase the demand for irrigation water.	High emissions scenario. Steady increase of likelihood of a year with summer precipitation below 75% ranges from 0.28 to 0.38. The closer the value to 1, the higher likelihood of snowpack drought; value closer to 0 are a lower likelihood.
Agriculture	Increase in summer maximum temperature	Extreme Heat	Warmer summers directly affect the health and well-being of people and stress and water availability for crops and ecosystems. Increase potential for heat stress on some crops and livestock and decrease crop yield. Agricultural pests are expected to have greater survival rates and population size with warming. Increase demand for irrigation water.	High emissions scenario. Increase in summer maximum temperature. From 2.4 deg F to 12.8 deg F with baseline temperature of 73 deg F.
Agriculture	Increase in extreme precipitation magnitude	Extreme Precipitation	Changes in the intensity of extreme precipitation events are more likely to cause damages to infrastructure and agricultural operations. Heavier precipitation is expected to increase flooding and inundation of agricultural lands, which can delay spring planting, affect crop quality and quantity, increase erosion and runoff, and increase susceptibility to root diseases.	High emissions scenario. Increase in extreme precipitation. Median likelihood is >10% from 2020 - 2099
Agriculture	N/A	Flooding	N/A	N/A
Agriculture	Increase in percentage of stream lengths winter to spring streamflow timing ratio	Reduced Snowpack	Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including agriculture, drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase. A shift in streamflow timing, with more streamflow in winter and early spring, will change the timing of water available for irrigated agriculture. Reduced snowpack may decrease the volume of avalanches but increase the frequency of avalanches.	High emissions scenario. Increase ratio in the future of streamflow in winter and a decrease in spring
Agriculture	N/A	Sea Level Rise	N/A	N/A
Agriculture	Increased wildlife likelihood	Wildfire	Increased likelihood of wildfire indicates a greater potential for wildfire to damage infrastructure, interrupt businesses, or affect public health and well-being. Potential to increase damage to crops, livestock, agriculture infrastructure and operations. Wildfire smoke may reduce the quality of some crops and adversely affect farm workers and other outdoor laborers in the industry	High emissions scenario. Slight increase in wildfire likelihood. Increase starting at median of 0.03 to 0.29. The closer the value to 1, the higher likelihood of wildfire; value closer to 0 are a lower likelihood.
Buildings and Energy	N/A	Drought	N/A	N/A
Buildings and Energy	Decrease in heating degree days and increase in cooling degree days	Extreme Heat	Decrease in heating degree days indicates lower potential energy demand for heating buildings in winter. Decrease in heating degree days is expected to reduce energy demand for heating; potential to reduce energy costs for businesses and residents, but decreases utility revenue to support infrastructure and operations. Increase in cooling degree days indicates greater potential energy demand for cooling buildings in summer. Increase energy demand for air conditioning and industrial cooling systems in summer when regional hydropower supply is expected to decrease. Increase in demand for air conditioning and infrastructure with cooling systems that do not already exist.	High emissions scenario. Negative decrease in heating degree days (-806 to -2203 days). High emissions scenario. Positive increase in cooling degree days (127 to 562 days)
Buildings and Energy	N/A	Extreme Precipitation	N/A	N/A
Buildings and Energy	N/A	Flooding	N/A	N/A
Buildings and Energy	N/A	Reduced Snowpack	N/A	N/A
Buildings and Energy	N/A	Sea Level Rise	N/A	N/A

Buildings and Energy	Increase wildfire likelihood	Wildfire	Increased likelihood of wildfire indicates a greater potential for wildfire to damage infrastructure, interrupt businesses, or affect public health and well-being. Can affect energy transmission by damaging infrastructure and interrupting transmission and distribution. Can cause property damage and loss. Poor air quality due to wildfire smoke could increase demand for air filtration systems in buildings.	High emissions scenario. Steady increase of likelihood of climate and fuel conditions for wildfire ranging from 0.03 to 0.29. The closer the value to 1, the higher likelihood of wildfire; value closer to 0 are a lower likelihood.
Cultural Resources and Practice	Increase in low streamflow	Drought	Lower streamflow's in summer are expected to reduce habitat quantity and quality for salmonids and other aquatic species that are culturally important to the Northwest Tribes.	High emissions scenario. Steady increase of low streamflow ranging from 25-38% of streams will have 30-50% less streamflow on average during their low summer streamflow and low streamflow ranging from 2-29% of streams will have 50-70% less streamflow.
Cultural Resources and Practice	Increase in August stream temperature	Extreme Heat	Increase in temperature during August (typically the hottest month for most streams) indicates the water quality for salmon and other species that depend on cold water. Warmer stream temperatures are expected to reduce habitat quality for salmonids and other aquatic species that depend on cold water. Can reduce the abundance of and access to these culturally important species for Northwest Tribes.	High emissions scenario. Greater increase of stream temperature with higher percentages and decrease of streams with colder temperature.
Cultural Resources and Practice	N/A	Extreme Precipitation	N/A	N/A
Cultural Resources and Practice	Increase in peak streamflow	Flooding	Increase in annual peak streamflow indicates a potential for higher stream flows and larger areas inundated every year at high flows. Higher stream flows are expected to directly affect salmonid populations and alter salmonid habitat, reducing the quantity of a culturally important species for Northwest Tribes.	High emissions scenario. Steady increase in maximum streamflow ranging from 49-69% increase of stream flows will have 10-30% more streamflow on the day of the year with the highest streamflow.
Cultural Resources and Practice	N/A	Reduced Snowpack	N/A	N/A
Cultural Resources and Practice	N/A	Sea Level Rise	N/A	N/A
Cultural Resources and Practice	Increased wildfire likelihood	Wildfire	Increased likelihood of wildfire indicates a greater potential for wildfire to damage infrastructure, interrupt businesses, or affect public health and well-being. Can have the potential to damage cultural and historical sites, buildings, and cultural resources. More frequent wildfires can also reduce access to culturally important sites and resources for Northwest Tribes.	High emissions scenario. Steady increase of likelihood of climate and fuel conditions for wildfire ranging from 0.03 to 0.29. The closer the value to 1, the higher likelihood of wildfire; value closer to 0 are a lower likelihood.
Economic Development	Decreased snowpack and increased streamflow timing	Drought	Decreased snowpack in the mountains in the beginning of spring indicates the amount of natural water storage in snowpack that will be available in the melt season. April 1st snowpack (snow water equivalent). Reduction in snowpack are expected to decrease opportunities for winter outdoor recreation and shorten the winter recreation season, with adverse effects on the economy and character of some communities. Warm season outdoor recreation opportunities may increase, shifting tourism from one recreation sector to another and into different seasons. Increase in the ratio of winter to spring streamflow is an indicator of the change in the seasonal timing of streamflow. The timing of snowmelt and streamflow influences the seasonal availability of water for hydropower generation and irrigation. A shift in streamflow timing, with more streamflow in winter and early spring, will change the timing of hydropower generation. Timing changes have the potential to affect energy costs for residents and businesses.	High emissions scenario. Steady decrease of April 1st snowpack. High emissions scenario. Steady increase in streamflow that indicates more winter streamflow and drastic decrease in spring streamflow.
Economic Development	Increase in summer maximum temperature	Extreme Heat	Warmer summer temperatures could decrease opportunities for warm season recreation activities in some areas and increase them in others. opportunities for warm season recreation activities in some areas and increase them in others.	High emissions scenario. Steady increase of summer maximum temperatures ranging from a median of 3.4 deg F to 9.9 deg F.

Economic Development	Increase in extreme precipitation magnitude	Extreme Precipitation	Changes in the intensity of extreme precipitation events are more likely to cause damages to infrastructure and agricultural operations than changes in seasonal and annual precipitation. Heavier precipitation is expected to increase the extent of flooding in low-lying areas and flood zones. Businesses are expected to have more disruptions to operations and damage to infrastructure.	High emissions scenario. Median likelihood ranges from 7-18% of the county to expect an increase in the total precipitation of the 25-year storm.
Economic Development	Increase of return interval of 25-yr peak streamflow	Flooding	<p>The 25-year peak streamflow is the streamflow that occurs on average every 25 years, similar to the 100-year high flow but more frequent. The return interval of the historical 25-year peak streamflow indicates how much more frequently stream flows of this magnitude are expected to occur in the future with heavier precipitation and more rain in the winter.</p> <p>More frequent high stream flows are expected to increase the frequency of flooding impacts to businesses and the economy by disrupting travel and shipping routes and damaging property. More frequent flooding has the potential to increase insurance premiums or make some properties more difficult to insure.</p>	<p>High emissions scenario. Increased frequency of historical peak streamflow occurring ranging from 35.3% to 91.8% of stream segments in the 0-10 years of return interval will have their historical peak streamflow occur on average once every 0-10 years, rather than once every 25 years.</p> <p>Similarly, 8.2% to 63.5 % of stream segments in the 10-20 years of return interval will have their historical peak streamflow occur on average once every 10-20 years, rather than once every 25 years.</p>
Economic Development	Decrease in snowpack	Reduced Snowpack	Reductions in snowpack are expected to decrease opportunities for winter outdoor recreation and shorten the winter recreation season, with adverse effects on the economy and character of some communities. Warm season outdoor recreation opportunities may increase, shifting tourism from one recreation sector to another and into different seasons. Reduced snowpack may decrease the volume of avalanches but increase the frequency of avalanches, increasing hazard risks for recreational snow activities and emergency response.	High emissions scenario. A decrease in April 1st snowpack indicates that less stored water will be available to supply streams, soils, and reservoirs during the melt season.
Economic Development	N/A	Sea Level Rise	N/A	N/A
Economic Development	Increase in wildfire danger	Wildfire	More high fire danger days indicates a greater potential for wildfire activity, assuming ignition sources and sufficient fuels are present. More days with high wildfire danger are expected to affect businesses through more frequent closures of recreation areas and restrictions on outdoor activities during the wildfire season. More high fire danger days will interrupt timber operations and outdoor recreation.	High emissions scenario. An increase in high fire danger days indicates a greater potential for wildfire danger to damage infrastructure, interrupt businesses, and affect public health and well-being.
Ecosystems	Decrease in late summer precipitation	Drought	Summer precipitation affects water availability for non-irrigated agriculture and fuel moisture during the height of the fire season. Less summer precipitation is expected to affect ecosystem types differently. In freshwater ecosystems, less summer precipitation will contribute to lower stream flows, reduce water quality, and increase water temperatures. In terrestrial ecosystems, less summer precipitation will contribute to drought stress and reduce the growth and productivity of some plants.	High emissions scenario. Steady decrease in late summer precipitation ranging from -10.3% to -26.5% for summer months of July 15 - September 15
Ecosystems	Increase in summer maximum temperature	Extreme Heat	<p>Warming is expected to be greatest in summer months. Warmer summers directly affect the health and well-being of people and stress and water availability for crops and ecosystems.</p> <p>Warmer summers are expected to reduce summer soil moisture and increase physiological stress for some plants and animals. Warmer summer temperatures are expected to reduce tree growth and forest productivity in some areas and increase growth and productivity in mild climates. Outbreaks of some forest pests, such as mountain pine beetles, are expected to increase.</p>	<p>High emissions scenario. Steady increase in summer maximum temperature ranging from 3.4 deg F to 9.9 deg F. 3.4 deg F means the average summer maximum temperature is expected to increase by 3.4 deg F for the county between (June - Aug).</p> <p>The change in average summer maximum temperature is an indicator of heat stress for people, ecosystems, and infrastructure.</p>
Ecosystems	N/A	Extreme Precipitation	N/A	N/A
Ecosystems	Increased peak streamflow	Flooding	Increased percentage of stream lengths indicates a potential for higher stream flows and larger areas inundated every year at high flows. Higher stream flows will scour the streambed and remove or crush salmon eggs, increasing mortality and reducing return rates. Higher stream flows reduce the availability of slow-water habitat and can increase sedimentation that affects habitat quality.	High emissions scenario. 40-69% increase in maximum streamflow. 17-42% increase of stream segments with streamflow above the historical maximum streamflow.

Ecosystems	Increase in streamflow timing	Reduced Snowpack	Earlier spring snowmelt and associated changes in streamflow timing are expected to alter migration timing and survival rates for salmonids. Reduced snowpack may decrease the volume of avalanches but increase the frequency of avalanches.	High emissions scenario. An increase in the ratio in the future means an increase in streamflow in winter and a decrease in spring. Steady increase of winter streamflow and decrease of spring streamflow.
Ecosystems	N/A	Sea Level Rise	N/A	N/A
Ecosystems	Increase in wildfire likelihood	Wildfire	More frequent wildfires have the potential to reduce timber, non-timber forest products, carbon storage, and forest habitat for some wildlife. Wildfires also increase establishment of invasive species. More frequent wildfires have the potential to increase runoff and sediment to streams, which can reduce aquatic habitat quality.	High emissions scenario. Steady increase in the likelihood of climate and fuel conditions for wildfire ranging from 0.03 to 0.29. A value of 0.03 means that there is a 3% change that a year in the time period will have climate and fuel conditions that are favorable for wildfire.
Emergency Management	Increase in precipitation Drought	Drought	Washington State's legal definition of drought for a declaration and associated response is 75% of normal water supply and hardship. Summer precipitation is one component of water supply considered in the determination. A greater likelihood of below normal summer precipitation indicates a greater likelihood of drought in any year. More frequent and severe droughts due to low summer precipitation are expected to increase the need for emergency services to plan, prepare, and respond to water shortages.	High emissions scenario. Steady increase in precipitation drought that a year in a selected 30-year period will have summer precipitation at or below 75% of normal. Ranges from 0.28 to 0.38 means that there is a 28% will have summer precipitation at or below 75% of normal. Values closer to one are a higher likelihood of snowpack drought; values closer to zero are a lower likelihood.
Emergency Management	Increase in 90 deg F Max Humidex Days	Extreme Heat	An increase in days over a maximum humidex of 90° is an indicator of day-time heat stress for people. More frequent extreme daytime heat events are expected to increase the demand for emergency services to plan, prepare, and respond to human health impacts. Extreme heat may also impact emergency services due to transportation and travel disruptions such as warped and buckling pavement on roads.	High emissions scenario. The humidex is a measure of experienced heat conditions, and takes into consideration both temperature and humidity. The change in the number of 90 deg F maximum humidex days is an indicator of stress on public health. Positive increase of humidex days from 11.7 days to 45.1 days.
Emergency Management	Increase of extreme precipitation magnitude	Extreme Precipitation	Heavier precipitation has the potential to increase the demand for emergency response services by intensifying flood events and increasing other emergencies associated with heavy precipitation.	High emissions scenario. Steady increase in percent change in the magnitude of 25-year storm ranging from 7-18%. Indicates the county is expected to experience an increase in total precipitation of the 25-year storm of 7%. Heavy precipitation is an indicator of flooding that can affect infrastructure and operations.
Emergency Management	Increase in peak streamflow	Flooding	Higher streamflow are expected to increase riverine flooding within existing floodplains and could expand flooding to new areas not currently in existing floodplains. More flooding has the potential to increase the demand for emergency services to plan, prepare, and respond to flood events.	High emissions scenario. Increase in maximum streamflow ranging from 47% to 69% in the 10 to 30 percent change. This indicates that 47% of the stream segments in the 10 to 30 category means that 47% of the streams in the county will have 10% to 30% more streamflow on the day of the year with the highest streamflow.
Emergency Management	N/A	Reduced Snowpack	N/A	N/A
Emergency Management	N/A	Sea Level Rise	N/A	N/A
Emergency Management	Increase in wildfire danger	Wildfire	More days with high fire danger will increase the need for fire bans and associated enforcement and capacity to respond to wildfires.	High emissions scenario. Increase of high fire danger days from 6 - 8 days. A value of 6 means that there are 6 additional days in which the 100-hour fuel moisture is less than the 20th percentile in the county.
Human Health	N/A	Drought	N/A	N/A
Human Health	Increase in summer maximum temperature	Extreme Heat	Warming is expected to be greatest in summer months. Warmer summers directly affect the health and well-being of people and stress and water availability for crops and ecosystems. Warmer summers are expected to increase concentrations of air pollutants, such as ozone and some vector-borne	High emissions scenario. Steady increase in maximum temperature ranging from 3.4 deg F to 9.9 deg F. An increase of 3.4 deg F means that the average summer maximum temperature is expected to increase by 3.4 deg F for the county.
Human Health	N/A	Extreme Precipitation	N/A	N/A
Human Health	N/A	Flooding	N/A	N/A
Human Health	N/A	Reduced Snowpack	N/A	N/A
Human Health	N/A	Sea Level Rise	N/A	N/A

Transportation	Decrease in snowpack	Drought	Reductions in snowpack have the potential to reduce snow-related road maintenance, road closures, and transportation delays. However, as more cold-season precipitation falls as rain rather than snow, transportation routes in mountainous areas may experience more damage from heavier winter rainfall and associated flooding, erosion, and washouts.	High emissions scenario. Steady decrease in April 1st snowpack ranging from 68% to 97%. April 1st snowpack is used as an indicator for the amount of stored water that becomes available during the melt season.
Transportation	Increase in hot days	Extreme Heat	Days with a temperature over 100°F is an indicator of potential damage to transportation infrastructure such as roads and bridges. More very hot days have the potential to damage the surfaces of roads and bridges, leading to greater maintenance and repair costs and more frequent traffic and service disruptions.	High emissions scenario. Steady increase of hot days ranging from 0.2 days to 2.3 days. A value of 0.2 days means that the number of annual hot days in the county is expected to increase by 0.2 days. A increase in the number of days above 100 deg F is an indication of more stress on transportation infrastructure.
Transportation	Increase in heavy precipitation magnitude	Extreme Precipitation	Heavier precipitation events are expected to intensify flooding, landslides, and erosion, which can interrupt transportation routes, damage infrastructure, and increase maintenance and repair costs.	High emissions scenario. Steady increase in heavy precipitation magnitude ranging from 7-18%. A value of 7% means a county is expected to experience an increase in the total precipitation of the 2-year storm of 7%.
Transportation	Increase in peak streamflow	Flooding	Higher stream flows are expected to increase riverine flooding, which can damage roads, bridges, and railways and overwhelm drainage structures, such as culverts.	High emissions scenario. Increase in maximum streamflow ranging from 47% to 69% in the 10 to 30 percent change. This indicates that 47% of the stream segments in the 10 to 30 category means that 47% of the streams in the county will have 10% to 30% more streamflow on the day of the year with the highest streamflow.
Transportation	Decrease in snowpack	Reduced Snowpack	Reductions in snowpack have the potential to reduce snow-related road maintenance, road closures, and transportation delays. However, as more cold-season precipitation falls as rain rather than snow, transportation routes in mountainous areas may experience more damage from heavier winter rainfall and associated flooding, erosion, and washouts. Reduced snowpack may decrease the volume of avalanches but increase the frequency of avalanches and closure of roads.	High emissions scenario. Steady decrease in April 1st snowpack ranging from 68% to 97%. April 1st snowpack is used as an indicator for the amount of stored water that becomes available during the melt season.
Transportation	N/A	Sea Level Rise	N/A	N/A
Transportation	Increase in wildfire likelihood	Wildfire	More frequent wildfires, and related smoke, can disrupt travel, increase road closures and delay construction projects. Wildfire smoke has the potential to affect labor in the transportation sector because of health effects on outdoor laborers. More roadside brush fires can create safety hazards and disrupt transportation.	High emissions scenario. Steady increase in the likelihood of climate and fuel conditions for wildfire ranging from 0.03 to 0.29. A value of 0.03 means that there is a 3% change that a year in the time period will have climate and fuel conditions that are favorable for wildfire.
Waste Management	N/A	Drought	N/A	N/A
Waste Management	N/A	Extreme Heat	N/A	N/A
Waste Management	Increase in extreme precipitation magnitude	Extreme Precipitation	Heavier precipitation has the potential to increase storm damage to infrastructure and generate more waste and debris. More waste will strain municipal cleanup and refuse capacity.	High emissions scenario. Steady increase in heavy precipitation magnitude ranging from 7-18%. A value of 7% means a county is expected to experience an increase in the total precipitation of the 2-year storm of 7%.
Waste Management	Increase in return interval of 25-yr peak streamflow	Flooding	The 25-year peak streamflow is the streamflow that occurs on average every 25 years, similar to the 100-year high flow but more frequent. The return interval of the historical 25-year peak streamflow indicates how much more frequently stream flows of this magnitude are expected to occur in the future with heavier precipitation and more rain in the winter. More frequent high stream flows are expected to increase flooding, which can generate more debris and waste. More waste will strain municipal cleanup and refuse capacity. Flooding of waste management facilities can release contaminants and hazardous materials.	High emissions scenario. Steady increase in return interval of 25-yr peak streamflow for 0-10 and 10-20 categories. In the 0-10 year category, a range of 35.3 % to 91.8% of the stream segments means that 35.3% of the streams in the county will have their historical peak streamflow occur on average once every 0-10 years, rather than once every 25 years. In the 10 to 20 year category, a range of 8.2% to 63.5% of the stream segments means that 8.2% of the streams in the county will have their historical peak streamflow occur on average once every 10-20 years, rather than once every 25 years.
Waste Management	N/A	Reduced Snowpack	N/A	N/A
Waste Management	N/A	Sea Level Rise	N/A	N/A

Waste Management	Increase in wildfire likelihood	Wildfire	More frequent wildfires have the potential to generate greater amounts of debris and waste. More waste will strain municipal cleanup and refuse capacity.	High emissions scenario. Steady increase in the likelihood of climate and fuel conditions for wildfire ranging from 0.03 to 0.29. A value of 0.03 means that there is a 3% change that a year in the time period will have climate and fuel conditions that are favorable for wildfire.
Water Resources	Increase in total annual precipitation	Drought	Total annual precipitation is the total input of water each year which limits the overall amount of water available for human uses and ecosystems. Increases in annual precipitation have the potential to increase groundwater recharge. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation.	High emissions scenario. Steady increase in total annual precipitation ranging from 1.8% to 4.6%. Positive values are an increase in average total annual precipitation.
Water Resources	N/A	Extreme Heat	N/A	N/A
Water Resources	N/A	Extreme Precipitation	N/A	N/A
Water Resources	N/A	Flooding	N/A	N/A
Water Resources	Decrease in snowpack	Reduced Snowpack	Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase.	High emissions scenario. Steady decrease in April 1st snowpack ranging from 68% to 97%. April 1st snowpack is used as an indicator for the amount of stored water that becomes available during the melt season.
Water Resources	N/A	Sea Level Rise	N/A	N/A
Water Resources	Increase in wildfire likelihood	Wildfire	More frequent wildfires have the potential to damage water distribution infrastructure and reduce water quality in reservoirs due to more runoff, erosion, and turbidity. Changes in water quality could increase the need for water treatment and filtration.	High emissions scenario. Steady increase in the likelihood of climate and fuel conditions for wildfire ranging from 0.03 to 0.29. A value of 0.03 means that there is a 3% change that a year in the time period will have climate and fuel conditions that are favorable for wildfire.
Zoning and Development	Decrease in snowpack	Drought	Reductions in snowpack are expected to decrease opportunities for winter outdoor recreation and shorten the winter recreation season with adverse effects on the economy and character of some communities. Warm season outdoor recreation opportunities are expected to increase, shifting tourism revenue from one recreation sector to another.	High emissions scenario. Steady decrease in April 1st snowpack ranging from 68% to 97%. April 1st snowpack is used as an indicator for the amount of stored water that becomes available during the melt season.
Zoning and Development	Increase in August stream temperature	Extreme Heat	Warmer stream temperatures have the potential to reduce the ability to meet water quality standards and the effluent limits (amount discharge to the water body) set on existing wastewater treatment facilities.	High emissions scenario. Steady increase in August stream temperature deg C. This indicates more of the streams are projected to have warmer average August streamflow temperatures.
Zoning and Development	Increase in heavy precipitation magnitude	Extreme Precipitation	Heavier precipitation events are expected to intensify urban flooding and demands on storm water systems, which can affect zoning restrictions on new buildings, and require revised building codes for development in more frequently flooded areas.	High emissions scenario. High emissions scenario. Steady increase in heavy precipitation magnitude ranging from 7-18%. A value of 7% means a county is expected to experience an increase in the total precipitation of the 2-year storm of 7%.
Zoning and Development	Increase in peak streamflow	Flooding	Higher streamflow are expected to increase damage to all types of infrastructure in flood zones and could expand the flood zone in some areas leading to damage of development not currently in flood zones.	High emissions scenario. Increase in maximum streamflow ranging from 47% to 69% in the 10 to 30 percent change. This indicates that 47% of the stream segments in the 10 to 30 category means that 47% of the streams in the county will have 10% to 30% more streamflow on the day of the year with the highest streamflow.
Zoning and Development	Decrease in snowpack	Reduced Snowpack	Reductions in snowpack are expected to decrease opportunities for winter outdoor recreation and shorten the winter recreation season with adverse effects on the economy and character of some communities. Warm season outdoor recreation opportunities are expected to increase, shifting tourism revenue from one recreation sector to another. Reduced snowpack may decrease the volume of avalanches but increase the frequency of avalanches.	High emissions scenario. Steady decrease in April 1st snowpack ranging from 68% to 97%. April 1st snowpack is used as an indicator for the amount of stored water that becomes available during the melt season.
Zoning and Development	N/A	Sea Level Rise	N/A	N/A
Zoning and Development	Increase in wildfire likelihood	Wildfire	More frequent wildfires are expected to increase damage to homes and infrastructure and displace residents.	High emissions scenario. Steady increase in the likelihood of climate and fuel conditions for wildfire ranging from 0.03 to 0.29. A value of 0.03 means that there is a 3% change that a year in the time period will have climate and fuel conditions that are favorable for wildfire.

Task 1.3: Pair assets and hazards, and describe exposure and consequences

Number	Asset-Hazard Pair (Note applicable sector(s) in parenthesis.)	Climate Indicator (Use the CMRW webtool and other resources, as needed, to fill out this column.)	Climate Impacts (Use the CMRW webtool and other resources, as needed, to fill out this column.)*	Exposure (Describe how each asset is exposed to the hazard, utilizing information from the CMRW webtool's "Understanding the Importance" tab, local knowledge, and other resources)	Non-Climate Stressors (Describe non-climate stressors that may exacerbate climate impacts.)	Consequences (Describe the consequences of the climate impacts, factoring in exposure, non-climate stressors, and your knowledge of how this hazard has impacted your community in the past. You may find it useful to divide consequences into past and future.)
1	General Government - Extreme Heat (Buildings & Energy)	Heating Degree Days (annual number of degree-days below a threshold of average daily temperature of 65°F) Cooling Degree Days (annual number of degree-days above a threshold of average daily temperature of 65°F)	Lewis County is expected to experience a decrease of heating degree days indicating increased potential energy demand for heating buildings in winter. Increase in cooling degree days indicates greater potential energy demand for cooling buildings in summer. Annual days with max temperatures above 90 °F is 6.3 days (lower emissions) and 7.1 days (higher emissions). (Source: CMRW tool, CMRA tool). The risk for heat waves in Lewis County is relatively low (Source: FEMA Nat'l Risk Index).	A majority of general government/administrative buildings are located in downtown Centralia with little to no tree canopy. County buildings located in this area may experience more heating and cooling degree days from urban heat island effects. Buildings with cooling systems and built to older codes will be more sensitive to higher energy demand for cooling (Source: CMRW tool). [refer to County planning staff for anecdotal info]	Increase in population (more demand on energy use); More impervious surface development	Future consequences: Longer durations of heating and cooling degree days are expected to occur. An increase in cooling degree days is expected to increase energy demand for air conditioning and industrial cooling systems in summer when regional hydropower supply is expected to decrease, increasing demand on external energy sources and causing potential widespread power outages (Source: CMRW tool). Power outages may inhibit the County from administering services and emergency relief (see asset details). Past consequences: Extreme heat events do not typically impact buildings; however, losses may be associated with the urban heat island effect and overheating of HVAC systems. These extreme heat events can lead to drought, impact water supplies, and lead to an increase in heat related illnesses and deaths (Source: Haz Mit Plan).
2	General Government - Wildfire (Buildings & Energy)	Wildfire likelihood (average likelihood of climate and fuel conditions being conducive to wildfire in a 30-year period)	The wildfire probability for Lewis County is extremely low at 0.03, indicating that there is a 3% chance that there will be climate and fuel conditions that are favorable for wildfire. Most wildfires result from "perfect storm" conditions and factors. An increased likelihood of climate and fuel conditions conducive to wildfire indicates greater potential for wildfire danger to damage infrastructure, interrupt businesses, and affect public health and well-being. Buildings and energy infrastructure located in the wildland-urban interface and areas with high wildfire risk historically will be most exposed to increases in the likelihood of wildfire (Source: CMRW tool). Wildfire risk is relatively low (Source: FEMA Risk Index). *Note: A local vulnerability assessment found that eastern County has higher risk of wildfire (Source: Haz Mitigation Plan).	Ash and smoke from wildfires pollute the air, leading to increased demands for air purification tech that may be limited for older buildings (Source: CMRW tool). Roads can be blocked and power outages may occur, which will affect all critical facilities that do not have backup power (Source: Haz Mit Plan).	Increase in population (more demand on energy use); More impervious surface development; Limited personnel	Future consequences: Large wildfires are anticipated to occur more frequently (Source: Hazard Mitigation Plan). More frequent wildfires are expected to cause property damage and loss (Source: CMRW tool). Past consequences: Wildfires in the past have been small and quickly contained (Source: Hazard Mitigation Plan).
3	Utility substations - Extreme Heat (Buildings & Energy)	Heating Degree Days; Cooling Degree Days	Same as General Gov't - Extreme Heat	Substations contain appurtenant equipment that is critical for maintaining utility infrastructure. Increased energy demand from building usage may cause additional stress on infrastructure.	Increase in population (more demand on energy use); Aging utility infrastructure	Increased energy demand from building usage may cause additional stress on infrastructure, leading to power outages and increased stress on PUD personnel, potentially increasing reliance on County or external agency personnel. Increase reliance on back-up generators. Investments in diversified energy sources i.e., solar, wind, etc.
4	Utility substations - wildfire (Buildings & Energy)	Wildfire likelihood	Same as General Gov't - Wildfire	More frequent wildfires have the potential to affect energy transmission by damaging infrastructure and interrupting transmission and distribution. More frequent wildfires are expected to cause property damage and loss (Source: CMRW tool). Systems that are flammable, such as wooden structures and power poles, can be destroyed during a fire. Roads can be blocked and power outages may occur, which will affect all critical facilities that do not have backup power (Source: Haz Mit Plan).	Increase in population (more demand on energy use); Aging utility infrastructure	With the increasing wildfire danger, exacerbated by east wind events, and limited resources available for initial attack, critical facilities and systems have a greater threat to ignitability and total loss. Should there be damages to critical facilities and systems, many of which do not have redundancies, there will be disruption to surrounding communities and the County. Increased extreme heat events are predicted to cause average of 6 additional fire hazard days per year within the next 30 years. Over the next 50 years, the western portion of the County is predicted to experience 11-12 additional high fire danger days each year (Source: Haz Mit Plan).
5	Radio Communications - Extreme Heat (Buildings & Energy)	Heating Degree Days; Cooling Degree Days	Same as General Gov't - Extreme Heat	Radio communications include radio towers that are located in remote forested areas.	Aging infrastructure; Limited personnel	Drier vegetation and soils from extreme heat events increase likelihood of wildfires and landslides that may increase destruction of towers.
6	Radio Communications - Wildfire (Buildings & Energy)	Wildfire likelihood	Same as General Gov't - Wildfire	Radio communications include radio towers that are located in remote forested areas. Wildfires directly impact radio communications by destroying towers and cutting off radio signal lines/channels. Indirect impacts from heavy precipitation followed by wildfire events can cause landslides that destroy tower foundations and equipment.	Aging infrastructure; Limited personnel	Same as above. Also, limited County personnel and aging infrastructure may result in lack of ability to respond efficiently to emergencies. Increasing climate change events may result in alternatives communication methods. Implement the IWUI code for radio towers, upgrade systems, and hire County staff to support (Source: Haz Mit Plan).
7	Hydroelectrical facilities - Extreme Heat (Buildings & Energy)	Heating Degree Days; Cooling Degree Days	Same as General Gov't - Extreme Heat. Increase energy demand for air conditioning and industrial cooling systems in summer when regional hydropower supply is expected to decrease.	Similar to utility substations, hydro facilities are owned and managed by the PUD. Extreme heat can reduce the amount of stream/river water supply available (drought) that increasingly reduces hydropower supply.	Population increase (more energy demand); Aging infrastructure; Limited personnel; Policy changes	Less hydroelectricity means outsourcing energy supplies from increased demand or unusual supply patterns, increasing stress on PUD staff and potentially increasing reliance on county or external agency personnel.
8	Hydroelectrical facilities - Wildfire (Buildings & Energy)	Wildfire likelihood	Same as General Gov't - Wildfire	Similar to utility substations, hydro facilities are owned and managed by the PUD. Heavy precipitation followed by wildfire events can cause landslides that impact water quality. Increased sedimentation may impact performance, and increase maintenance requirements.	Lack of personnel; Aging infrastructure	Increased sedimentation may impact hydroelectric facility maintenance requirements. Implement the IWUI code and hire County staff to support.

According to the most recent Hazard Mitigation Plan, the County plans to create ignition-resistant communities through different programs adopted in WA State (i.e. Firewise, Wildfire Ready Neighbors, Ready, Set, Go!, WUI Code) that targets communities located in high/very high risk wildfire areas.

	Power Plant - Extreme Heat (<i>Buildings & Energy</i>)	Heating Degree Days; Cooling Degree Days	Same as General Gov't - Extreme Heat	Decrease in heating degree days indicates lower potential energy demand for heating buildings in winter. Decrease in heating degree days is expected to reduce energy demand for heating; potential to reduce energy costs for businesses and residents, but decreases utility revenue to support infrastructure and operations. Increase in cooling degree days indicates greater potential energy demand for cooling buildings in summer. Increase energy demand for air conditioning and industrial cooling systems in summer when regional hydropower supply is expected to decrease. Increase in demand for air conditioning and infrastructure with cooling systems that do not already exist.	Decreases in energy demand for heating will depend on current seasonal patterns of demand. Energy utilities with a higher dependence on revenue from winter sales will be more sensitive to this change. Increases in energy demand for cooling will depend on current seasonal patterns of supply and demand and sources of energy. Utilities with greater redundancy and flexibility in energy sources are likely to be less affected.	A decrease in heating degree days is expected to reduce energy demand for heating. This has the potential to reduce energy costs for businesses and residents, but decrease utility revenue to support infrastructure and operations. An increase in cooling degree days is expected to increase energy demand for air conditioning and industrial cooling systems in summer when regional hydropower supply is expected to decrease. Demand for air conditioning and infrastructure with cooling systems is also expected to increase where it does not already exist.
	Power Plant - Wildfire (<i>Buildings & Energy</i>)	Wildfire likelihood	Same as General Gov't - Wildfire	Increased likelihood of wildfire indicates a greater potential for wildfire to damage infrastructure, interrupt businesses, or affect public health and well-being. Can affect energy transmission by damaging infrastructure and interrupting transmission and distribution. Can cause property damage and loss. Poor air quality due to wildfire smoke could increase demand for air filtration systems in buildings.	Energy infrastructure built to standards that do not account for wildfire risk, such as untreated wooden poles, or with inadequate vegetation management along transmission and distribution lines will be more sensitive. Building design and codes can affect sensitivity to wildfire, including age, construction materials and degree of fire resistance. Older and less well maintained buildings may be more affected by poor air quality from wildfire smoke.	Power plant service may be interrupted and impact service to businesses, residential homes, government buildings, hospitals, etc.
	Wind farm - Extreme Heat	Heating Degree Days; Cooling Degree Days	Same as General Gov't - Extreme Heat	Extreme heat can reduce the efficiency of wind farm turbines.	Turbines that are not up to standard and are aging/need to be upgraded.	Wind farm service may be interrupted and impact service to businesses, residential homes, government buildings, hospitals, etc. In addition, components of wind turbines may overheat and increase wind resistance.
	Wind farm - Wildfire	Wildfire likelihood	Same as General Gov't - Wildfire	Same as Wind farm - Extreme Heat	Same as Wind Farm - Wildfire	Same as Wind Farm - Extreme Heat
	Natural gas pipelines - Extreme Heat	Heating Degree Days; Cooling Degree Days	Same as General Gov't - Extreme Heat	Extreme heat can expose natural gas pipelines to have sharp pressure increases.	Same as Power Plant - Extreme Heat	Natural gas pipelines will require high intensity for cooling, which increases natural gas demand and decreases natural gas flow in pipelines; thus, natural gas production may be interrupted and service will be affected. In addition, sharp pressure increases in natural gas pipelines can potentially cause leaking or bursting.
	Natural gas pipelines - Wildfire	Wildfire likelihood	Same as General Gov't - Wildfire	Same as Natural gas pipelines - Wildfire	Same as Power Plant - Wildfire	Same as Natural gas pipelines - Extreme Heat
9	Historical Buildings & Sites - Flooding (<i>Cultural Resources & Practices</i>)	Peak Streamflow (Increase in peak streamflow)	Lewis County maintains three historic buildings (2 churches and 1 museum). Increase in annual peak streamflow indicates a potential for higher stream flows and larger areas inundated every year at high flows. Direct impacts to historical buildings is lack of access and loss of cultural symbol i.e., irreplaceable historic items.	Lack of access and loss of cultural symbols from flooding of historic bldgs. and sites can reduce quality of life and erode community identity.	Lack of personnel; Aging infrastructure; Lack of replacement materials	Future consequences: Increased maintenance costs. Longer closures for remodels and sourcing of rare or outdated materials. Past consequences: The worst flooding occurred along Chehalis and its tributaries, requiring more than two dozen water rescues (<i>Source: Haz Mit Plan</i>).
10	Historical Buildings & Sites - Wildfire (<i>Cultural Resources & Practices</i>)	Wildfire likelihood	Increased likelihood of wildfire indicates a greater potential for wildfire to damage historic buildings, and affect public health and well-being. Can have the potential to damage cultural and historical sites, buildings, and cultural resources.	More frequent wildfires can also reduce access to culturally important sites and resources.		Same as above
11	Airports - Drought (<i>Economic Dev</i>)	Snowpack Decreased snowpack and increased streamflow timing	N/A	N/A		
12	Airports - Extreme Heat (<i>Economic Dev</i>)	Summer Max Temp Increase in summer maximum temperature	Lewis County owns and operates two regional airports: Packwood and Ed Carlson Memorial Field in South County. The Packwood Airport is important for aviation activities such as emergency response (e.g., wildfire), air ambulance service, flight training, and personal flying (<i>Source: Haz Mit Plan</i>). Longer extreme heat days may lead to a decrease in recreational activities and daytime operations. <i>*Note: Climate impacts to airport emergency mg't is discussed below.</i>	Exposure to more extreme heat events can lead to decrease in recreational activities.	Policy changes (Federal Aviation Admin); Increased demand throughout County; Lack of funding	Daytime operations may stall towards cooler parts of the day and delay overall efficiencies of the agency, reducing recreational flying activities.
13	Airports - Extreme Precipitation & Flooding (<i>Economic Dev</i>)	Heavy Precip Magnitude Increase of return interval of 25-yr peak streamflow	Lewis County is anticipated to experience a 7% increase of a 2-year storm event. Heavier precipitation is expected to intensify flooding in low-lying areas and require higher capacity storm water drainage systems.	More frequent high streamflow's are expected to increase the frequency of flooding impacts to businesses and the economy by disrupting travel and shipping routes and damaging property.	same as above	Future consequences: Increased demand for emergency response services. Possible airport closure from flooding. Past consequences: The Centralia/Chehalis airport is protected by a levee system that overtopped several times, resulting in the closing of the airport.
14	Airports - Reduced Snowpack (<i>Economic Dev</i>)	n/a	n/a	n/a	n/a	n/a
15	Airports - Wildfire (<i>Economic Dev</i>)	Wildfire danger Increase in wildfire danger	Potential for more intense and frequent wildfire danger is anticipated.	Closure of recreational/outdoor activities and more frequent interruptions of daily operations.	same as above	Closure of recreational flying and training - lack of revenue. Available fleet is expected to be utilized for wildfire response rather than personal flying.
	Fiber optics - Drought	Snowpack Decreased snowpack and increased streamflow timing	n/a	n/a	n/a	n/a

	Fiber optics - Extreme Heat	Summer Max Temp Increase in summer maximum temperature	High temperatures can increase the Bit Error rate (BER) in fiber optic cables. In addition, the intrinsic attenuation of the fiber can be increased especially at high temperatures. Transmission will not be interfered due to extreme heat; however, the structural integrity of the fiber optics is at higher risk.	Fiber optics are usually hanging from poles or buried underground directly which can influence level of exposure.	Durability and material selection of fiber optic cables	Due to the high temperatures, fiber optics risk increased errors in data transmission, leading to lower quality signals and potential data loss. This may lead to important data breaches for commercial/industrial companies, governments, and a loss of internet for residential areas.
	Fiber optics - Extreme Precipitation & Flooding	Heavy Precip Magnitude Increase of return interval of 25-yr peak streamflow	Extreme precipitation may impact the structural integrity of the fiber optics.	Same as Fiber Optics - Extreme Heat.	Same as Fiber Optics - Extreme Heat.	Transmission won't be impacted; however, physical damage to the optics may be occur; thus, data breaches are at high risk for commercial/industrial companies, governments, and a loss of internet for residential areas.
	Fiber optics - Reduced snowpack	n/a	Same as Fiber Optics - Reduced snowpack	Same as Fiber Optics - Extreme Heat.	Same as Fiber Optics - Extreme Heat.	Same as Fiber Optics - Reduced snowpack.
	Fiber optics - Wildfire	Wildfire danger Increase in wildfire danger	Same as Fiber Optics - Wildfire.	Same as Fiber Optics - Extreme Heat.	Same as Fiber Optics - Extreme Heat.	Same as Fiber Optics - Extreme Heat.
16	Shorelines - Drought (Ecosystem)	Decrease in late summer precipitation	Less summer precipitation is expected to affect ecosystem types differently. In freshwater ecosystems, less summer precipitation will contribute to lower stream flows, reduce water quality, and increase water temperatures. In terrestrial ecosystems, less summer precipitation will contribute to drought stress and reduce the growth and productivity of some plants.	The County contains 16 shoreline management areas that are further classified into 222 shoreline reaches under the SMA - includes waterbodies, 200-ft. buffers, and floodplains. County SMAs are important for Human Health, Access, Recreation, and Intrinsic ecological benefits. Decreased biodiversity may reduce recreation opportunities and increase health risks from pathogen exposure.	Concentrated development; Increased population; Incompatible land uses; Invasive species; Increased logging activity; Human overuse; Policy changes (FEMA)	Rising stream temperatures and lower summer streamflow will reduce the quality and quantity of freshwater habitat for salmon and other coldwater fish (Source: DOE, 2012). Reduced economic revenue from tourism i.e., fishing, kayaking/boating, etc.
17	Shorelines - Extreme Heat (Ecosystem)	Increase in summer maximum temperature	Likelihood of increased extreme heat events in the County is low. Warmer summers are expected to reduce summer soil moisture and increase physiological stress for some plants and animals. Generally projected increases in extreme heat events for the 2040s, esp. in south central WA and western WA lowlands (Source: DOE, 2023).	Exposure to extreme heat events may affect trees w/in 200-ft. shore line buffer areas i.e., pine bark beetle disease and affect water quality. Increased soil sterilization - loss in topsoil nutrients that becomes water repellent.		Increased extreme heat events with lower streamflow can affect water quality resulting in algae blooms and increased vector-borne diseases.
18	Shorelines - Flooding (Ecosystem)	Increased peak streamflow	Lewis County is anticipated to experience increased annual max streamflow (CMRW). Risk index of riverine flooding is relatively moderate (FEMA). Lewis County experiences historic problems with flooding of the Chehalis, Nisqually, and Cowlitz Rivers, some of which have been presidentially declared disasters (Source: Haz Mit Plan). River bank erosion is also a big problem in Lewis County. Many County-owned parcels are located on	Increased sedimentation; Increased mortality rates for sensitive species and impacts to cultural sites. Significant road closures that may reduce or prevent efficient emergency responses. Flood damage costs to infrastructure.		Future consequences: Increasing flood damage costs: losses, damages, clean-up, lost revenue. Possible abandonment of structures due to high cost of insurance premiums. Past consequences: Past flood frequencies indicate that County can expect minor river flooding every year and major river flooding every two-five years (Source: Haz Mit Plan).
19	Shorelines - Reduced Snowpack (Ecosystem)	Increase in streamflow timing	Lewis County is expected to experience twice the average streamflow in western County area vs eastern County area (CMRW tool). The amount of snow is critical for water supply and environmental needs, but so is the timing of snowmelt runoff into rivers and streams.	Alteration in migration timing and survival rates for salmonids or other species lifecycles.		By 2050, snowmelt is projected to shift three to four weeks earlier than the 20th century average that may not coincide with fish migrations. Result in increased mass fish kills. Loss in culturally significant natural resource, changes in apex predator hunting patterns.
20	Shorelines - Wildfire (Ecosystem)	Increase in wildfire likelihood	Wildfires increase establishment of invasive species. More frequent wildfires have the potential to increase runoff and sediment to streams, which can reduce aquatic habitat quality.	Heavy precipitation followed by wildfire events can cause landslides that impact water quality i.e., increased sedimentation, increased water temp & hypoxia, water channel alterations.		Landslides pose a significant risk to the County. Increased wildfire likelihood most likely cause secondary hazards to shorelines - burning of near-shoreline forest areas followed by heavy rain, rapid snowmelt, that causes landslides and affect water quality, bank stabilization, habitat, and cultural sites.
21	Public Safety Radio - Drought (Emergency Mgmt)	Increase in below normal summer precipitation - increased likelihood of drought	The County maintains about 20 communication sites to support emergency services (refer to asset list). Lewis County's internal communication system experiences time delay interference (TDI) between east and west County areas due to its vast space 89 miles wide (east-west approach)(Source: Televate report, 2023). More frequent and severe droughts due to low summer precipitation are expected to increase the need for emergency services to plan, prepare, and respond to water shortages.	Response to increased emergency services may result in more frequent TDI - lack of efficiency and quick response. Increased costs and demand for emergency preparedness, response, and recovery activities; Additional costs to human well-being as first responders are constantly on alert.	Lack of personnel; Equipment limitations	More emergency calls may exacerbate existing infrastructure problems and limitations. Drought causes secondary hazards such as increased wildfire likelihood that may destroy radio communication infrastructure.
22	Public Safety Radio - Extreme Heat (Emergency Mgmt)	Increase in 90 deg F Max Humidex Days	More frequent extreme daytime heat events are expected to increase the demand for emergency services to plan, prepare, and respond to human health impacts. Extreme heat may also impact emergency services due to poor road conditions, making it difficult for County personnel to maintain tower infrastructure.	More frequent power loss due to extreme storms; Shuttered power generating stations or transmission corridors; Increased costs and demand for emergency preparedness, response, and recovery activities; Additional costs to human well-being as first responders are constantly on alert. Reduce system reliability (disrupt microwave link) with temperatures over 95 degrees (Source: Televate report, 2023).		More emergency calls may exacerbate existing infrastructure problems and limitations. Extreme heat causes secondary hazards such as increased wildfire likelihood that may destroy radio communication infrastructure.
23	Public Safety Radio - Extreme Precipitation (Emergency Mgmt)	Increase of extreme precipitation magnitude	Increase of extreme precipitation causes more frequent landslides that damage infrastructure.	Increase of extreme precipitation may increase landslide frequencies which can compromise structural stability of radio towers located on hillside areas.		Increased demand for emergency response services.
24	Public Safety Radio - Flooding (Emergency Mgmt)	Increase in peak streamflow	Increase riverine flooding within existing floodplains and could expand flooding to new areas not currently in existing floodplains. More flooding has the potential to increase the demand for emergency services	Radio towers exposed to increased riverine flooding come from secondary hazards like landslides. Radio traffic can become busier from increased demand for emergency services and exacerbates TDI - response to emergencies.		Increased demand for emergency response services that may exacerbate TDI and stall emergency response services.
25	Public Safety Radio - Wildfire (Emergency Mgmt)	Increase in wildfire danger	More days with high fire danger will increase the need for fire bans and associated enforcement and capacity to respond to wildfires. Fire coverage is limited in many County areas; Use of a simplex channel for fire hampers the ability of field users to communicate directly with each other and they must relay messages through dispatch in many situations (Source: Televate report, 2023).	Radio traffic can become busier from increased demand for emergency services and exacerbates TDI - delayed response to emergencies and deployment of equipment. Direct impact to radio tower infrastructure.		Increased demand for emergency response services that may exacerbate TDI and stall emergency response services. Relocating towers for better signal strength may increase chances of wildfire danger.

26	Fire Stations - Drought (Emergency Mgmt)	Increase in precipitation Drought	Fire stations are located within special districts that coordinate with Lewis County to respond to emergencies. A greater likelihood of below normal summer precipitation indicates a greater likelihood of drought in any year.	Increased likelihood of drought also increases dry vegetative fuel loads and soil sterilization. Frequent maintenance operations such as prescribed burns and implementing fire safe codes through householder education to prevent intense wildfire events.	Development in WUI zones	Drought causes secondary hazards such as increased wildfire likelihood that may directly impact fire stations and personnel. Increased demand for emergency response services.
27	Fire Stations - Extreme Heat (Emergency Mgmt)	Increase in 90 deg F Max Humidex Days	More frequent extreme daytime heat events are expected to increase the demand for emergency services to plan, prepare, and respond to human health impacts. Extreme heat may also impact emergency services due to poor road conditions.	Increased costs and demand for emergency preparedness, response, and recovery activities; Additional costs to human well-being as first responders are constantly on alert		Extreme heat causes secondary hazards such as increased wildfire likelihood that may directly impact fire stations and personnel. Increased demand for emergency response services.
28	Fire Stations - Extreme Precipitation (Emergency Mgmt)	Increase of extreme precipitation magnitude	Heavier precipitation has the potential to increase the demand for emergency response services by intensifying flood events and increasing other emergencies associated with heavy precipitation. Increased costs and demands for emergency preparedness, response, and recovery activities; increased	same as above		Extreme precipitation causes secondary hazards such as increased flooding likelihood that may directly impact fire stations and personnel. Increased demand for emergency response services.
29	Fire Stations - Flooding (Emergency Mgmt)	Increase in peak streamflow	Increase riverine flooding within existing floodplains and could expand flooding to new areas not currently in existing floodplains. More flooding has the potential to increase the demand for emergency services.	Increased flooding from peak streamflow directly damages fire station buildings and infrastructure.	Changing path/course of waterways; Levee failure	Less resources to respond to emergencies - puts additional stress on other stations
30	Fire Stations - Wildfire (Emergency Mgmt)	Increase in wildfire danger	More days with high fire danger will increase the need for fire bans and associated enforcement and capacity to respond to wildfires. East County area experiences more wildfire danger.	Increased costs and demand for emergency preparedness, response, and recovery activities; Increased reliance on special districts to respond to and protect County infrastructure and assets. Additional costs to human well-being as first responders are constantly on alert. Radio communications are limited due to TDI and other equipment failures, and can be exacerbated by increased emergency response and recovery demands.	Equipment limitations; Lack of personnel i.e., dispatch operators	More severe and frequent wildfires may occur if there are no improvements to radio communication system and personnel availability. Increased reliance on external agencies.
31	Airports - Drought & Extreme Heat (Emergency Mgmt)	Increase in precipitation Drought & Increase in 90 deg F Max Humidex Days	Lewis County owns and operates two regional airports: Packwood and Ed Carlson Memorial Field in South County. The Packwood Airport is important for aviation activities such as emergency response (e.g., wildfire), air ambulance service, and flight training (Source: Haz Mit Plan). More frequent severe droughts due to low summer precipitation and extreme daytime heat events are expected to increase the need for emergency services to plan, prepare, and respond to human health impacts.	Exposure to more extreme heat events can lead to delays in emergency response. Continual emergency response may add stress to County due to limited personnel and resources.	Lack of personnel	Daytime operations may stall towards cooler parts of the day and delay overall efficiencies of the agency. Increased exposure of personnel to heat related illnesses.
32	Airports - Extreme Precipitation & Flooding (Emergency Mgmt)	Increase of extreme precipitation magnitude & Increase in peak streamflow	Increase riverine flooding within existing floodplains and could expand flooding to new areas not currently in existing floodplains.	More flooding has the potential to increase the demand for emergency services. Increased demand for emergency response services.	Aging infrastructure; Limited personnel	Closure of airport due to potential flooding. Should there be damages to critical facilities and systems, many of which do not have redundancies, there will be disruption to surrounding communities and the County.
33	Airports - Wildfire (Emergency Mgmt)	Increase in wildfire danger	More days with high fire danger will increase the need for fire bans and associated enforcement and capacity to respond to wildfires.	Direct disruptions to emergency responses for wildfire, evacuations, and air ambulance services. Continual emergency response may add stress to County due to limited personnel and resources.		Packwood airport contains County equipment and personnel necessary for responding to emergencies. Should there be damages to critical facilities and systems, many of which do not have redundancies, there will be disruption to surrounding communities and the County.
34	Recreation facilities - Extreme Heat (Health & Well-Being)	Increase in summer maximum temperature	Warmer summers directly affect the health and well-being of people and stress. Warmer summers are expected to increase concentrations of air pollutants, such as ozone and some vector-borne illnesses, such as West Nile virus.	Elderly and youth populations are most vulnerable to heat-related illnesses. Exposure to extreme heat can increase heat-related illness and death.	Aging infrastructure; Increased population	Social isolation and increased short- and long-term emotional trauma and mental health issues. Increased energy demand to cool indoor recreation facilities. Limiting outdoor recreation facility maintenance to seasonal use.
35	Recreation facilities - Wildfire (Health & Well-Being)	Increase in wildfire likelihood	More frequent wildfires are expected to reduce human health through loss of life, injury and reduced mental health associated with displacement. Poor air quality due to more wildfire smoke can cause adverse respiratory health effects.	Elderly and youth populations are most vulnerable to poor air quality. Exposure to poor air quality from wildfires can increase adverse respiratory health effects.		same as above
36	Senior Centers - Extreme Heat (Health & Well-Being)	Increase in summer maximum temperature	Same as Rec facilities - extreme heat	same as above		same as above
37	Senior Centers - Wildfire (Health & Well-Being)	Increase in wildfire likelihood	Same as Rec facilities - wildfire	same as above		same as above
	Hospitals - Extreme Heat	Increase in summer maximum temperature	Same as Rec facilities - extreme heat	Increased hospitalizations from climate-induced illnesses - increased reliance on energy grid or backup generators. Can act as community relief center for disasters - exacerbates limited resources and space.	Aging infrastructure; Disease	same as above
	Hospitals - Wildfire	Increase in wildfire likelihood	Same as Rec facilities - wildfire	same as above	same as above	same as above
38	County roads - Drought (Transportation)	Decrease in snowpack	The County maintains 1,065 miles of roadways and includes 5,110 culverts. Reductions in snowpack have the potential to reduce snow-related road maintenance, road closures, and transportation delays. However, as more cold-season precipitation falls as rain rather than snow, transportation routes in mountainous areas may experience more damage from heavier winter rainfall and associated flooding, erosion, and washouts.	Snowpack exposure to warming varies by elevation. In your county or community, the exposure of transportation routes and infrastructure will depend on elevation with assets in mountainous areas more exposed. The low-elevation Cascade and Olympic foothills will be exposed first because these areas currently receive substantial snowfall at temperatures near freezing. By the end of the century, snowpack is expected to remain relatively unaffected only in the high-elevations of the Northern Cascade Mountains.	Depends on design standards for winter temperature and precipitation.	Will intensify flooding, landslides, and erosion, which can interrupt transportation routes, damage infrastructure, and increase maintenance and repair costs.
39	County roads - Extreme Heat (Transportation)	Increase in hot days	More very hot days have the potential to damage the surfaces of roads and bridges, leading to greater maintenance and repair costs and more frequent traffic and service disruptions.	The exposure of road surfaces to extreme heat will vary locally based on features that exacerbate or ameliorate extreme heat such as the extent of urban heat islands and tree canopy cover for shade.	Depends on age and condition of assets, materials, and heat-related design standards.	More very hot days have the potential to damage the surfaces of roads and bridges, leading to greater maintenance and repair costs and more frequent traffic and service disruptions.

40	County roads - Extreme Precipitation (Transportation)	Increase in heavy precipitation magnitude	Change in the intensity of heavy precipitation events are more likely to cause damages to infrastructure and agricultural operations than changes in seasonal and annual precipitation.	Transportation routes and infrastructure located in low-lying areas, within or near current floodplains or regulatory flood zones, or adjacent to unstable slopes are expected to be more exposed to an increase in heavy precipitation.	Depends on the current infrastructure condition and age, design standards, and redundancy in the system. Older assets or those built to older design standards are likely to be more affected by heavier precipitation.	Same consequences as county roads - drought
41	County roads - Flooding (Transportation)	Increase in streamflow	An increase in the annual peak streamflow indicates a potential for higher streamflow and larger areas inundated every year at high flows.	Transportation routes and infrastructure located in river valleys and in or near current and historical flood zones will be most exposed to projected increases in high streamflow that can cause the failure, damage, disruption, and reduced capacity of transportation routes.	Depends on how well design standards accommodate flooding. A lack of transportation redundancy in flood prone areas can increase sensitivity to more frequent high stream flows.	Higher stream flows are expected to increase riverine flooding, which can damage roads, bridges, and railways and overwhelm drainage structures, such as culverts. Flooding and drainage problems from heavy storms can happen anywhere in Lewis County, although the major floods are caused by the overflow of Chehalis, Cowlitz, Tilton, and Newaukum Rivers and Coal, Salzer, and Dillenbaugh Creeks. Flooding has been a historic problem in Lewis County, particularly with the rivers mentioned above. The primary north-south transportation corridor passing through Lewis County and the Cities of Centralia and Chehalis is Interstate 5. Interstate 5 passes through Chehalis River floodplain and is affected by flooding. A 100-year flood could displace up to 5,371 people, with 383 of those people needing short-term shelter. (Source: Haz Mit Plan)
42	County roads - Reduced snowpack (Transportation)	Decrease in snowpack	Snowpack in the mountains in the beginning of spring indicates the amount of natural water storage in snowpack that will be available in the melt season. April 1st snowpack (snow water equivalent) is one source of water for uses including including hydropower generation, drinking water, irrigation, and instream flows for ecosystems. Reduced snowpack may decrease avalanche severity but increase frequency, leading to road closures and increased repairs/maintenance.	Same as County-Roads Drought exposure.	Same non-climate stressors as county roads - Drought	Reductions in snowpack have the potential to reduce snow-related road maintenance, road closures, and transportation delays. However, as more cold-season precipitation falls as rain rather than snow, transportation routes in mountainous areas may experience more damage from heavier winter rainfall and associated flooding, erosion, and washouts.
43	County roads - Wildfire (Transportation)	Increase in wildfire likelihood	More frequent wildfires, and related smoke, can disrupt travel, increase road closures and delay construction projects. Wildfire smoke has the potential to affect labor in the transportation sector because of health effects on outdoor laborers. More roadside brush fires can create safety hazards and disrupt transportation.	Transportation routes and infrastructure wildland-urban interface and areas with high wildfire risk historically will be most exposed to increases in the likelihood of wildfire.	Depends on redundancy in the transportation network.	Indicates a greater potential for wildfire to damage infrastructure, interrupt businesses, or affect public health and well-being.
44	Bridges - Drought (Transportation)	Decrease in snowpack	The County maintains 196 bridges which are owned by the County. Same climate impacts as County roads	Same climate impacts as County roads	Same non-climate stressors as county roads - Drought	Same consequences as county roads - reduced snowpack
45	Bridges - Extreme Heat (Transportation)	Increase in hot days	Same climate impacts as County roads - Extreme Heat	Same climate impacts as County roads - Extreme Heat	Same non-climate stressors as county roads - extreme heat	Same consequences as county roads - extreme heat
46	Bridges - Extreme Precipitation (Transportation)	Increase in heavy precipitation magnitude	Same climate impacts as County roads - Extreme Precipitation	Same climate impacts as County roads - Extreme Precipitation	Same non-climate stressors as county roads - extreme precipitation	Heavier precipitation events are expected to intensify flooding, landslides, and erosion, which can interrupt transportation routes, damage infrastructure, and increase maintenance and repair costs.
47	Bridges - Flooding (Transportation)	Increase in peak streamflow	Same climate impacts as County roads - Flooding	Same climate impacts as County roads - Flooding	Same non-climate stressors as county roads - Flooding	Same consequences as county roads - flooding. There are 77 bridges located within the 100-year floodplain and 78 located within the 500-year floodplain. Flooding events can significantly impact road bridges. These are important because they often provide the only ingress and egress to some neighborhoods. (Source: Haz Mit Plan)
48	Bridges - Reduced snowpack (Transportation)	Decrease in snowpack	Same climate impacts as County roads - Reduced snowpack	Same climate impacts as County roads - Reduced snowpack	Same non-climate stressors as county roads - Drought	Same consequences as county roads - reduced snowpack
49	Bridges - Wildfire (Transportation)	Increase in wildfire likelihood	Same climate impacts as County roads - Wildfire	Same climate impacts as County roads - Wildfire	Same non-climate stressors as county roads - wildfire	Same consequences as county roads - wildfire
50	Appurtenant Structures for Roads - Drought & Extreme Heat (Transportation)	Decrease in snowpack & increase in hot days	Same climate impacts as County roads - Drought & Extreme Heat	Same climate impacts as County roads - Drought & Extreme Heat	Same non-climate stressors as county roads - drought and county roads - extreme heat.	Same consequences as county roads - drought and extreme heat
51	Appurtenant Structures for Roads - Extreme Precipitation & Flooding (Transportation)	Increase in heavy precipitation magnitude and peak streamflow	Same climate impacts as County roads - Extreme Precipitation & Flooding	Same climate impacts as County roads - Extreme Precipitation & Flooding	Same non-climate stressors as county roads - extreme precipitation and flooding	Same consequences as county roads - extreme precipitation and flooding. There would be up to \$252 million of flood loss from a 100-year flood event in the planning area. (Source: Haz Mit Plan)
52	Appurtenant Structures for Roads - Reduced snowpack (Transportation)	Decrease in snowpack	Same climate impacts as County roads - Reduced snowpack	Same climate impacts as County roads - Reduced snowpack	Same non-climate stressors as county roads - reduced snowpack	Same consequences as county roads - reduced snowpack
53	Appurtenant Structures for Roads - Wildfire (Transportation)	Increase in wildfire likelihood	Same climate impacts as County roads - Wildfire	Same climate impacts as County roads - Wildfire	Same non-climate stressors as county roads - wildfire	Same consequences as county roads - wildfire
54	Airports - Drought & Extreme Heat (Transportation)	Decrease in snowpack and increase in hot days	Same climate impacts as County roads - Drought & Extreme Heat	Same climate impacts as County roads - Drought & Extreme Heat	Same non-climate stressors as county roads - drought & extreme heat	Same consequences as county roads - drought & extreme heat
55	Airports - Extreme Precipitation & Flooding (Transportation)	Increase in heavy precipitation magnitude and peak streamflow	Same climate impacts as County roads - Extreme precipitation and flooding	Same climate impacts as County roads - Extreme precipitation and flooding	Same non-climate stressors as county roads - extreme precipitation and flooding	Same consequences as county roads - extreme precipitation and flooding. The Chehalis-Centralia airport is protected by a dike system, but the dikes were overtopped during the January 1990 and December 2007 flood event, closing the airport. Extreme future flooding may influence similar events to occur. (Source: Haz Mit Plan)
56	Airports - Reduced snowpack (Transportation)	Decrease in snowpack	Same climate impacts as County roads - Reduced snowpack	Same climate impacts as County roads - Reduced snowpack	Same non-climate stressors as county roads - reduced snowpack	Same consequences as county roads - reduced snowpack
57	Airports - Wildfire (Transportation)	Increase in wildfire likelihood	Same climate impacts as County roads - Wildfire	Same climate impacts as County roads - Wildfire	Same non-climate stressors as county roads - wildfire	Same consequences as county roads - wildfire.
	Railways - Drought & Extreme Heat	Decrease in snowpack and increase in hot days	Same climate impacts as County roads - Drought & Extreme Heat	Same climate impacts as County roads - Drought & Extreme Heat	Aging infrastructure; Limited personnel	Disruptions to economic activity
	Railways - Extreme Precipitation & Flooding	Increase in heavy precipitation magnitude and peak streamflow	Same climate impacts as County roads - Extreme precipitation and flooding	Same climate impacts as County roads - Extreme precipitation and flooding		same as above
	Railways - Reduced snowpack	Decrease in snowpack	Same climate impacts as County roads - Reduced snowpack	Same climate impacts as County roads - Reduced snowpack		same as above
	Railways - Wildfire	Increase in wildfire likelihood	Same climate impacts as County roads - Wildfire	Same climate impacts as County roads - Wildfire		same as above

58	Solid Waste transfer station - Extreme Precipitation (Waste Mgmt)	Increase in extreme precipitation magnitude	Heavier precipitation has the potential to increase storm damage to infrastructure and generate more waste and debris. More waste will strain municipal cleanup and refuse capacity.	Waste management services that serve people located in low-lying areas, within current floodplains or regulatory flood zones, or adjacent to unstable slopes are expected to be more exposed to the impacts of heavier precipitation events.	Increases in debris and waste will depend on current capacity. Increase in demand from population increase. Limited personnel and waste hauling capacity. Economic limitations: cost of waste hauling fluctuates, rent prices, etc.	Cause damages to infrastructure and agricultural operations than changes in seasonal and annual precipitation.
59	Solid Waste transfer station - Flooding (Waste Mgmt)	Increase in return interval of 25-yr peak streamflow	The 25-year peak streamflow is the streamflow that occurs on average every 25 years, similar to the 100-year high flow but more frequent. The return interval of the historical 25-year peak streamflow indicates how much more frequently streamflows of this magnitude are expected to occur in the future with heavier precipitation and more rain in the winter	Waste management services that serve development located in low-lying areas and in current and historical flood zones will be most exposed to projected increases in the frequency of high streamflows that can cause flooding and generate more waste.	Increases in debris and waste will depend on current capacity. Facilities with older design standards or standards that do not account for flooding will be more affected.	More frequent high streamflows are expected to increase flooding, which can generate more debris and waste. More waste will strain municipal cleanup and refuse capacity. Flooding of waste management facilities can release contaminants and hazardous materials.
60	Solid Waste transfer station - Wildfire (Waste Mgmt)	Increase in wildfire likelihood	More frequent wildfires have the potential to generate greater amounts of debris and waste. More waste will strain municipal cleanup and refuse capacity.	Waste management facilities that serve areas in the wildland-urban interface will be more exposed to increases in waste with more wildfire.	Same non-climate stressors as solid waste transfer station - flooding	An increasing likelihood of wildfire indicates a greater potential for wildfire to damage infrastructure, interrupt businesses, or affect public health and well-being.
61	Sewer infrastructure - Extreme Precipitation (Waste Mgmt)	Increase in extreme precipitation magnitude	Heavier precipitation has the potential to increase storm damage to infrastructure and generate more waste and debris. More waste will strain municipal cleanup and refuse capacity.	Waste management services that serve people located in low-lying areas, within current floodplains or regulatory flood zones, or adjacent to unstable slopes are expected to be more exposed to the impacts of heavier precipitation events.	Same non-climate stressors as solid waste transfer station - flooding	Likely to cause damages to infrastructure and agricultural operations than changes in seasonal and annual precipitation.
62	Sewer infrastructure - Flooding (Waste Mgmt)	Increase in return interval of 25-yr peak streamflow	Same climate impacts as solid waste transfer station - flooding	Same as Solid Waste Transfer Station - Flooding exposure	Same non-climate stressors as solid waste transfer station - flooding	More frequent high stream flows are expected to increase flooding, which can generate more debris and waste. More waste will strain municipal cleanup and refuse capacity. Flooding of waste management facilities can release contaminants and hazardous materials.
63	Sewer infrastructure - Wildfire (Waste Mgmt)	Increase in wildfire likelihood	More frequent wildfires have the potential to generate greater amounts of debris and waste. More waste will strain municipal cleanup and refuse capacity.	Same as Solid Waste Transfer Station - Wildfire exposure	Same non-climate stressors as solid waste transfer station - extreme precipitation	Greater potential to damage infrastructure, interrupt businesses, or affect public health and well-being.
64	Dump stations - Extreme Precipitation (Waste Mgmt)	Increase in extreme precipitation magnitude	Same climate impacts as Sewer Infrastructure	Same as Solid Waste Transfer Station - Extreme precipitation exposure	Same non-climate stressors as solid waste transfer station - extreme precipitation	Same consequences as sewer infrastructure - extreme precipitation
65	Dump stations - Flooding (Waste Mgmt)	Increase in return interval of 25-yr peak streamflow	Same climate impacts as Sewer Infrastructure	Same as Solid Waste Transfer Station - Flooding exposure	Same non-climate stressors as sewer infrastructure - flooding.	Same consequences as sewer infrastructure - flooding
66	Dump stations - Wildfire (Waste Mgmt)	Increase in wildfire likelihood	Same climate impacts as Sewer Infrastructure	Same as Solid Waste Transfer Station - Wildfire exposure	Same non-climate stressors as solid waste transfer station - extreme precipitation	Same consequences as sewer infrastructure - wildfire
67	Water infrastructure - Drought (Water Resources)	Increase in total annual precipitation	Increases in annual precipitation have the potential to increase groundwater recharge. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation.	The exposure of water resources to changes in annual precipitation in your county or community depends on the presence of critical groundwater aquifer recharge areas and the location of wells.	Depend on the sources of water and the effects of non-climatic stressors on water supplies. Groundwater sources are sensitive to changes in annual precipitation. Non-climatic stressors that increase demand, such as population growth and development, will increase the sensitivity of water resources to changes in annual precipitation.	Can limit the overall amount of water available for human use and ecosystems.
68	Water infrastructure - Reduced snowpack (Water Resources)	Decrease in snowpack	Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase. Shifting in snowpack is expected to occur to earlier times of the year.	The exposure of water resources will depend on the location of water sources. The low-elevation Cascade and Olympic foothills will be exposed first because these areas currently receive substantial snowfall at temperatures near freezing. By the end of the century, snowpack is expected to remain relatively unaffected only in the high-elevations of the Northern Cascade Mountains.	Dependent on sources of water and energy. Surface water sources and hydropower are sensitive to changes in snowpack. A lack of redundancy	Can limit the amount of natural water storage in snowpack that will be available in the melt season. April 1st snowpack (snow water equivalent)
69	Water infrastructure - Wildfire (Water Resources)	Increase in wildfire likelihood	More frequent wildfires have the potential to damage water distribution infrastructure and reduce water quality in reservoirs due to more runoff, erosion, and turbidity. Changes in water quality could increase the need for water treatment and filtration.	The local exposure of water resources to increases in wildfire will depend on the extent of water distribution infrastructure and water resources located in the wildland-urban interface or wildlands.	Dependent on current condition of water treatment and distribution infrastructure. Surface water sources and systems with limited treatment will be more sensitive to wildfire-related changes in water quality. Older infrastructure with a lack of redundancy will be more sensitive to wildfire damage.	There is a greater potential for wildfire to damage infrastructure, interrupt businesses, or affect public health and well-being.
70	Civic Centers - Drought (Zoning & Development)	Decrease in snowpack	Snowpack in the mountains in the beginning of spring indicates the amount of natural water storage in snowpack that will be available in the melt season. April 1st snowpack (snow water equivalent) is one source of water for uses including including hydropower generation, drinking water, irrigation, and instream flows for ecosystems.	Same as Water Infrastructure - Reduced snowpack exposure	Dependence of the recreation sector to snowpack and seasons, as well as flexibility to shift among seasons.	Reductions in snowpack are expected to decrease opportunities for winter outdoor recreation and shorten the winter recreation season with adverse effects on the economy and character of some communities. Warm season outdoor recreation opportunities are expected to increase, shifting tourism revenue from one recreation sector to another.
71	Civic Centers - Extreme Heat (Zoning & Development)	Increase in August stream temperature	Stream temperature during August, which is typically the hottest month for most streams, is an indicator of water quality for salmon and other species that depend on cold water.	Undefined	Dependent on non-climatic stressors that also increase water temperatures such as discharge of heated effluents, removal of riparian and upland vegetation, channel alternation, etc.	Warmer stream temperatures have the potential to reduce the ability to meet water quality standards and the effluent limits (amount discharge to the water body) set on existing wastewater treatment facilities.
72	Civic Centers - Extreme Precipitation (Zoning & Development)	Increase in heavy precipitation magnitude	Heavier precipitation events are expected to intensify urban flooding and demands on storm water systems, which can affect zoning restrictions on new buildings, and require revised building codes for development in more frequently flooded areas.	Certain land uses and development located in low-lying areas, within current floodplains or regulatory flood zones, or adjacent to unstable slopes are expected to be more exposed to an increase in heavy precipitation.	Dependent on the types of land use, building codes in flood and steep slope zones, and the capacity of stormwater systems.	Changes in the intensity of heavy precipitation events are more likely to cause damages to infrastructure and agricultural operations than changes in seasonal and annual precipitation.

73	Civic Centers - Flooding (Zoning & Development)	Increase in peak streamflow	Higher streamflow are expected to increase damage to all types of infrastructure in flood zones and could expand the flood zone in some areas leading to damage of development not currently in flood zones.	Development located in river valleys and in or near current and historical flood zones will be most exposed to projected increases in high streamflow that cause flooding.	Dependent on the types of land use in flood zones and the extent of flood protection.	An increase in the annual peak streamflow indicates a potential for higher streamflow and larger areas inundated every year at high flows.
74	Civic Centers - Reduced snowpack (Zoning & Development)	Decrease in snowpack	Reductions in snowpack are expected to decrease opportunities for winter outdoor recreation and shorten the winter recreation season with adverse effects on the economy and character of some communities. Warm season outdoor recreation opportunities are expected to increase, shifting tourism revenue from one recreation sector to another. Reduced snowpack may decrease the volume of avalanches but increase the frequency of avalanches.	Same as Water Infrastructure - Reduced snowpack exposure	Dependence of the recreation sector to snowpack and seasons, as well as flexibility to shift among seasons.	Decrease in snowpack indicates a decreased amount of natural water storage in snowpack that will be available in the melt season. This may impact hydropower generation, drinking water, irrigation, and instream flows for ecosystems.
75	Civic Centers - Wildfire (Zoning & Development)	Increase in wildfire likelihood	More frequent wildfires are expected to increase damage to homes and infrastructure and displace residents.	The extent of development and the types of land use in the wildland-urban interface will affect local exposure to increases in the likelihood of wildfire.	Types of land use in the wildland-urban interface and population growth.	An increasing likelihood of wildfire indicates a greater potential for wildfire to damage infrastructure, interrupt businesses, or affect public health and well-being.
	Colleges - Drought & Extreme Heat		Changes in stream temperature affects ecosystem habitats which impact learning abilities.	Student learning outcomes may be inhibited by extreme weather. Increased energy consumption for cooling or heating may exacerbate infrastructure limitations.	Aging infrastructure; Limited personnel; Increased student body presence	Multi-use of college campuses or facilities for emergency response; Need for alternative energy source; Connection with greater community requires more collaboration and networking during extreme weather events.
	Colleges - Extreme Precipitation & Flooding		Increased peak streamflows and precip magnitude affects ecosystem habitats and human safety which impacts learning abilities.	Student learning outcomes may be inhibited by extreme weather. Increased energy consumption for cooling or heating may exacerbate infrastructure limitations.		same as above
	Colleges - Wildfire		Increased costs for maintenance, Increased damage to infrastructure	same as above		same as above

EXAMPLES

1	Roadways-Extreme Heat (Transportation)	Hot Days (change in annual hot days, or the average number of days per year with a maximum temperature greater than 100°F)	More hot days: Pullman is expected to experience about 2 additional days annually with a maximum temperature greater than 100°F in the 2030s (early century); 5 additional days in the 2040s; 9 additional days annually in the 2050s (midcentury); and 20 additional days annually in the 2080s (late century), compared to 1980-2009, under a high-emissions scenario. More hot days have the potential to damage the surfaces of roads and bridges (Source: UW CIG tool, Climate Mapping for a Resilient Washington).	The exposure of road surfaces to extreme heat will vary locally based on features that exacerbate or ameliorate extreme heat such as the extent of urban heat islands and tree canopy cover for shade (Source: UW CIG tool, Climate Mapping for a Resilient Washington). Many of Pullman's major streets do not have street trees, causing those areas to feel hotter than other areas in the city (Source: Pullman Planner Ariel Medeiros).	Population growth, along with more vehicle traffic and associated wear and tear on transportation infrastructure	Future Consequences: Higher temperatures can put stress on bridge infrastructure through thermal expansion of bridge joints and paved surfaces, and deterioration of steel, asphalt, protective cladding, coats, and sealants. Extreme heat can accelerate the deterioration or threaten the integrity of some types of asphalt pavement through softening, rutting, and migration of liquid asphalt. Hotter summer days can pose risks to the health and safety of maintenance and construction crews, limiting working hours (Source: American Association of State Highway and Transportation Officials white paper, Extreme Weather and the Transportation System). Consequences for Pullman could include greater transportation infrastructure maintenance and repair costs and more frequent traffic and service disruptions. Road crews will be affected by the increase in temperature as they are forced to work in the heat conditions with the lack of shade trees (Source: Pullman Planner Ariel Medeiros).	COMMERCE NOTE: This example is from Pullman's 2023 pilot test of the resilience guidance.
2	Wellbeing 1-Extreme Heat (Health)	65°F Min. Humidex Days (indicator of nighttime heat stress); 90°F Max Humidex Days (indicator of daytime heat stress)	More warm and humid days and nights: The humidex is a measure of experienced heat conditions and takes into consideration of both temperature and humidity. The average number of days a year with a maximum humidex greater than 90°F is expected to increase by about 16 days annually in Pullman for the 2030s (early century), 30 days annually for the 2050s (midcentury), and 55 days annually for the 2080s (late century), compared to the 1980-2009 period, under a high-emissions scenario. The average number of days a year with a minimum humidex greater than 65°F is expected to increase by about 7 days annually for the 2030s (early century), 20 days annually for the 2050s (midcentury), and 41 days annually for the 2080s (late century), compared to the 1980-2009 period, under a high-emissions scenario (Source: UW CIG tool, Climate Mapping for a Resilient Washington).	Exposure will vary locally based on features that exacerbate or ameliorate extreme heat, such as the extent of paved surfaces, tree canopy for shade, or proximity to water bodies (Source: UW CIG tool, Climate Mapping for a Resilient Washington). Newer subdivisions will have the most exposure, as street trees are young and don't provide much shade. Apartment land (Northeast area) also has high impervious surface and low canopy cover, based on maps BERK created. Many places on WSU campus also have low canopy cover with high impervious surfaces (Source: Pullman Planner Ariel Medeiros).	Development of urban forests and other natural areas; Increase in the % of residents age 65+; Aging housing stock	Future Consequences: The elderly, very young, people with preexisting health conditions, and people without housing, substandard housing or without cooling systems are likely to be more affected by the expected increase in warm and humid days and nights (Source: UW CIG tool, Climate Mapping for a Resilient Washington). Strenuous activities in dangerous temperatures and humidity can quickly cause heat-related illness, but exposure to high temperatures over a long period of time and during the night also has a detrimental impact on human health (Source: APA report-- Planning for Urban Heat Resilience). Consequences could include more heat-related medical emergencies for Pullman residents and more demand and costs for municipal emergency services (police, fire) and hospitals (Source: Pullman Fire Chief Mike Heston). Past Consequences: Past extreme heat events have limited when emergency services personnel can do outdoor training (Source: Pullman Fire Chief Mike Heston). Various groups, including the City, open their doors as cooling centers. The parks and rec. building and the library were open in 2021 for cooling centers. Two of our senior-living facilities are in areas with high urban heat island that might cause higher heat-related illnesses (Source: Pullman Planner Ariel Medeiros).	COMMERCE NOTE: This example is from Pullman's 2023 pilot test of the resilience guidance.
3	Gateway Transit Center-SLR (transportation sector)	Change in Sea Level Rise	Likely Sea Level Rise: For Port Angeles, modeling projects a "likely" sea level rise estimate (corresponding to a 50% chance that absolute sea level will rise by at least that amount) — of about 0.3 feet by 2030, 0.5 feet by 2050, and 1.3 feet by 2100, relative to the average sea level for 1991-2009, for a low emissions scenario. For a high emissions scenario, "likely" sea level rise is projected to be about 0.3 feet by 2030, 0.6 feet by 2050, and 1.8 feet by 2100. High Sea Level Rise: The modeling projects a 1% probability that absolute sea level rise will reach or exceed about 0.5 feet by 2030, 1.2 feet by 2050, and 3.9 feet by 2100, relative to the average sea level for 1991-2009, for a lower greenhouse gas scenario. For a higher emissions scenario, "high" sea level rise will reach or exceed about 0.5 feet by 2030, 1.3 feet by 2050, and 4.6 feet by 2100. (Source: UW CIG tool, Climate Mapping for a Resilient Washington)	The Gateway Transit Center sits between Railroad Avenue and Front Street/U.S. Hwy. 101. The publicly owned transit center is a hub for Clallam Transit and Greyhound buses, and the facility includes a farmers' market. The transit center's proximity to the marine shoreline (about 250 feet) and low elevation (see map) expose it to potential coastal inundation. The center also has a below-grade parking garage with an entrance that abuts Railroad Avenue at grade and ramps down to a basement garage level beneath the center. The center is also adjacent to the Peabody Creek estuary, where a conjunction of flooding and a king tide event could cause issues in the future (Source: Port Angeles Sr. Planner Ben Braudrick).	Bluff Erosion	Future Consequences: Inundation of Front Street/U.S. Hwy 101 (the downtown couplet's westbound route) could block access to this facility and affect transit service routes and reliability throughout Clallam County.	COMMERCE NOTE: This example is from Port Angeles' 2023 pilot test of the resilience guidance.
4	Olympic Discovery Trail-SLR (transportation sector)	Change in Sea Level Rise	" (see above)	The Olympic Discovery Trail is highly exposed to rising sea levels, as the multiuse trail runs along downtown's marine shoreline -- either directly along the water or behind the ferry terminal and other piers. The trail is protected by rip rap, with the exception of stream ravines where bridges are required (Source: Port Angeles Planner Ben Braudrick).		Future Consequences: Rising sea levels, coupled with storm surge, heavy precipitation, and high tide events, could lead to inundation of the trail. This could cut off an important active-transportation route through downtown. Sea level rise could potentially undermine the trail behind the rip rap, inundate and destroy culverts draining the southern upland side of the trail that drains the bluffs, and undermine bridge abutments. Past Consequences: We do have an example of trail failure due to prevailing easterly waves near Morse Creek to the east: There were \$80K of emergency repairs/repairs related to storm events; this includes adding in woody debris, rip-rap and geotextile bank stabilization. (Source: Port Angeles Sr. Planner Ben Braudrick).	COMMERCE NOTE: This example is from Port Angeles' 2023 pilot test of the resilience guidance.
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Task 1.4: Identify priority climate hazards

Hazard	Relevant to your jurisdiction? (Mark Yes or No.)	Notes (Explain why you determined this hazard is or is not relevant to your jurisdiction.)
Drought	No	Jurisdiction has significant agricultural land and industry; however, jurisdiction does not have managing authority over agricultural land and rather responds to emergencies/natural hazard events that occur on agricultural land.
Extreme heat	No	Jurisdiction's exposure to increased extreme heat events is low.
Extreme precipitation	Yes	Jurisdiction is more likely to experience secondary hazards such as landslides and overtopping of levees that flood protected areas.
Flooding	Yes	Jurisdiction has various rivers, lakes, streams, scattered across the county; high stream flows are expected to increase or alter floodplain zones that destroy infrastructure (river bank erosion, landslides), render County property undevelopable, and increase emergency responses/demand.
Reduced snowpack	Yes	Jurisdiction is surrounded by various mountainous regions. Reduced snowpack impacts streamflow timing which affects hydroelectrical facilities, fisheries, and recreation activities that rely on predictable snowmelt.
Sea level rise	No	Jurisdiction is not immediately along the coastline.
Wildfire	Yes	Eastern County has higher risk of wildfire likelihood; Jurisdiction is likely to experience more intense and frequent wildfire events.
Other - please list		
Earthquake	No	Jurisdiction experiences earthquakes due to its location near the Juan de Fuca and Pacific plates; however, the impacts of climate change on earthquake probability are unknown.
Volcano	No	Nearby volcano includes Mount Adams (active), Mount Rainier, Mount Saint Helens which has not erupted in more than 1000 years. The impacts of climate change on volcanic probability are unknown.
Avalanche		Jurisdiction is surrounded by various mountainous regions and risk of avalanche is high. Jurisdiction is expected to experience reduced snowpack or altered timing of available snowpack during a season. Volume of avalanches may decrease but frequency is expected to increase. East county higher risk.
Other - please list		

Task 2.1: Review existing plans for climate gaps and opportunities

ID	Measure	Document	Sector	Climate Indicator	Hazards	Climate Impacts	Assets	Gaps and Opportunities	Next Step
	<i>List existing measure (goal or policy) that implicitly or explicitly supports climate resilience.</i>	<i>List the document where the measure is found (comprehensive plan, hazard mitigation plan, shoreline master program, stormwater management plan, etc.).</i>	<i>List the most appropriate sector(s) for the measure [select all that apply].</i> OPTIONS: Buildings & Energy, Cultural Resources & Practices; Economic Development; Emergency Management; Health & Well-being; Ecosystems; Transportation; Agriculture & Food Systems; Waste Management; Water Resources; Zoning & Development	<i>Information from Step 1: List the climate indicator(s) that are relevant to the measure (changes in snowpack, streamflow, sea level, etc.).</i>	<i>Information from Step 1: List the climate-related hazard(s) that the measure addresses.</i>	<i>Information from Step 1: List climate impacts that the measure addresses now or could be addressed via changes. Also, consider whether the measure is maladaptive and could increase climate vulnerability and risk.</i>	<i>Information from Step 1: List assets (forests, orchards, bridges, etc.) that are affected by the climate impacts you listed.</i>	<i>If applicable, note how the existing measure could be amended or supplemented by a new goal or policy to better address your local climate hazards and impact(s).</i>	<i>Note desired next step (e.g., amend an existing measure; consolidate with a similar measure; add a new measure; keep existing measure as-is in comprehensive plan).</i>
1	POLICY URBAN 1.4 Consider greenbelt and open space areas and other environmentally sensitive areas when determining urban growth areas.	Lewis County Comp Plan (2021)	Ecosystems; Zoning & Development	Increased peak streamflow	Flooding	Lewis County is anticipated to experience increased annual max streamflow and risk of riverine flooding. River bank erosion is also a big problem in Lewis County. Many County-owned parcels are located on floodplains - see assets list. Summer stream flows are expected to substantially diminish due to shifting of projected snowmelt patterns.	Roads, Parks, Recreation facilities, Utilities	Add specificity.	Amend existing measure to consider climate impacts such as riverine flooding. Add to climate resiliency element.
2	Policy Urban 4B.5 - Minimize potential adverse impacts of commercial development on nearby resource uses and critical areas.	Lewis County Comp Plan (2021)	Ecosystems; Zoning & Development	Increased peak streamflow	Flooding	Lewis County is anticipated to experience increased annual max streamflow and risk of riverine flooding. River bank erosion is also a big problem in Lewis County. Many County-owned parcels are located on floodplains - see assets list. Summer stream flows are expected to substantially diminish due to shifting of projected snowmelt patterns.	County administrative buildings, parks, recreation facilities	Add specificity.	Amend existing policy to consider climate impacts. Add measures to Hazard Mitigation Plan or ensure consistency with HMP.
3	Policy Urban 5A.1 - Locate sites for industrial use in areas: where major enviro constraints, such as unsuitable soils, floodplains or wetlands, are minimal or able to be mitigated.	Lewis County Comp Plan (2021)	Emergency Mgm't; Zoning & Development	Increased peak streamflow	Flooding	Lewis County is anticipated to experience increased annual max streamflow and risk of riverine flooding. River bank erosion is also a big problem in Lewis County. Many County-owned parcels are located on floodplains - see assets list. Summer stream flows are expected to substantially diminish due to shifting of projected snowmelt patterns.	County appurtenant structures	Add specificity.	Amend existing policy to consider climate impacts. Add measures to Hazard Mitigation Plan or ensure consistency with HMP.
4	Policy Urban 6.5 - Ensure that future developments within urban reserve areas provide employment with competing prevailing wages and consider environmental sensitivity.	Lewis County Comp Plan (2021)	Economic Development; Zoning & Development	Increase in wildfire danger, Increase of return interval of 25-yr peak streamflow	Wildfire, Flooding, Reduced snowpack (Avalanche)	An increased likelihood of climate and fuel conditions conducive to wildfire indicates greater potential for wildfire danger to damage infrastructure, interrupt businesses, and affect public health and well-being. Buildings and energy infrastructure located in the wildland-urban interface and areas with high wildfire risk historically will be most exposed to increases in the likelihood of wildfire. Eastern County has higher risk of wildfire and avalanches. Reduced snowpack may decrease the volume of avalanches but increase the frequency of avalanches, resulting in seasonal employment rather than permanent employment in environ sensitive areas. Additionally, Lewis County is anticipated to experience increased annual max streamflow and risk of riverine flooding.	All County assets	Add specificity.	Amend existing policy to consider climate impacts and hazards. Add provisions for advancing environmental justice per HB 1181. Add to new climate resiliency element.

5	POLICY RURAL 3.1 Preserve rural character by providing adequate public facilities and services. Ensure water, wastewater treatment and other services are consistent with development standards.	<i>Lewis County Comp Plan (2021)</i>	Health & Well-being; Waste Mgm't; Water Resources; Zoning & Development	Increase in wildfire likelihood, Increase in extreme precipitation magnitude, Increase in return interval of 25-yr peak streamflow, Decrease in snowpack	Wildfire, Extreme Precipitation, Flooding, Reduced snowpack	Lewis County is anticipated to experience increased annual max streamflow and risk of riverine flooding. Heavier precipitation is expected to intensify flooding in low-lying areas and require higher capacity storm water drainage systems. May also overwhelm treatment facilities. Lewis County is expected to experience twice the average streamflow in western County area vs eastern County area.	Hydroelectric facilities, Water wells, Roadway culverts	Add specificity - climate impacts	Integrate the resiliency element with the land use element, housing, and capital facilities elements.
6	Policy Rural 9.1-9.2 - Rural development to have a variety of uses and densities consistent with rural character. Allow wide range of rural economic activities that do no cause environmental degradation.	<i>Lewis County Comp Plan (2021)</i>	Economic Development; Zoning & Development	Increase in wildfire danger, Increase of return interval of 25-yr peak streamflow	Wildfire, Flooding, Reduced snowpack (Avalanche)	An increased likelihood of climate and fuel conditions conducive to wildfire indicates greater potential for wildfire danger to damage infrastructure, interrupt businesses, and affect public health and well-being. Buildings and energy infrastructure located in the wildland-urban interface and areas with high wildfire risk historically will be most exposed to increases in the likelihood of wildfire. Eastern County has higher risk of wildfire and avalanches. Reduced snowpack may decrease the volume of avalanches but increase the frequency of avalanches, resulting in seasonal employment rather than permanent employment in environ sensitive areas. Additionally, Lewis County is anticipated to experience increased annual max streamflow and risk of riverine flooding.	All County assets	Add specificity.	Amend existing policy to consider climate impacts and hazards. Integrate with economic development element. Add provisions for advancing environmental justice per HB 1181.
7	NR Goal 5.0 Ensure resource activities protect the environment. Policy NR 5.1 - Natural resource activities - ranching, farming, forestry, mining, etc. - minimizes adverse environ impacts.	<i>Lewis County Comp Plan (2021)</i>	Economic Development; Ecosystems; Agriculture & Food Systems	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Extreme Precipitation, Flooding, Reduced snowpack, Wildfire	Agriculture, carpentry, construction, natural resources harvesting, transportation and warehousing, or other related jobs may be reduced to operating seasonally or to different times of the year. Increases in emergency responses may increase stress on personnel and equipment. Shift in water supply and energy demands, shift in energy source - government spendings and investments on alternative energy industries. Climate impacts exacerbate vulnerabilities of low-income, unemployed households in rural neighborhoods. Increased demand on County's Work Opportunities department.	All assets.	Add specificity regarding climate impacts.	Integrate with Economic Development element.
8	POLICY UCF 16.3 Craft the county's development regulations to be flexible and responsive to innovations and advances in telecommunications technology.	<i>Lewis County Comp Plan (2021)</i>	Buildings & Energy; Zoning & Development	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Extreme Precipitation, Flooding, Reduced snowpack, Wildfire	More frequent power loss, shuttered power generating stations or transmission corridors. Increased cost and demand for emergency preparedness/response/recovery. Additional stress on personnel and equipment. Wildfire and flooding can lead to secondary hazards such as landslides that destroy utility infrastructure, requiring the siting and design of facilities in non-hazard areas or with minimum exposure to hazard.	Utility substations, Hydroelectric facilities, Radio communications	Add specificity - climate impacts.	Integrate into Economic Development element.
9	NE Goal 1.0 Preserve natural/scenic beauty. Minimize development impact on environ. Policies NE 1.1-1.4 - Develop in areas with few environ hazards to prevent loss of life and property. Preserve hazardous areas as open space. Preserve natural buffers along waterways.	<i>Lewis County Comp Plan (2021)</i>	Ecosystems; Zoning & Development	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Flooding, Reduced snowpack (Avalanche), Wildfire, Extreme Precipitation	Lewis County is anticipated to experience increased annual max streamflow. River bank erosion is also a big problem in Lewis County. Summer stream flows are expected to substantially diminish due to shifting of projected snowmelt patterns. Reduced snowpack may decrease the volume of avalanches but increase the frequency. More flooding and avalanches events will increase the demand for emergency services. Closure of roads and buckling/warping of road infrastructure. Eastern County has higher risk of wildfire likelihood due to steep topography and "perfect storm" conditions. More frequent extreme weather events can disrupt travel, increase road closures and delay construction projects. Some existing developed areas would be considered hazardous from increasingly frequent flooding, avalanche, and potential wildfire damage.	All assets. Many County-owned vacant parcels are located on floodplains - see assets list.	Add specificity.	Amend existing policy to consider climate impacts. Add measures to Hazard Mitigation Plan or ensure consistency with HMP.
10	POLICY NE 2.1 Require activities that produce air pollutants and odors to comply with adopted air quality standards.	<i>Lewis County Comp Plan (2021)</i>	Health & Well-being	Increase in wildfire likelihood	Wildfire	More frequent wildfires are expected to reduce human health through loss of life, injury and reduced mental health associated with displacement. Poor air quality due to more wildfire smoke can cause adverse respiratory health effects and can be exacerbated by GHG emissions from County assets.	Transportation fleet; County administrative buildings, Solid waste facilities	Add specificity	Amend existing policy to consider climate impacts on vulnerable neighborhoods or communities. Integrate into economic development, transportation, and utilities/capital facilities elements.

11	POLICY NE 2.2 Encourage the use of alternative, cleaner burning fuels and other sources of energy.	Lewis County Comp Plan (2021)	Buildings & Energy;	Increase in wildfire likelihood	Wildfire	More frequent wildfires are expected to reduce human health through loss of life, injury and reduced mental health associated with displacement. Poor air quality due to more wildfire smoke can cause adverse respiratory health effects and can be exacerbated by GHG emissions from County assets.	Transportation fleet; County administrative buildings, Solid waste facilities	Add specificity	Amend existing policy to consider climate impacts on vulnerable neighborhoods or communities. Integrate into economic development, transportation, and utility/capital
12	NE Goal 3.0 Preserve and enhance the quality of water in Lewis County. Policies NE 3.1 thru 3.4 Encourage septic system development and livestock operations in a way that does not contaminate groundwater and surface waters.	Lewis County Comp Plan (2021)	Health & Well-being; Waste Management; Water Resources	Increased peak streamflow, Increase in streamflow timing, Increase in heavy precipitation magnitude	Extreme Precipitation, Flooding, Reduced snowpack	Changes in the timing and intensity of precipitation and water supply from snowpack; Increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation. Snowmelt is projected to shift three to four weeks earlier in Lewis County, resulting in lower summer peak stream flows that may temporarily impact water quality due to contamination or excess nutrient levels.	Shorelines, Water wells	No changes needed	Adopt into comprehensive plan
13	LU Goal 4.0 Maintain the quality of the county's environmentally sensitive critical areas. Obj 4B - Preserve wetland functions and values Seek to retain the function and values of wetlands in the County.	Lewis County Comp Plan (2021)	Health & Well-being; Ecosystems	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood	Flooding, Reduced snowpack, Wildfire	County ESAs include shorelines, waterways, and buffers along waterways. Shifting of projected snowmelt patterns is expected, resulting in shifting of peak stream flows for ESA habitat. Changing habitat quality could lead to mass fish kills and degradation of habitat. Wildfire and incompatible land uses can also increase runoff and sediment to streams, which can reduce aquatic habitat quality. Invasive species spread through wildfire threatens county's ESAs.	Shorelines, Parks	Add specificity.	Amend existing measure to consider climate impacts.
14	OBJ 4C – PROTECTED GROUNDWATER SOURCES Protect aquifer recharge areas to help ensure a long-term, high quality supply of water for Lewis County residents.	Lewis County Comp Plan (2021)	Health & Well-being; Water Resources	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood	Flooding, Reduced snowpack, Wildfire	Recharge and distribution areas include Cowlitz River and Middle Fork. Cowlitz floods during high precip and snowmelt events. Wildfire events may increase sedimentation and affect water quality, increasing stress on groundwater infrastructure.	Hydroelectric facilities, Water wells	Add specificity.	Amend existing measure to consider climate impacts.
15	OBJ 4D - Protect life and property from flood hazards. Policies NE 4D.1 thru 4D.5 - Avoid development in floodplains. Prioritize compatible land uses.	Lewis County Comp Plan (2021)	Zoning & Development	Increased peak streamflow	Flooding	More flooding and avalanches events will increase the demand for emergency services. More frequent extreme weather events can cause buckling/warping of road infrastructure, resulting in disrupted travel, increased road closures, and delayed construction projects. Some existing developed areas would be considered hazardous from increasingly frequent flooding, avalanche, and potential wildfire damage. Levees overtopping and flash floods from built up sediment may occur more frequently. Interagency collaboration to respond to large scale flooding events.	All assets.	Add specificity	Amend existing policy to consider climate impacts. Add measures to Hazard Mitigation Plan or ensure consistency with HMP.

16	Obj 4E - Retain flood storage and transmission capacity of rivers and streams. Policies NE 4E.1-4E.2 - Prohibit wetland and floodplain fill. Regulate flood hazard areas per LCC 15.35, 17.35, 17.35A.	Lewis County Comp Plan (2021)	Emergency Management; Water Resources	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Flooding, Reduced snowpack (Avalanche), Wildfire, Extreme Precipitation	Lewis County is anticipated to experience increased annual max streamflow. River bank erosion is also a big problem in Lewis County. Summer stream flows are expected to substantially diminish due to shifting of projected snowmelt patterns. Reduced snowpack may decrease the volume of avalanches but increase the frequency. More flooding and avalanches events will increase the demand for emergency services. Closure of roads and buckling/warping of road infrastructure. Eastern County has higher risk of wildfire likelihood due to steep topography and "perfect storm" conditions. More frequent extreme weather events can disrupt travel, increase road closures and delay construction projects. Some existing developed areas would be considered hazardous from increasingly frequent flooding, avalanche, and potential wildfire damage.	Hydroelectric facilities, water wells, Shorelines	Add specificity.	Amend existing policy to consider climate impacts. Add measures to Hazard Mitigation Plan or ensure consistency with HMP.
17	Obj 4F - Protect and enhance critical resources and habitats. Policies NE 4F.1 thru 4F.4 - Preserve and restore endangered, threatened, or sensitive species habitat.	Lewis County Comp Plan (2021)	Ecosystem	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood	Flooding, Reduced snowpack, Wildfire	County ESAs include shorelines, waterways, and buffers along waterways. Shifting of projected snowmelt patterns is expected, resulting in shifting of peak stream flows for ESA habitat. Changing habitat quality could lead to mass fish kills and degradation of habitat. Wildfire and incompatible land uses can also increase runoff and sediment to streams, which can reduce aquatic habitat quality. Invasive species spread through wildfire threatens county's ESAs.	Shorelines, Parks	Add specificity.	Amend existing measure to consider climate impacts.
18	NE Goal 5.0 Manage shorelines consistent with the shoreline master program and restoration plan.	Lewis County Comp Plan (2021)	Health & Well-being; Ecosystems; Zoning & Development	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood	Flooding, Reduced snowpack, Wildfire	County ESAs include shorelines, waterways, and buffers along waterways. Shifting of projected snowmelt patterns is expected, resulting in shifting of peak stream flows for ESA habitat. Changing habitat quality could lead to mass fish kills and degradation of habitat. Wildfire and incompatible land uses can also increase runoff and sediment to streams, which can reduce aquatic habitat quality. Invasive species spread through wildfire threatens county's ESAs.	Shorelines, Parks	Add specificity.	Amend existing measure to consider climate impacts.
19	NE Goal 6.0 Strive to ensure stormwater runoff does not contribute to larger flooding issues or pollution. Policies NE 6.1 thru 6.4 - Minimize adverse impacts of new/existing development on water quality via stormwater runoff.	Lewis County Comp Plan (2021)	Emergency Management; Water Resources; Zoning & Development	Increase in heavy precipitation magnitude, Increase in peak streamflow	Extreme Precipitation, Flooding	Extreme precip events that coincide with non-climate stressors (mismanagement of waste, increase of impervious surface, lack of adequate stormwater infrastructure) can impact stormwater runoff that leads to localized urban flooding. Such events that coincide with riverine flooding can cause significant damage to life and property.	All assets.	Add specificity.	Amend existing measure to consider climate impacts such as impacts. Ensure consistency with 2009 flood hazard management plan and 2023 hazard mitigation plan.
20	NE Goal 7.0 Encourage the preservation of wetlands, open lands, and habitat areas for the benefit of indigenous fish/wildlife, and quality of life of residents. Balance recreation, habitat preservation, and watershed functions.	Lewis County Comp Plan (2021)	Ecosystem; Health & Well-being	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Flooding, Reduced snowpack (Avalanche), Wildfire, Extreme Precipitation	Lewis County is anticipated to experience increased annual max streamflow. River bank erosion is also a big problem in Lewis County. Summer stream flows are expected to substantially diminish due to shifting of projected snowmelt patterns. Reduced snowpack may decrease the volume of avalanches but increase the frequency. More flooding and avalanches events will increase the demand for emergency services. Closure of roads and buckling/warping of road infrastructure. Eastern County has higher risk of wildfire likelihood due to steep topography and "perfect storm" conditions. More frequent extreme weather events can disrupt travel, increase road closures and delay construction projects. Some existing developed areas would be considered hazardous from increasingly frequent flooding, avalanche, and potential wildfire damage.	All assets. Many County-owned vacant parcels are located on floodplains - see assets list.	No changes needed	Adopt into comprehensive plan

21	T Goal 1.0 Provide well-maintained transport system. Policies T1.1-1.2 - Maintain inventory and surveying of transport facilities' conditions/age/useful life/maintenance records.	<i>Lewis County Comp Plan (2021)</i>	Transportation	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Extreme Precipitation, Flooding, Reduced snowpack, Wildfire	Road infrastructure degradation i.e., potholes, buckling, erosion, making it difficult to access remote areas. Wildfire events can lead to road and bridge closures and/or delays in traffic and construction. Flooding and reduced snowpack cause secondary hazards such as landslides and riverine erosion that may compromise nearby road and bridge infrastructure - increase in damages. Reduced snowpack may decrease the volume of avalanches but increase the frequency of avalanches, leading to road/bridge closures and increased emergency responses. Wash out or destruction of road maintenance facilities i.e., pits and quarries, road shops, stock pile sites, etc., requiring longer drives to fix roads.	Roads, Culverts, Roadway appurtenant structures, Bridges	No changes needed	Adopt into comprehensive plan. Add to climate resiliency element.
22	T Goal 2.0 Provide transport system that minimizes risks for all users. Policies T2.1-2.2 - Safety is key priority. Prioritize corrective actions.	<i>Lewis County Comp Plan (2021)</i>	Emergency Management; Transportation	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Extreme Precipitation, Flooding, Reduced snowpack, Wildfire	County fleet located at various facilities throughout the County. Lewis County Transit serves cities of Centralia and Chehalis in west County, which experiences more flooding and extreme weather hazards than wildfire or avalanche. Flooding and extreme precipitation can degrade road infrastructure, and secondary hazards can increase road damage and potentially lead to road closures.	Roads, Culverts, Roadway appurtenant structures, Bridges	Add specificity.	Amend existing policy to consider climate impacts. Add measures to Hazard Mitigation Plan or ensure consistency with HMP.
23	T Goal 10.0 Provide adequate capacity and safety for air service of county airports. Policies T 10.1 thru 10.3 - Long-term viability of airports thru partnership, appropriate road/rail connections for passenger, freight, and other services movement.	<i>Lewis County Comp Plan (2021)</i>	Economic Development; Emergency Mgm't; Transportation	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Extreme Precipitation, Flooding, Reduced snowpack, Wildfire	Increased maintenance costs of airstrip and other airport infrastructure. Increase in emergency response and stress on personnel and equipment due to lack of adequate capacity anticipated. Secondary hazards may result in closure of airport.	Airports	Add specificity.	Amend existing measure to consider climate impacts. Integrate into Economic Development element.
24	UCF Goal 6.0 Use environmentally sound approaches to construct, operate, and maintain utilities and facilities. Policies UCF 6.1 thru 6.3 - Promote sensitive design and siting of facilities.	<i>Lewis County Comp Plan (2021)</i>	Buildings & Energy; Zoning & Development	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Extreme Precipitation, Flooding, Reduced snowpack, Wildfire	More frequent power loss, shuttered power generating stations or transmission corridors. Increased cost and demand for emergency preparedness/response/recovery. Additional stress on personnel and equipment. Wildfire and flooding can lead to secondary hazards such as landslides that destroy utility infrastructure, requiring the siting and design of facilities in non-hazard areas or with minimum exposure to hazard.	Utility substations, Hydroelectric facilities, Radio communications	Add specificity - climate impacts.	Integrate into Economic Development element.
25	Policy UCF 12.1 Use education and outreach to raise community awareness about the benefits of stormwater management to reduce flood hazards.	<i>Lewis County Comp Plan (2021)</i>	Emergency Mgm't; Health & Well-being	Increase in heavy precipitation magnitude, Increase in peak streamflow	Extreme Precipitation, Flooding	Extreme precip events that coincide with non-climate stressors (mismanagement of waste, increase of impervious surface, lack of adequate stormwater infrastructure) can impact stormwater runoff that leads to localized urban flooding. Such events that coincide with riverine flooding can cause significant damage to life and property.	All assets.	Add specificity.	Amend existing measure to consider climate impacts.
	Policy UCF 13.1 Implement strategies for solid waste management including waste reduction, recycling and energy recovery identified in the Solid and Hazardous Waste Management Plan.	<i>Lewis County Comp Plan (2021)</i>	Waste Management	Increased heavy precipitation magnitude, Increased peak streamflow, Increase wildfire likelihood	Extreme Precipitation, flooding, wildfire	Heavier precipitation has the potential to increase storm damage to infrastructure and generate more waste and debris. More waste will strain municipal cleanup and refuse capacity.	Centralia and Morton solid waste transfer stations	No changes needed	Keep as is - integrate into new climate resiliency element.

26	ED Goal 2.0 Promote a diverse range of jobs in a variety of sectors.	Lewis County Comp Plan (2021)	Economic Development	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Extreme Precipitation, Flooding, Reduced snowpack, Wildfire	Agriculture, carpentry, construction, natural resources harvesting, transportation and warehousing, or other related jobs may be reduced to operating seasonally or to different times of the year. Increases in emergency responses may increase stress on personnel and equipment. Shift in water supply and energy demands, shift in energy source - government spendings and investments on alternative energy industries. Climate impacts exacerbate vulnerabilities of low-income, unemployed households in rural neighborhoods. Increased demand on County's Work Opportunities department.	All assets.	Add specificity.	Amend existing measure to consider climate impacts and environmental justice measures.
27	ED Goal 15.0 Enhance quality of life for County residents. Policy ED 15.3 - Support programs/agencies that address community needs, quality of life.	Lewis County Comp Plan (2021)	Economic Development; Health & Well-being	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Extreme Precipitation, Flooding, Reduced snowpack, Wildfire	Agriculture, carpentry, construction, natural resources harvesting, transportation and warehousing, or other related jobs may be reduced to operating seasonally or to different times of the year. Increases in emergency responses may increase stress on personnel and equipment. Shift in water supply and energy demands, shift in energy source - government spendings and investments on alternative energy industries. Climate impacts exacerbate vulnerabilities of low-income, unemployed households in rural neighborhoods. Increased demand on County's Work Opportunities department.	All assets.	Add specificity.	Amend existing measure to consider climate impacts, OR remove and consolidate with ED Goal 2.0 above.
28	6.2 - Encourage diversified economic base to minimize economic fluctuations and local economy vulnerabilities.	Countywide Planning Policies	Economic Development	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Extreme Precipitation, Flooding, Reduced snowpack, Wildfire	Agriculture, carpentry, construction, natural resources harvesting, transportation and warehousing, or other related jobs may be reduced to operating seasonally or to different times of the year. Increases in emergency responses may increase stress on personnel and equipment. Shift in water supply and energy demands, shift in energy source - government spendings and investments on alternative energy industries. Climate impacts exacerbate vulnerabilities of low-income, unemployed households in rural neighborhoods. Increased demand on County's Work Opportunities department.	All assets.	Add specificity.	Amend existing measure to consider climate impacts and environmental justice measures.
29	6.10 - Encourage efforts to expand workforce training and alternative energy industry labor training i.e., "green collar" jobs.	Countywide Planning Policies	Economic Development	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Extreme Precipitation, Flooding, Reduced snowpack, Wildfire	Agriculture, carpentry, construction, natural resources harvesting, transportation and warehousing, or other related jobs may be reduced to operating seasonally or to different times of the year. Increases in emergency responses may increase stress on personnel and equipment. Shift in water supply and energy demands, shift in energy source - government spendings and investments on alternative energy industries. Climate impacts exacerbate vulnerabilities of low-income, unemployed households in rural neighborhoods. Increased demand on County's Work Opportunities department.	All assets.	Add specificity.	Amend existing measure to consider climate impacts and environmental justice measures.
30	10 - Encourage open space and development of recreational opportunities, conserve habitat, increase access, and develop parks.	Countywide Planning Policies	Health & Well-being; Ecosystems	Increased peak streamflow, Increase in streamflow timing, Increase in wildfire likelihood, Increase in heavy precipitation magnitude	Flooding, Reduced snowpack (Avalanche), Wildfire, Extreme Precipitation	Lewis County is anticipated to experience increased annual max streamflow. River bank erosion is also a big problem in Lewis County. Summer stream flows are expected to substantially diminish due to shifting of projected snowmelt patterns. Reduced snowpack may decrease the volume of avalanches but increase the frequency. More flooding and avalanches events will increase the demand for emergency services. Closure of roads and buckling/warping of road infrastructure. Eastern County has higher risk of wildfire likelihood due to steep topography and "perfect storm" conditions. More frequent extreme weather events are expected to increase the demand for emergency services.	All assets. Many County-owned vacant parcels are located on floodplains - see assets list.	No changes needed	Adopt into comprehensive plan
31	11.6 - Water resources i.e., floodplains, lakes, rivers, etc. should be managed for multiple beneficial uses and preserved to the fullest extent possible. Promote opportunities for other uses.	Countywide Planning Policies	Economic Development; Emergency Mgm't; Health & Well-being; Ecosystems; Agriculture & Food Systems; Water Resources	Increase in total annual precipitation, decrease in snowpack	Drought and reduced snowpack,	Increases in annual precipitation have the potential to increase groundwater recharge. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation. Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase.	Water infrastructure, County buildings, Roads, Utilities	No changes needed	add to comp plan - integrate to new climate resiliency element.
32	14 - Identify and encourage preservation of lands, sites, and structures that have historical or archaeological significance.	Countywide Planning Policies	Cultural Resources & Practices	Increase in peak streamflow; Increase in wildfire likelihood	Flooding, Wildfire	Increase in annual peak streamflow indicates a potential for higher stream flows and larger areas inundated every year at high flows. Increased wildfire likelihood may permanently destroy buildings - lack of access and loss of cultural symbol i.e., irreplaceable historic items. Culturally significant sites can be damaged by flooding and wildfire.	Historic buildings	Add specificity.	Amend existing measure to consider climate impacts.

33	Goal ED-1 Utilize shoreline resources to improve the standard of living for residents of the County, while assuring that the resources are utilized in a manner consistent with minimizing adverse effects to the shoreline environment.	Shoreline Master Program (SMP)	Economic Development	Decreased snowpack and increased streamflow timing, Increase in summer maximum temperature, Increase in extreme precipitation magnitude, Increase of return interval of 25-yr peak streamflow, increase in wildfire danger	Drought, extreme heat, extreme precipitation, flooding, reduced snowpack, wildfire	Reduction in snowpack are expected to decrease opportunities for winter outdoor recreation and shorten the winter recreation season, with adverse effects on the economy and character of some communities. Warm season outdoor recreation opportunities may increase, shifting tourism from one recreation sector to another and into different seasons. The timing of snowmelt and streamflow influences the seasonal availability of water for hydropower generation and irrigation. A shift in streamflow timing, with more streamflow in winter and early spring, will change the timing of hydropower generation. Timing changes have the potential to affect energy costs for residents and businesses.	Airports, hydroelectrical facilities, Shorelines	Add specificity	Add specificity. Amend existing measure to consider climate impacts.
34	Goal SU-1. Assure that shoreline development in the County corresponds with the character and physical limitations of the land and water. Promote a viable pattern of land and water use without disrupting environmental quality.	Shoreline Master Program (SMP)	Water Resources	Increase in total annual precipitation, decrease in snowpack	Drought and reduced snowpack,	Increases in annual precipitation have the potential to increase groundwater recharge. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation. Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase.	Water infrastructure	Add specificity	Add specificity
35	Goal HSCE-1 Protect, preserve, and restore areas and sites having historic, cultural, educational, or scientific values.	Shoreline Master Program (SMP)	Cultural Resources & Practices	Increase in low streamflow, increase in August stream temperature, increase in peak streamflow, increase in wildfire likelihood.	Drought, extreme heat, flooding, wildfire	Lower stream flows in summer are expected to reduce habitat quantity and quality for salmonids and other aquatic species that are culturally important to the Northwest Tribes. Warmer stream temperatures are expected to reduce habitat quality for salmonids and other aquatic species that depend on cold water. Can reduce the abundance of and access to these culturally important species for Northwest Tribes. Higher stream flows are expected to directly affect salmonid populations and alter salmonid habitat, reducing the quantity of a culturally important species for Northwest Tribes. Increased wildfire can have the potential to damage cultural and historical sites, buildings, and cultural resources. More frequent wildfires can also reduce access to culturally important sites and resources for Northwest Tribes. Lack of access and loss of cultural symbols from flooding/wildfire hazards leads to loss of historic buildings and sites (from irreplaceable materials) which can reduce quality of life and erode community identity.	Historical Buildings, Shorelines	Add specificity	Add specificity. Amend existing measure to consider climate impacts.
36	Goal FHP-1. Recognize the hydrologic functions of floodplains, and protect frequently flooded areas.	Shoreline Master Program (SMP)	Water Resources, Zoning & Development	Increase in total annual precipitation, decrease in snowpack, increase in peak streamflow	Drought and reduced snowpack, extreme precipitation, flooding	Increases in annual precipitation have the potential to increase groundwater recharge- but increased impervious surfaces from development exacerbates flooding. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation. Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase.	Water infrastructure, County buildings, Roads	Add specificity	Add specificity. Amend existing measure to consider climate impacts.
37	Aquatic Management Policy 3. Encourage multiple uses of overwater facilities to reduce the impacts of development and increase effective use of water resources in shoreline jurisdiction.	Shoreline Master Program (SMP)	Buildings & Energy, water resources	Increase in total annual precipitation, decrease in snowpack	Drought and reduced snowpack,	Increases in annual precipitation have the potential to increase groundwater recharge. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation. Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase.	Water infrastructure, County buildings, Roads, Utilities	No changes needed	add to comp plan - integrate to new climate resiliency element.
38	Aquatic Management Policy 5. Design and manage shoreline uses and modifications to prevent degradation of water quality and alteration of natural hydrographic conditions.	Shoreline Master Program (SMP)	Water Resources	Increase in total annual precipitation, decrease in snowpack, increase in peak streamflow	Drought and reduced snowpack, flooding, extreme precipitation	Increases in annual precipitation have the potential to increase groundwater recharge. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation. Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase.	Water infrastructure, Shorelines, Parks, Recreation facilities	No changes needed	add to comp plan - integrate to new climate resiliency element.

39	<p>Aquatic Management Policy</p> <p>7. Reserve space in shoreline jurisdiction for shoreline preferred uses, while considering upland and in-water uses, water quality, navigation, presence of aquatic vegetation, existing critical habitats, aesthetics, public access, and views.</p>	<p>Shoreline Master Program (SMP)</p>	<p>Water Resources, Zoning & Development, Ecosystems</p>	<p>Increase in total annual precipitation, decrease in snowpack</p>	<p>Drought and reduced snowpack, extreme precipitation, flooding, wildfire</p>	<p>Increases in annual precipitation have the potential to increase groundwater recharge. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation.</p> <p>Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase.</p> <p>Shorelines provide buffers for development against flooding hazards and other multiple benefits/uses. Shorelines change due to secondary hazards - river bank erosion, landslides, changing locations of cultural and/or recreational sites and impacting infrastructure i.e., boat launch areas, picnic areas, spur access roads, etc.</p>	<p>Water infrastructure, Shorelines, Parks, Recreation facilities, Roads</p>	<p>No changes needed</p>	<p>add to comp plan - integrate to new climate resiliency element and land use element (resource land goals/policies).</p>
40	<p>High Intensity Management Policies</p> <p>5. Restore visual and remediate shoreline areas within new development sites consistent with State and Federal laws.</p>	<p>Shoreline Master Program (SMP)</p>	<p>Buildings & Energy, water resources</p>	<p>Increase in total annual precipitation, decrease in snowpack</p>	<p>Drought and reduced snowpack, extreme precipitation, flooding, wildfire</p>	<p>Increases in annual precipitation have the potential to increase groundwater recharge. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation.</p> <p>Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase.</p>	<p>Water infrastructure, Recreation facilities, Shorelines</p>	<p>Add specificity</p>	<p>Add specificity - integrate with new climate resiliency element. Consider climate impacts.</p>
41	<p>Natural Management Policies.</p> <p>3. Scientific, historic, cultural, educational research uses, and low-intensity water-oriented recreational uses that do not affect ecological functions may be allowed.</p>	<p>Shoreline Master Program (SMP)</p>	<p>Cultural Resources & Practices; Zoning and development</p>	<p>Increase in low streamflow, increase in peak streamflow, decrease in snowpack, increase in heavy precipitation magnitude</p>	<p>Drought, flooding, extreme precipitation,</p>	<p>Increase in annual peak streamflow indicates a potential for higher stream flows and larger areas inundated every year at high flows. Heavier precipitation events are expected to intensify urban flooding and demands on storm water systems, which can affect zoning restrictions on new buildings, and require revised building codes for development in more frequently flooded areas.</p>	<p>Recreation facilities, Parks, Shorelines</p>	<p>Add specificity</p>	<p>add to comp plan - integrate to new climate resiliency element and land use element.</p>
42	<p>Rural Conservancy Management Policies.</p> <p>7. Construction of new structural shoreline stabilization and flood control works should be allowed when the documented need exists to protect an existing primary structure or ecological functions. Mitigation may be necessary for such construction. New development should be designed and located to preclude the need for such work. Shoreline stabilization measures shall infringe on private property rights to the minimum extent necessary.</p>	<p>Shoreline Master Program (SMP)</p>	<p>Buildings & Energy, water resources</p>	<p>Increase in total annual precipitation, decrease in snowpack, Increased peak streamflow</p>	<p>Drought and reduced snowpack, flooding</p>	<p>Increases in annual precipitation have the potential to increase groundwater recharge. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation.</p> <p>Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase.</p> <p>Riverine flooding combined with stormwater flooding exacerbates peak streamflow hazards that may expand shorelines and designated 100-year floodplains over larger areas. Consider climate impacts in mitigation measures.</p>	<p>Water infrastructure, County buildings, Roads, Utilities, Hydroelectrical facilities</p>	<p>No changes needed</p>	<p>add to comp plan - integrate to new climate resiliency element and land use element.</p>

43	<p>Shoreline Residential Management Policies.</p> <p>1. Preserve ecological functions by establishing development standards for shoreline height, shoreline buffers, building setbacks, density, impervious surface coverage, shoreline stabilization, critical area protection, and water quality protection to assure no net loss of ecological functions in shoreline jurisdiction.</p>	<p><i>Shoreline Master Program (SMP)</i></p>	<p>Buildings & Energy, water resources, Ecosystem</p>	<p>Increase in total annual precipitation, decrease in snowpack</p>	<p>Drought and reduced snowpack, extreme precipitation, flooding</p>	<p>Increases in annual precipitation have the potential to increase groundwater recharge. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation.</p> <p>Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase.</p>	<p>Water infrastructure, Shorelines, Roads, County buildings</p>	<p>No changes needed</p>	<p>Integrate with new climate resiliency element, housing element, land use element.</p>
44	<p>Urban Conservancy Management Policy.</p> <p>1. Allow uses that preserve the natural character of the shoreline environment, promote preservation of open space, floodway, floodplain, or critical areas directly, or over the long-term as the primary allowed uses. Allow uses that result in restoration of ecological functions if the use is otherwise compatible with the purpose of the environment and setting.</p>	<p><i>Shoreline Master Program (SMP)</i></p>	<p>Water Resources, Ecosystem, Zoning & Development</p>	<p>Increase in total annual precipitation, decrease in snowpack</p>	<p>Drought and reduced snowpack, flooding, extreme precipitation, wildfire</p>	<p>Increases in annual precipitation have the potential to increase groundwater recharge. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation.</p> <p>Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase.</p>	<p>Water infrastructure, Shoreline</p>	<p>No changes needed</p>	<p>add to comp plan - integrate with new climate resiliency element and land use element.</p>
45	<p>Archaeological and Historic Resources</p> <p>E. Where development or demolition activity is proposed adjacent to an identified archaeological or historic site, design and operate the proposed development to be compatible with the continued protection of the site.</p>	<p><i>Shoreline Master Program (SMP)</i></p>	<p>Cultural Resources & Practices</p>	<p>Increase in peak streamflow and wildfire likelihood</p>	<p>Flooding and wildfire</p>	<p>Increase in annual peak streamflow indicates a potential for higher stream flows and larger areas inundated every year at high flows. Increased wildfire likelihood can have the potential to damage cultural and historical sites, buildings, and cultural resources. More frequent wildfires can also reduce access to culturally important sites and resources for Northwest Tribes.</p>	<p>Historical Buildings</p>	<p>Add specificity</p>	<p>Add specificity - consider climate impacts</p>
46	<p>Flood Hazard Management.</p> <p>D. Prefer nonstructural flood hazard management measures to structural measures where feasible. New structural flood hazard reduction measures should only be allowed when demonstrated to be necessary, nonstructural methods are insufficient, and mitigation is accomplished.</p>	<p><i>Shoreline Master Program (SMP)</i></p>	<p>Water Resources, Zoning & Development</p>	<p>Increase in total annual precipitation, decrease in snowpack</p>	<p>Drought and reduced snowpack</p>	<p>Increases in annual precipitation have the potential to increase groundwater recharge. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation.</p> <p>Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase.</p>	<p>Water infrastructure, County building, Roads</p>	<p>No changes needed</p>	<p>add to comp plan - integrate to new climate resiliency element.</p>

47	Water Quality Policy. A. Use existing regulations to protect surface water quality and quantity within Lewis County.	Shoreline Master Program (SMP)	Water Resources, Ecosystem	Increase in total annual precipitation, decrease in snowpack	Drought and reduced snowpack, extreme precipitation, flooding, wildfire	Increases in annual precipitation have the potential to increase groundwater recharge. Changes in the timing and intensity of precipitation and increases in water demand and evaporation are expected to offset increases in groundwater recharge due to more annual precipitation. Reduced snowpack and more winter rain is expected to increase water availability in winter for multiple uses including drinking water and hydropower generation, and decrease water availability in late spring and summer when demand is also expected to increase.	Water infrastructure, Shorelines	No changes needed	add to comp plan - integrate with land use element (natural environment goals/policies).
48	Agriculture. B. Locate and design new agricultural activities on land not currently used for agricultural activity to assure no net loss of ecological functions and not to have a significant adverse impact on other resources and values in shoreline jurisdiction.	Shoreline Master Program (SMP)	Agriculture & food systems	Extreme precipitation, increase in percentage of stream lengths winter to spring streamflow timing ratio	Drought and reduced snowpack, extreme precipitation, flooding	Reduction of water available for livestock and irrigation during the same time that warmer temperatures and longer growing seasons are expected to increase the demand for irrigation water. Flooding hazards have direct impacts to agricultural activities and incurs economic losses in the region.	N/A	No changes needed	Keep as is - consider climate impacts on agriculture in new climate resiliency element.
49	Forests Policy. A. Effectively balance timber harvesting with the preservation of shoreline ecological functions, public access to shorelines, and other shoreline goals.	Shoreline Master Program (SMP)	Ecosystems	Increase in wildfire likelihood	Wildfire	More frequent wildfires have the potential to reduce timber, non-timber forest products, carbon storage, and forest habitat for some wildfire. Potential increase in runoff and sediment to streams, which can reduce aquatic habitat quality.	Shorelines	No changes needed	add to comp plan - integrate with natural resource goals/policies of land use element.
50	Forest Policy. F. Promote proper road and bridge design, location and construction, and maintenance practices to prevent development of roads and structures that would adversely affect shoreline resources.	Shoreline Master Program (SMP)	Transportation	Increase in hot days, increase in heavy precipitation magnitude, increase in peak streamflow, increase in wildfire likelihood	Extreme heat, extreme precipitation, flooding, wildfire	More hot days will have potential to damage the surfaces of roads and bridges, leading to greater maintenance and repair costs and more frequent traffic and service disruptions. Heavy precipitation events expected to intensify flooding, landslides, and erosion, which can interrupt transportation routes, and damage infrastructure. Higher streamflow can increase riverine flooding, which can damage roads, bridges, and railways, and overwhelm drainage structures, such as culverts.	County roads and bridges	Add specificity	Add specificity - integrate measure with new climate resiliency element and transportation element.
51	Industrial Development Policy. B. Locate, design, and construct industrial development in a manner that assures no net loss of shoreline ecological functions and does not have significant adverse impacts to other shoreline resources and values.	Shoreline Master Program (SMP)	Buildings & Energy, water resources	Decrease in heating degree days and increase in cooling degree days	Extreme Heat	Decrease in heating degree days expected to reduce energy demand for heating. Increase in cooling degree days indicates greater potential energy demand for cooling buildings in summer.	General government buildings, utility substations, radio communications, hydroelectrical buildings	No changes needed	Keep as is
52	Transportation Facilities Policy. A. Plan, locate, and design new transportation facilities where routes will have the least adverse effect on shoreline features, shoreline ecological functions, and existing or planned water-dependent uses.	Shoreline Master Program (SMP)	Transportation	Decrease in snowpack, increase in heavy precipitation magnitude, increase in peak streamflow	Drought, extreme precipitation, flooding, reduced snowpack	Transportation routes and facilities in mountainous areas may experience more damage from heavier winter rainfall and associated flooding, erosion, and washouts.	Bridges, county roads, road facilities i.e., sheds, pits/quarries, stockpiles, etc.	No changes needed	Add to comp plan - integrate with new climate resiliency element.

Task 2.2: Determine next step

Instructions: For each climate hazard (flooding, drought, etc.) that you identified in Step 1 as relevant to your jurisdiction make a copy of the table below and answer the questions to help determine whether a more detailed vulnerability and risk assessment is warranted for your jurisdiction.

Question	Answer	Discussion Notes
1. Has your jurisdiction already completed a localized study for this hazard and its impacts?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The 2015 Climate Change Preparedness Plan for North Olympic Peninsula contains localized sea level rise projections. Page 70 of this plan contains a summary of impacts to critical infrastructure in Port Angeles, but this is not a detailed localized study of impacts.
2. If yes to Q1, does it provide enough information to address the hazard through goals and policies? If yes, move to Step 5 of this checklist.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Not sure <input type="checkbox"/> N/A	The information provided in the 2015 Climate Change Preparedness Plan is insufficient for localized policy development, although it does provide a helpful overview of potential impacts that may be worth studying further.
3. Are certain geographic areas in your jurisdiction more vulnerable to this hazard than others?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure	Port Angeles has variable elevations. Much of the City's waterfront is elevated above sea level due to the presence of the marine bluff, but a significant portion containing extensive critical infrastructure is located at or near sea level. This includes much of the working waterfront of the town, Ediz Hook, and some of the most frequented areas of the City such as the shoreline adjacent to downtown. Even elevated areas are vulnerable to sea level rise due to the potential for bluff erosion, which will eventually impact development elevated significantly above sea level but near the bluff edge.
4. If yes to Q3, have these areas already been identified at a scale that is relevant to setting goals and policies?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	The City has contour data that provides information on elevation in a specific location. However, no analysis has been completed of what critical infrastructure at lower elevations would be susceptible and in what order it would be compromised. Such an analysis would lead to goals and policies about how to prioritize repairs, where to reinforce the shoreline (e.g., sea walls) and retain the infrastructure, and when to retreat to higher elevations and abandon the infrastructure.
5. Are certain built, natural, or social assets in your jurisdiction more vulnerable to this hazard or more at risk from this hazard?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure	The portion of the City shoreline extending from the McKinley Paper Company Mill site to where the bluff once again abuts the shoreline east of the City Pier is especially vulnerable to sea level rise due to its elevation. The Rayonier Mill site is also vulnerable to impacts. Much of the natural shoreline has been developed, but there still remains essential natural segments that would be vulnerable to sea level rise. Cultural resources, including those of the Lower Elwha Klallam Tribe, are present in this segment.
6. If yes to Q5, has the vulnerability and risk to these assets been identified at a scale that is relevant to setting goals and policies?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Other than the 2015 Climate Change Preparedness Plan mentioned in Q1, the risk to assets from sea level rise and the cost of the impacts to the City and community have not been identified at a sufficient scale. The City's Emergency Mitigation Plan will be useful in helping identify vulnerable infrastructure.
7. Are certain sectors in your jurisdiction more vulnerable to this hazard or more at-risk from this hazard?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure	Economic activities that rely on the waterfront are especially vulnerable. This includes key facilities such as the ferry terminal which facilitates international connection, productive waterfront industrial sites, the marina, public transit infrastructure, Ediz Hook (including the Coast Guard Air Station), and the McKinley Paper Mill site. Utility infrastructure associated with all these uses (water, sewer, electrical, etc.) will be impacted. Cultural resources of local tribes are also vulnerable to impacts. Environmental resources that contribute to a healthy shoreline would also be compromised.
8. If yes to Q7, has the vulnerability and risk to these sectors been identified at a scale that is relevant to setting goals and policies?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Multiple agencies and City departments would need to provide input in order for actual vulnerability (in terms of monetary value) to be determined. In implementing goals and policies, it would also be important to incorporate community stakeholders to allow identification of vulnerability from their perspective.
9. Are certain populations in your jurisdiction more vulnerable to this hazard or more at-risk from this hazard?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure	Low-income populations are always more vulnerable when their housing is located in areas susceptible to impact. Business owners and workers in facilities located in the segment described in Q7 are also vulnerable and subject to loss of assets needed for livelihood. Non-human populations may also be vulnerable resulting from damage to shoreline environmental resources.
10. If yes to Q9, has the vulnerability and risk to these populations been identified at a scale that is relevant to setting goals and policies?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	There would be a need to consider the disparate impacts of each (potentially overlapping) population. Goals and policies would need to be based on these risks and formulated to ensure future development avoids exacerbating vulnerability and risk to these populations.
11. Does your jurisdiction plan to update its local hazard mitigation plan and submit it for FEMA approval?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The City is focused on implementation of the 2019 Hazard Mitigation Plan, as identified in the City's Climate Resiliency Plan, but regular updates will be necessary as available information evolves.
12. Based on the answers to these questions, have you identified a need for a vulnerability and risk assessment for this hazard?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Not only do these questions lead staff to believe that a sea level rise vulnerability assessment is necessary, but the City has already committed to conducting one as an action item in the Climate Resiliency Plan adopted in June of 2022. This process will help to implement that action item (Action #CRW-1.6).
12. If yes to Q12, does your jurisdiction intend to conduct a vulnerability and risk assessment of this hazard -- or all applicable hazards -- at this time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Conducting an assessment will help fulfill the action item mentioned in Q12, while providing useful information for development of goals and policies in the 2023 Comprehensive Plan Update, thereby helping to integrate the two planning processes and provide a foundation for further prevention and adaptation actions.
12. If yes to Q12, proceed to Step 3. If no to Q12, proceed to Step 4.		

COMMERCE NOTE: This example -- which looks at sea-level rise inundation -- is from Port Angeles' 2023 pilot test of the resilience guidance.