# 4. Climate change and resiliency

The Climate Element evaluates the impacts of climate change on the built, natural, and social environment of the of Forks and identifies local tactics to balance these changes with future growth and built environment priorities. In preparing to respond to a changing climate, Forks recognizes the benefit of partnership with peer communities and regional agencies. Effects of climate change are projected to intensify, persist over longer durations, and become more frequent. This element incorporates adaptation, mitigation, and response and recovery measures into local planning to reduce disruptions to climate-reliant industries (tourism, agriculture, etc.), highlighting public health strategies among physical and structural improvements.

The goals and policies contained within this Element reflect realistic actions to increase resilience to climate-related hazards.

## Growth Management Act (GMA) Requirements

In July 2023, the Washington State Legislature signed House Bill (HB) 1181 into law, adopting planning goals for greenhouse gas (GHG) emissions reduction and climate change and resiliency under the Growth Management Act (GMA). Planning jurisdictions under RCW 36.70A.040 are required to integrate a climate element into the comprehensive plan to identify and prepare for natural hazards exacerbated by climate change. The climate element includes a resilience sub-element. Pursuant to HB 1181's minimum requirements (RCW 36.70A.070(9)(e)(i)) the resilience sub-element must:

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

An assessment was conducted of Forks assets to evaluate impacts of climate-related hazards. The assessment was utilized to prioritize where action should be taken or whether to accept potential impacts over the 20-year planning horizon. The technical memorandum, "Climate Mitigation Challenges and Opportunities Analysis," outlines the findings and community engagement efforts that led to the development of Forks set of climate resilience goals and policies based on the extent of risk posed to each asset from climate-influenced hazards.

## Forks priorities

Using technical studies, including the University of Washington Climate Impact Group's Climate Mapping for a Resilient Washington tool, the following climate-exacerbated hazards were identified to be relevant to Forks:

- Drought
- Extreme Heat
- Extreme Precipitation
- Flooding
- Reduced Snowpack
- Wildfire

Environmental protection is only a component of this element. Protection and enhancement of resources can be facilitated through sustainable approaches, such as green stormwater

infrastructure, low impact development, and promoting active transportation.

This element is intended to focus climate change actions on several areas where many co-benefits can be achieved, while acknowledging the contribution of human activities to global warming. Aligning goals and policies with co-benefits better clarifies Forks intent in development regulations, reflecting community desires as well.

## Sources

The Washington State Department of Commerce (DOC) published intermediate climate element planning guidance and a list of more than 200 model climate goals and policies (Menu of Measures).

The Climate Impacts Group (CIG) at the University of Washington (UW) created a publicly available web application to help local jurisdictions navigate climate information available for Washington and apply the information in climate resilience planning. The Climate Mapping for a Resilient Washington (CMRW) tool was created to support Washington State's efforts to update state climate risk assessment and is integrated into Washington State Department of Commerce's (DOC) work on the state's climate guidance for comprehensive planning.

CMRW was created with input from many stakeholders, including local governments and state agencies. CMRW is a compilation and curation of the best existing climate projection information for Washington State and includes information on changes in climate hazards at the local level.

CMRW includes projected changes in streamflow, snowpack, extreme precipitation, drought, and wildfire hazards that are critical for managing natural resources and protecting residents and communities.

## Limitations

The diversity of local impacts of a changing climate makes it challenging to use climate information to effectively plan for resilience and to strategically identify and prioritize risk-reduction activities in local jurisdictions. CMRW data is not a prediction of future conditions, rather a depiction of multiple possible future conditions.

- When multiple scenarios are available, the scenarios should be considered separately and not averaged together.
- The data in CMRW should be analyzed at the county or community scale. While climate models have proven effective at describing past and future conditions, the models are not equipped to describe changes for small areas even though the data in CMRW is down-scaled and is best suited for community and county-scale analysis.
- All streamflow data in CMRW applications are natural flows, and therefore do not include any influence from water withdrawals and hydropower projects.
- The model median values for change should be considered along with the range in model values. For some climate indicators, the range in model output for some areas is large and for others it may be small. Regardless, the range provides important context for how certain a change may be and should therefore be considered along with the model median.

## Forecasts

The following climate and climate-related natural hazard changes are mapped across the state with summaries at the ***county level***. Future conditions are forecast across multiple time periods and lower and higher scenarios for 19-year increments for base years 2020, 2030, 2040, 2050, 2060, and 2070-2099.

**Reduced snowpack** - percent change in the amount of water contained in the snowpack (snow water equivalent, SWE) on April 1 relative to the average for 1980-2009.

| | | Median | Model range* |
|---|---|---|---|
| 1980-2009 | Historical baseline | 9 inches | 8-11 inches |
| 2020-2049 | High scenario | -64% | -79 to -51% |
| 2030-2059 | High scenario | -71% | -85 to -56% |
| 2040-2069 | High scenario | -76% | -89 to -62% |
| 2050-2079 | High scenario | -84% | -94 to -70% |
| 2060-2089 | High scenario | -89% | -97 to -77% |
| 2070-2099 | High scenario | -93% | -98 to -82% |

* 10th to 90th percentile

Impact – a significant reduction in the snowpack means more winter rain is expected to occur in lower elevations resulting in more possible flooding events.

**Annual precipitation** - percent change in average total accumulated precipitation in inches over a year relative to the average for 1980-2009.

| | | Median | Model range* |
|---|---|---|---|
| 1980-2009 | Baseline | 70 inches | 51 to 80 inches |
| 2020-2049 | High scenario | 1.4% | -2.5 to 6.0% |
| 2030-2059 | High scenario | 1.7% | -2.6 to 7.6% |
| 2040-2069 | High scenario | 2.8% | -5.8 to 9.2% |
| 2050-2079 | High scenario | 3.8% | -4.5 to 9.4% |
| 2060-2089 | High scenario | 2.1% | -2.0 to 14.7% |
| 2070-2099 | High scenario | 2.9% | -4.0 to 17.5% |

* 10th to 90th percentile

Impact – significant increase in rainfall will likely create flooding events along Calawah and Bogachiel Rivers and on non-permeable soils within the developed residential areas causing property damage, and residential and business losses.

**Magnitude of 2-year storm** - percent change in the maximum amount of water from the 24-hour rainstorm that occurs on average once every 2 years relative to the average for 1980-2009 using probability analysis shown below as "NaN."

| | | Median | Model range* |
|---|---|---|---|
| 1980-2009 | Baseline | NaN | NaN |
| 2020-2049 | High scenario | 4% | -5 to 11% |
| 2030-2059 | High scenario | 5% | -2 to 11% |
| 2040-2069 | High scenario | 8% | -2 to 19% |
| 2050-2079 | High scenario | 12% | 1 to 21% |
| 2060-2089 | High scenario | 12% | 3 to 17% |
| 2070-2099 | High scenario | 14% | 5 to 17% |

* 10th to 90th percentile

Impact - significant increase in severe storm events will likely create flooding events along Calawah and Bogachiel Rivers and on non-permeable soils within the developed residential areas causing property damage, and residential and business losses.

**Likelihood of a year with summer precipitation below 75% of historical normal** - likelihood that summer (June-August) precipitation in any given year is below 75% of average precipitation, the historical normal for 1980-2009

| | | Median | Model range* |
|---|---|---|---|
| 1980-2009 | Baseline | 0 | 0 to 0 |
| 2020-2049 | High scenario | 0.24 | 0.14 to 0.34 |
| 2030-2059 | High scenario | 0.25 | 0.19 to 0.39 |
| 2040-2069 | High scenario | 0.25 | 0.18 to 0.42 |
| 2050-2079 | High scenario | 0.30 | 0.18 to 0.47 |
| 2060-2089 | High scenario | 0.31 | 0.22 to 0.51 |
| 2070-2099 | High scenario | 0.33 | 0.23 to 0.48 |

* 10th to 90th percentile

Impact – significant probability of increased drought conditions with dry vegetation on the wooded slopes north and west of Forks resulting in risk of wildfires.

**Maximum temperature** - change in the average daily summer (June-August) maximum temperature relative to 1980-2009[1].

| | | Median | Model range* |
|---|---|---|---|
| 1980-2009 | Baseline | 68 *F | 68 to 69 *F |
| 2020-2049 | High scenario | 3.1 *F | 1.7 to 4.1 *F |
| 2030-2059 | High scenario | 4.0 *F | 2.3 to 5.6 *F |
| 2040-2069 | High scenario | 5.5 *F | 2.9 to 7.2 *F |
| 2050-2079 | High scenario | 6.7 *F | 4.5 to 8.5 *F |
| 2060-2089 | High scenario | 8.1 *F | 5.3 to 10.1 *F |
| 2070-2099 | High scenario | 9.2 *F | 6.3 to 11.6 *F |

* 10th to 90th percentile

Impact – significant increase in temperature will require more energy to cool residential and business activities and risk increased dry vegetation for wildfire risk.

**Days above 100*F** - change in the number of days per year with maximum temperature greater than 100*F relative to 1980-2009.

| | | Median | Model range* |
|---|---|---|---|
| 1980-2009 | Baseline | 0 days | 0 to 0 days |
| 2020-2049 | High scenario | 0.0 days | 0.0 to 0.1 days |
| 2030-2059 | High scenario | 0.0 days | 0.0 to 0.1 days |
| 2040-2069 | High scenario | 0.0 days | 0.0 to 0.1 days |
| 2050-2079 | High scenario | 0.0 days | 0.0 to 0.1 days |
| 2060-2089 | High scenario | 0.1 days | 0.0 to 0.4 days |
| 2070-2099 | High scenario | 0.2 days | 0.1 to 0.7 days |

* 10th to 90th percentile

[1] Actual days with temperatures over 100 °F are as follows: 1981 – 2; 1988 – 2; 2021 – 3; and, 203 -2. www.extremeweatherwatch.com

Impact – mild increase in severe temperature will nonetheless require more energy to cool residential and business activities.

**Fire danger** - change in the number of days per year, relative to 1971 - 2000, with high fire potential based on dry fuels, fuel moisture below the 20th percentile.

| | | Median | Model range* |
|---|---|---|---|
| 1971-2000 | Baseline | 48 days | 48 to 48 days |
| 2010-2039 | High scenario | 5 days | -1 to 10 days |
| 2040-2069 | High scenario | 10 days | 1 to 16 days |

* 10th to 90th percentile, Note – only forecast to 2069.

Impact – significant increase in summer temperature and decrease of summer precipitation will increase summer drought conditions and wildfire risks.

**Wildfire** - likelihood of having climate and vegetation conditions each year that could support a wildfire, assuming ignitions are present and fire suppression is implemented.

| | | Median | Model range* |
|---|---|---|---|
| 1980-2009 | Baseline | 0 | 0 to 0 |
| 2020-2049 | High scenario | 0.00 | 0.00 to 0.00 |
| 2030-2059 | High scenario | 0.00 | 0.00 to 0.01 |
| 2040-2069 | High scenario | 0.00 | 0.00 to 0.01 |
| 2050-2079 | High scenario | 0.01 | 0.00 to 0.02 |
| 2060-2089 | High scenario | 0.01 | 0.00 to 0.03 |
| 2070-2099 | High scenario | 0.02 | 0.00 to 0.04 |

* 10th to 90th percentile

Impact – significant increase in summer drought conditions and risk of summer wildfires in the forested areas on the north, south, and boundaries of the UGA

**Humidex** - change in the number of days per year with a maximum humidex value of 90* relative to 1980-2009. Humidex is a measure of "experienced" temperature and includes measures of both temperature and humidity.

| | | Median | Model range* |
|---|---|---|---|
| 1980-2009 | Baseline | 2 days | 2 to 3 days |
| 2020-2049 | High scenario | 4.1 days | 2.3 to 7.4 days |
| 2030-2059 | High scenario | 7.3 days | 3.0 to 11.2 days |
| 2040-2069 | High scenario | 11.9 days | 4.7 to 17.7 days |
| 2050-2079 | High scenario | 17.4 days | 7.5 to 27.3 days |
| 2060-2089 | High scenario | 24.0 days | 10.7 to 41.3 days |
| 2070-2099 | High scenario | 30.8 days | 13.7 to 52.1 days |

* 10th to 90th percentile

Impact – significant increase in humidex values will cause more energy to cool residential and business activities and health risks to youngest and oldest residents.

**Streamflow** - percent change in the magnitude of streamflow on the day of the year with the most streamflow.

| | | 70-100% | 50-70% | 30-50% | 10-30% | -10-10% |
|---|---|---|---|---|---|---|
| 1980-2009 | Baseline | 0.0 | 0.0 | 0.0 | 0.0 | 100 |
| 2020-2049 | High scenario | 0.0 | 0.0 | 6.1 | 39.2 | 54.7 |
| 2030-2059 | High scenario | 0.0 | 0.0 | 19.0 | 68.6 | 12.4 |
| 2040-2069 | High scenario | 0.0 | 3.8 | 22.7 | 70.1 | 3.4 |
| 2050-2079 | High scenario | 0.0 | 12.8 | 24.7 | 58.6 | 3.9 |
| 2060-2089 | High scenario | 2.5 | 18.7 | 14.2 | 62.3 | 2.3 |
| 2070-2099 | High scenario | 12.4 | 8.2 | 18.8 | 58.8 | 1.7 |

* 10th to 90th percentile

Impact – significant increase in streamflow, the volume of surface water runoff in Calawah and Bogachiel Rivers, will create safety and flooding risks.

## Potential climate sector impacts

Following are examples of potential climate change impacts identified by Washington State Department of Commerce (DOC) by major activity sector that may affect Forks.

**Agriculture and food systems** – including the production, distribution, food processing in industrial areas and community gardens:

- Increased heat stress on crops and livestock.
- Reduced water availability for crops, livestock, and processing, as well as increased demand for irrigation due to longer and warmer growing season.
- Changes in weeds and/or plants that grow with the crops.
- Increased pest outbreaks, disease, and weeds.
- Increased food scarcity after hazards that disrupt food transportation and distribution.

**Buildings and energy** – including generation, transmission, and consumption:

- Reduced heating demand during winter months.
- Increased cooling demand during summer months, extreme heat events.
- More frequent power loss due to extreme storms and other hazard events.
- Shuttered power generating stations or transmission corridors to reduce wildfire risk.

**Cultural resource and practices** – including historic sites and cultural resources and processes:

- Loss of cultural and historic sites along the Calawah and Bogachiel Rivers due to more frequent and intense severe weather events.
- Loss of locally grown temperature-sensitive foods that are culturally important such as berries, shellfish, and salmon.

**Economic development** – including business continuity opportunities:

- Increased disruptions of business continuity and lost revenue and wages from floods, wildfires, and other hazards.
- Increased opportunities for warm-season activities including hiking, boating, and camping.
- Decreased opportunities for warm-season activities during the hottest part of the year because of heat, forest fires, low water levels, and reduced air quality.
- Possible positive increase in tourism dollars during expanded warm-season activities.

**Emergency management** - including preparedness, response, recovery:

- Increased costs and demands for emergency preparedness, response, and recovery activities due to more frequent and intense diversion of resources from planning, equipping, training, and exercising for other community hazards and risks.
- Increased household costs to prepare for, respond to, and recover from natural hazards.
- Additional cost as first responders are constantly on alert or responding with little downtime for recovery; and more residents are impacted by hazards on a year-round basis.

**Health and well-being** - including community well-being, equity, and engagement:

- Increased heat-related deaths and illnesses, particularly among the elderly, poor, and other vulnerable populations.
- Increased ozone and particulate matter from wildfire smoke and rising temperatures, elevating the risk of cardiovascular and respiratory illnesses and death.
- Increased negative health effects and potential exposure to contaminants spread via floodwaters.
- Increased risk of landslides and avalanches that could cause injury and property damage, particularly on the steep east and southeastern slopes of the UGA.
- Increased water temperatures that will alter timing, extent, location and intensity of vibrio growth and harmful algal blooms, increasing exposure and risk of waterborne disease.
- Increased exposure to weather-related disasters can cause or exacerbate stress and mental health consequences.
- Increased vulnerability of residents, particularly those who live in poverty and polluted and/or high-risk hazard areas.

**Ecosystems** – including terrestrial and aquatic species, habitats, and services:

- Increased strain added to people experiencing homelessness and service providers.
- Increased severe seasonal allergies and increased hospitalizations for people with chronic respiratory diseases due to longer pollen seasons and changing pollen composition.
- Increased wildfire and smoke from forests and grasslands.
- Periodic drought impacting species diversity and distribution and loss of species not able to adapt to changes.
- Increased competition from and expanded coverage of invasive species.
- Increase in forest growth and productivity in the near-term where soil moisture is adequate and fire risk is low and vice versa.
- Increased stress on cold-water species in lakes and rivers.
- Increased possibility of diseases and death of fish populations.

**Transportation** - including multimodal travel and infrastructure:

- Increased road surface damage from higher temperatures.
- Increased maintenance requirements for roadside and median strip vegetation.
- Increased infrastructure damage from rapid rain-freeze-thaw cycles.

**Waste management** – including materials recycling and disposal:

- Increased solid waste and potentially hazardous waste and associated environmental and public-safety impacts following severe storms, flooding, and other hazards.
- Increased emissions of carbon dioxide, methane, and other greenhouse gases associated with the transport and disposal of waste.

**Water resources** – including water quality and quantity:

- Shift in the timing of spring snowmelt.
- Lower summer streamflow.
- Impacts of wildfire, smoke, and ash on drinking water supply and storage.
- Increased drought impacts on water quality and quantity.
- Increased flooding impacts.
- Increased aquifer drawdown and competition for water.
- Warmer water temperature in lakes and rivers.
- Changes in water quality.
- Increased demands on stormwater management systems with the potential for more combined stormwater and sewer overflows.

**Zoning and development** – including site use, design, and other development facets:

- increased climate-induced population displacement and migration.
- Increased erosion or damage to shoreline infrastructure and other natural features due to storm surge.
- Increased demand for irrigation of non-native, non-productive landscaping.
- Changes in the size and shape of designated environmentally critical areas, buffers, and shoreline environments.
- Changes in housing stock availability due to hazard events.
- Increased impervious surface runoff, and associated management and maintenance costs.
- Increased costs for maintenance and expansion of shoreline erosion control.
- Need for new or upgraded flood-control and erosion-control structures.

## Greenhouse gases (GHGs)

Greenhouse gases (GHGs) trap heat in the earth's atmosphere and are a primary contributor to a changing climate. GHGs include carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons, among other gases. A significant human source of GHG emissions is from the burning of fossil fuels for transportation, energy use, and industrial processes. GHG emissions also occur because of deforestation and agricultural production.

Local governments can limit GHG emissions and mitigate climate impacts using a range of actions and strategies across sectors. In evaluating what actions to take, a local government should consider such factors as the resources required to implement the action, the emissions reduction potential of the action, community context, actions and plans already being implemented, and the co-benefits of the action. Co-benefits can include cost savings, public health, improved mobility, climate justice, environmental health, and others.

Climate action plans (CAPs) typically list emissions reduction strategies by sector (such as buildings, transportation, land use, waste, natural systems, etc.), and there are many options for reducing emissions within each sector. Below are several strategies for local GHG reduction with associated examples and resources that apply to Forks.

## CHG reduction measures

The following measures can be instituted in Forks to reduce CHG emissions:

**City operations** - manage fleets to reduce vehicle miles traveled (VMT), install renewable energy sources in capital facilities, encourage telework and car sharing, provide employee bus passes, and adopt green purchasing policies.

**Sustainable purchasing** - purchase products that have a lesser or reduced negative effect or increased positive effect on human health and the ecological environment, when compared with competing products that serve the same purpose.

**Telework/remote work** - allow employees to work from home or at a neighborhood telework office rather than commuting daily to a distant work site.

**Electric vehicles (EVs)** - purchase electric and low emissions vehicles for town operations and invest in EV charging infrastructure using Department of Commerce (DOC) grants for electric vehicle charging infrastructure.

**Transportation and land use** – create trails, paths, sidewalks, and transit stops to improve walking, biking, and transit that produce fewer greenhouse gas emissions and improve air quality and public health.

**Urban forest/tree canopy** - integrate trees and green space that mitigate GHG emissions and reduce exposure to harmful effects of climate change, such as heat.

**Buildings** - improve energy efficiency in buildings by implementing strategies for building electrification, green building incentives/performance standards, renewable energy, and C-PACER financing of efficiency upgrades.

**Building electrification** - electrify or eliminate the use of natural gas in all buildings as the most cost-effective way to meet statewide climate goals of achieving 95% reduction in greenhouse gases by 2050.

**Green building incentives/performance standards** – adopt building efficiency and sustainable design to reduce long-term operating/maintenance costs and significantly reduce energy consumption and GHG emissions.

**Renewable energy strategies** - promote and incentivize use of renewable energy resources in homes, commercial buildings, and public facilities.

**Commercial Property Assessed Clean Energy and Resilience (C-PACER)** - facilitate financing of energy efficiency upgrades by participating in the C-PACER program to allow commercial property owners access to private financing for qualifying energy efficiency, renewable energy, water conservation, and resiliency improvements.

**Waste reduction** - reduce waste, recycling, and composting to reduce GHG emissions, both by reducing the energy used in the production of materials and by reducing the flow of materials to the landfill where anaerobic decomposition produces methane — a potent GHG.

## Goals and policies

**Resilience Sub-element**

**Goal CG 1: Ensure the local transportation system includes infrastructure, routes, and travel modes - can withstand and recover quickly from the impacts of extreme weather events and other hazards exacerbated by climate change.**

Policy CG 1.1: Improve street connectivity and walkability, including sidewalks and street crossings, to serve as potential evacuation routes.

Policy CG 1.2: Design and site new and expanded roads to have the least possible adverse effect on the shoreline and not result in a net loss of shoreline ecological functions, or adversely

impact existing or planned water-oriented uses, public access, and habitat restoration and enhancement projects.

Policy CG 1.3: Enhance the resilience of parks and recreational trails by assessing and addressing climate hazards and impacts.

**Goal CG 2: Ensure energy infrastructure - including generation and transmission - accommodate renewable energy opportunities and withstand and recover quickly from impacts of extreme weather and other natural hazards worsened by climate change**

Policy CG 2.1: Install distributed renewable energy generation and battery infrastructure at public facilities to store renewable electricity generated on site and provide emergency power that ensures continuity of operations.

Policy CG 2.2: Require new subdivisions bury electricity transmission lines and associated infrastructure to reduce damage from storms and wildfire ignition risks

Policy CG 2.3: Work with energy utilities to improve the safety and reliability of infrastructure vulnerable to climate change.

**Goal CG 3: Ensure development and redevelopment projects are resilient to the impacts of climate change.**

Policy CG 3.1: In areas with significant vulnerability to climate hazards, facilitate and support long-term community visioning including consideration of managed retreat processes and facilities.

Policy CG 3.2: Review required buffers and setbacks for steep slopes and shorelines vulnerable to erosion exacerbated by climate change, and establish new minimums, if necessary, so that improvements are not required to protect structures during the expected life cycle.

Policy CG 3.3: Consider future climate conditions during siting and design of capital facilities, including changes to temperature, rainfall, and water level, to help ensure the capital facility functions as intended over a planned life cycle.

Policy CG 3.4: Identify and implement strategies for reducing residential development pressure in the wildland-urban interface.

**Goal CG-4: Protect and preserve water quality and quantity from drought, extreme heat, and other hazards exacerbated by climate change.**

Policy CG 4.1: Manage **water** resources sustainably in the face of climate change through smart irrigation, stormwater management, preventative maintenance, water conservation and wastewater reuse, plant selection, and landscape management.

Policy CG 4.2: Develop and implement a comprehensive drought resilience strategy that factors in projected climate impacts and sets action levels for different drought stages.

Policy CG-4.3: Evaluate the long-term adequacy of water delivery infrastructure to ensure that changes in hydrological patterns (e.g., increases in flooding frequency or reduction of late-summer water availability associated with climate change) can be anticipated and managed effectively.

Policy CG 4.4: Construct and maintain new water-storage systems (e.g., large cisterns, water towers, and reservoirs) to provide back-up water supplies during droughts and support climate resilience.

Policy CG-4.5: Develop and implement an urban heat resilience strategy that includes land use, urban design, urban greening, and waste heat reduction actions.

**Goal CG-5: Ensure the protection and restoration of streams, riparian zones, estuaries, wetlands, and floodplains to achieve healthy watersheds that are resilient to climate change.**

Policy CG 5.1: Protect and restore watershed-scale processes to maximize the ecological benefits and climate resilience of riparian ecosystems.

Policy CG 5.2: Establish land use patterns that increase the resilience of the built environment, ecosystems, and communities to climate change.

Policy CG- 5.3: Protect and restore riparian vegetation to reduce erosion, provide shade, and support other functions that improve the climate resilience of streams.

Policy CG-5.4: Restore floodplains and connectivity to improve the resilience of streams and rivers and reduce flood risk.

Policy CG 5.5: Enhance natural areas and habitat for climate resilience.

**Goal CG 6: Ensure that buildings are designed and built sustainably to reduce environmental impacts and remain resilient to extreme weather and other hazards worsened by climate change.**

Policy 6.1: Require the design and construction of commercial and residential buildings and their surrounding sites to reduce and treat stormwater runoff and pollution while continuing the requirement for that all new construction must keep its stormwater on site.

**Goal CG-7: Enhance emergency preparedness, response, and recovery efforts to mitigate risks and impacts associated with extreme weather and other hazards worsened by climate change.**

Policy 7.1: Map transportation infrastructure that is vulnerable to repeated floods, landslides, and other natural hazards, and designate alternative travel routes for critical transportation corridors when roads must be closed.

Policy 7.2: Factor climate impacts into the planning of operations and coordination of preparedness, response, and recovery activities among first responders and partners, including public health, law enforcement, fire, school, and emergency medical services (EMS) personnel.

Policy 7.3: Analyze how the municipal water system maintains adequate pressure during a major wildfire event (e.g., multiple structures burning) and how it will look under current and projected drought conditions.

Policy 7.4: Develop and implement a wildfire smoke resilience strategy in partnership with residents, emergency management officials, regional clean air agency officials, and other stakeholders.

GHG Reduction Sub-element

**Goal CG 8: Reduce vehicle miles traveled to achieve greenhouse gas reduction goals.**

Policy CG 8.1: Implement travel demand management (TDM) programs and strategies

Policy CG 8.2: Create safe, well-connected, and attractive bicycle and pedestrian transportation networks to encourage active transportation.

Policy CG 8.3: Prioritize, develop, and maintain mobility hubs in transportation-efficient locations - especially in

overburdened communities experiencing a scarcity of transportation alternatives.

Policy CG 8.4: Facilitate the siting of complimentary destinations such as commercial-employment centers, schools or education centers, and residential developments.

**Goal CG 9: Ensure that buildings use renewable energy, conservation, and efficiency technologies and practices to reduce greenhouse gas emissions.**

Policy CG 9.1: Encourage the use of green building certifications, as well as the utilize of Washington grown wood products to improve energy and environmental performance.

Policy CG 9.2: Maximize renewable energy sources for the supply of electricity and heat to new and existing buildings.

Policy CG 9.3: Retrofit buildings for energy efficiency.

*Policy CG 9.4: Encourage the analysis of utilizing renewable energy for part or all of publicly owned energy needs.*

**Goal CG 10: Increase housing diversity and supply within urban growth areas to reduce greenhouse gas emissions and support environmental justice.**

Policy CG 10.1: *Support increased transit options within the denser areas of the urban growth area (UGA).*

Policy CG 10.2: Allow or encourage micro-housing units.

Policy CG 10.3: Develop and implement inclusionary zoning to support greater income diversity in housing types.

## Resources

Washington State's Department of Commerce (DOC) assembled data from the following sources with which to estimate climate change impacts including:

- **NOAA's (National Oceanic and Atmospheric Administration) Climate Mapping for Resilience and Adaptation (CMRA) Too**l - provides information about past, present, and future climate conditions at the census tract and tribal reservation scales.

- **NOAA's U.S. Climate Resilience Toolkit** - provides additional online resources, including county-scale climate data via The Climate Explorer.

- **The U.S. Global Change Research Program's Fifth National Climate Assessment** - includes a northwest chapter and national climate change impacts for different hazards and sectors.

- **Washington Department of Natural Resources' (DNR) Geologic Information Portal** - includes an interactive map of landslides and geologic hazards across the state.

- **Washington Department of Health's (DOH) Environmental Health Disparities Map** - evaluates environmental health risk factors in communities and provides a cumulative environmental health impact score for each census tract, reflecting pollutant exposures and factors that affect people's vulnerability to environmental pollution. The tool incorporates indicators that include ozone concentration, wastewater discharge, poverty rate, disability, death from cardiovascular disease, and low birth weight. DOH's map is not fully comprehensive about tribal information, so the map should be complemented by consultation with tribes and guidance from the Environmental Justice Council (EJC).

- **University of Washington's (UW) Climate Health and Risk Tool** - describes how climate-exacerbated hazards impact health; assess communities' relative vulnerability, exposure, and risk and identify policies.

- **University of Washington's (UW) Climate Change Impacts and Adaptation in Washington State: Technical Summaries for Decision Makers** - summarizes existing knowledge about the likely effects of climate change on Washington state.