CITY OF PUYALLUP ENVIRONMENT & SUSTAINABILITY ACTION PLAN

VULNERABILITY ASSESSMENT
Overview

How will Climate Change Impact the City of Puyallup?

The Puget Sound region is experiencing a diversity of climate changes: **warmer temperatures, shifting rainfall patterns, reduced winter snowpack, and increased frequency and risk of wildfires**. These changes have introduced and exacerbated a variety of risks for communities and natural systems across the region, including increased flooding and landslide risk, reduced water supply and streamflow, impaired ecosystems and habitat, and prolonged periods of drought.

The following graphic summarizes **projected climate trends through 2050 and 2080** based on the latest climate change research available for the Puget Sound region and the City of Puyallup.

Maximum Daytime Temperature	Precipitation Intensity	April 1st Snowpack	Summer Runoff	Winter Runoff
Protected changes in extreme high daytime temperatures	Projected change in a 25-year, 1 hour rain event	April 1st snowpack levels as measured	Jul-Sep, includes overland water flows and subsurface runoff in shallow groundwater	Dec-Feb, includes overland water flows and subsurface runoff in shallow groundwater
Change by 2050	**Change by 2050**	**Change by 2050**	**Change by 2050**	**Change by 2050**
↑ 7.5°F increase	↑ 33% increase	↓ 53% decrease	↓ 4.1% decrease	↑ 8.5% increase
Change by 2080	**Change by 2080**	**Change by 2080**	**Change by 2080**	**Change by 2080**
↑ 12.0°F increase	↑ 43% increase	↓ 74% decrease	↓ 4.5% decrease	↑ 11.6% increase

WHAT IS PUYALLUP DOING?

The City of Puyallup completed a climate vulnerability assessment to:

- Evaluate how climate change may impact the community, natural systems, and City infrastructure such as roads and buildings.
- Identify strategies for building resilience to climate change impacts.
- The results of the vulnerability assessment are summarized below across four City sectors: Buildings and Energy; Natural Systems and Water; Transportation; and Public Health and Economic Wellbeing.

What is Climate Change Vulnerability?

Vulnerability refers to the degree to which people, natural resources, infrastructure, or other assets Puyallup residents value are susceptible to the adverse impacts of climate change. Three primary factors determine vulnerability to climate change impacts –**exposure, sensitivity, and adaptive capacity**—are described below:

Exposure + Sensitivity – Adaptive Capacity = Vulnerability

Exposure: Is a system physically located in an area that currently experiences or will experience climate change impacts (e.g., sea level rise, flooding, heatwave)?

Sensitivity: To what degree is the system likely to be affected by the climate change impacts it is exposed to?

Adaptive Capacity: Is the system able to withstand or adjust to climate change impacts with minimal disruption?

Vulnerability: A system's susceptibility to being adversely affected by climate change, vulnerability is a function of the exposure of a system to climate impacts, its sensitivity to those impacts, and its ability to withstand or adjust to those impacts.

WHO IS MOST AT RISK?

Climate impacts will be disproportionately experienced across different communities within Puyallup, including people with low income, older adults, youth, immigrants, non-English speakers or those with limited English proficiency, outdoor workers, refugees, unhoused community members, and Black, Indigenous, People of Color (BIPOC).

Each city sector analysis includes a summary of how climate change will impact these frontline community groups.

FRONTLINE COMMUNITIES

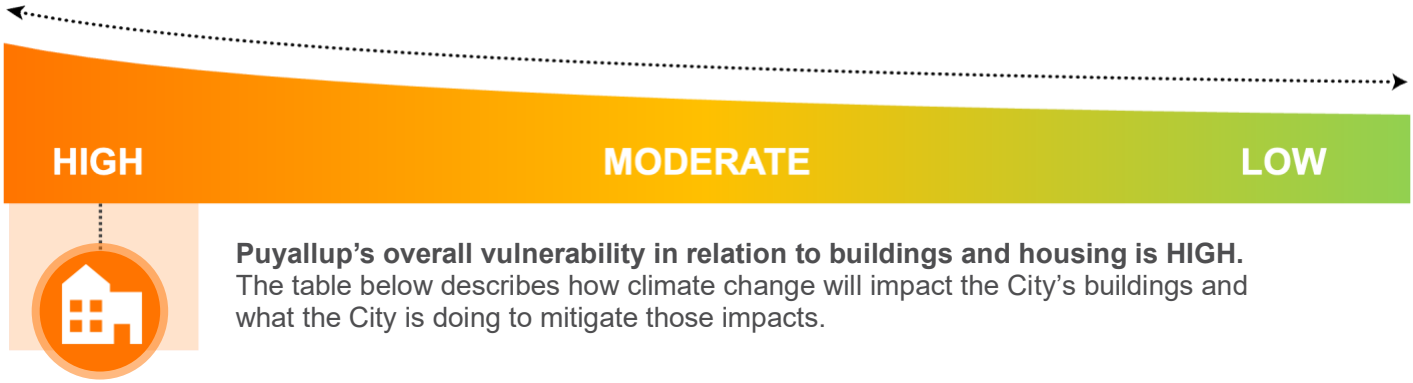
Frontline communities are those that often experience the earliest and most acute impacts of climate change, face historic and current inequities, and have limited resources and/or capacity to adapt.

CITY OF PUYALLUP ENVIRONMENT & SUSTAINABILITY ACTION PLAN

VULNERABILITY ASSESSMENT
Buildings & Energy

This factsheet presents climate risks to Puyallup's built environment and the City's adaptive capacity to climate change. Climate risks are the exposure and sensitivity to climate change and adaptive capacity is what the City is doing to mitigate the impacts of climate change.

Buildings & Housing



Puyallup's overall vulnerability in relation to buildings and housing is HIGH. The table below describes how climate change will impact the City's buildings and what the City is doing to mitigate those impacts.

Climate Risk (Exposure + Sensitivity)	Adaptive Capacity
MODERATE - HIGH	LOW
• **Floods** will likely increase in frequency and intensity, putting existing and future structures in the floodplains and low-lying areas at high risk and structures adjacent to these floodplains at moderate risk. • **Impervious surfaces** such as asphalt and concrete prevent rainwater from being absorbed into the ground. Areas with a large proportion of impervious surfaces could face higher flood risk.	• Puyallup has implemented higher **regulatory standards** for buildings in flood hazard areas. The City is also designing a **setback levee** on the Puyallup River and works with nearby jurisdictions to mitigate flood risk. • Puyallup's levees and revetments are 60 to 100 years old and do not meet modern design criteria. The **uncertified levees** would expose parts of the City to flooding during a 100-year flood event.

WHO IS MOST AT RISK?

- Renters living in housing that is older, not built according to updated flood mitigation standards and codes, and located in low-lying areas
- Communities of color facing racial wealth gaps and limited access to public resources
- Residents with limited mobility, including people with disabilities, the elderly, and those without a car.

Energy Systems

Puyallup's overall vulnerability in relation to energy systems is MODERATE.

The table below describes how climate change will impact the City's buildings and what the City is doing to mitigate those

Climate Risk (Exposure + Sensitivity)	Adaptive Capacity
MODERATE - HIGH	**MODERATE**
• **Winter storms, floods, and extreme heat** can make Cities more prone to **power outages**. Falling trees and branches, erosion, and flooding during winter storms can damage utility poles and transmission and distribution lines. • **Higher demand for air conditioning** during extreme heat events can strain the electricity grid and lead to **power outages**.	• **Energy efficient buildings** increase Puyallup's ability to provide essential heating and cooling for residents and maintain essential operations during extreme weather events while decreasing the risk of power outages. Within the City, approximately 18 buildings have LEED (Leadership in Energy and Environmental Design) or Energy Star certification**.** • The City is taking action to **manage stormwater, erosion, and flooding** around critical energy infrastructure and has installed **backup generators** for critical city infrastructure. • Puyallup gets its electricity from Puget Sound Energy (PSE), which relies on **hydroelectric power** for nearly one third of its energy supply portfolio. Given **future projections of lower streamflow in the summer**, PSE's current energy supply portfolio is will likely be unable to meet future energy demand, especially during the summer.

WHO IS MOST AT RISK?

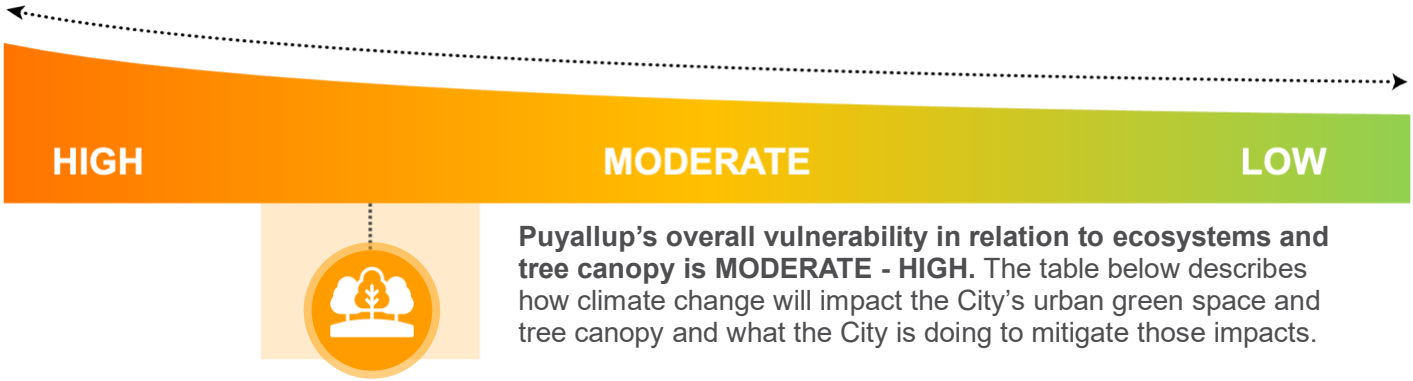
- **Low-income residents** who are less likely to have energy efficiency upgrades in their homes and have limited access to energy services will be at most risk to rising summer temperatures and heatwaves.

CITY OF PUYALLUP ENVIRONMENT & SUSTAINABILITY ACTION PLAN

VULNERABILITY ASSESSMENT
Natural Systems & Water

This factsheet presents climate risks to Puyallup's natural systems and water and the City's adaptive capacity to climate change. Climate risks are the exposure and sensitivity to climate change and adaptive capacity is what the City is doing to mitigate the impacts of climate change.

Ecosystems and Urban Tree Canopy



Puyallup's overall vulnerability in relation to ecosystems and tree canopy is MODERATE - HIGH. The table below describes how climate change will impact the City's urban green space and tree canopy and what the City is doing to mitigate those impacts.

Climate Risk (Exposure + Sensitivity)	Adaptive Capacity
MODERATE - HIGH	MODERATE - LOW
• **Hotter and drier summers with lower streamflow** in the Puget Sound Region will strain ecosystems, watersheds and urban tree canopy, making them more susceptible to **invasive plant species and pests.** • **Reduced rainfall and streamflow** in the summer will likely **degrade critical habitat for salmon,** which rely on sufficient streamflow for upstream migration and reproduction each year. • **Flooding** due to higher rainfall in winter will **increase runoff of contaminants and debris** into creeks and the Puyallup and White Rivers and could **scour salmon nests from streambeds.**	• The City's 20-year **Natural Open Spaces Restoration Plan** aims to restore and maintain natural open spaces that support healthy ecosystems and waterways through community stewardship. • Puyallup's tree canopy coverage is 26%, falling short of the recommended 40% tree canopy coverage for cities by American Forests. • Puyallup's Green City Partnership Program aims to get the City **recertified as a Tree City USA.**

Stormwater Infrastructure

Puyallup's overall vulnerability in relation to stormwater infrastructure is MODERATE.

The table below describes how climate change will impact the City's stormwater infrastructure and what the City is doing to mitigate those impacts.

Climate Risk (Exposure + Sensitivity)	Adaptive Capacity
MODERATE - HIGH	**MODERATE**
• Stormwater systems and retention facilities can **overflow during heavy rain and flooding.** Puyallup's **aging storm drainage pipes**, especially those on the valley floor, would likely overflow during a heavy rainstorm. Stormwater outfalls to the river will also likely experience more frequent and **greater backflows with more frequent and intense flood events.** • The U.S. Army Corps of Engineers **decertified levees** along the Lower Puyallup River because they do not have sufficient height to protect the City from a 100-year flood.	• Each year, the City updates its **Stormwater Management Program Plan** to comply with the Clean Water Act. The City's municipal code establishes **standards for stormwater quantity and quality.** • The City's Hazard Mitigation Plan lays out a plan to **retrofit the Lower Puyallup River levee system.** • The City's **floodplain and flood insurance rate maps,** which are used to inform development and stormwater management, do not reflect climate change projections and therefore **would not protect the City from a 100-year flood.**

Water Supply and Quality

Puyallup's overall vulnerability in relation to water supply and quality is LOW - MODERATE. The table below describes how climate change will impact the City's water supply and quality and what the City is doing to mitigate those impacts.

Climate Risk (Exposure + Sensitivity)	Adaptive Capacity
MODERATE - LOW	**MODERATE-HIGH**
• **Intensifying drought and higher temperatures** are expected to reduce overall regional water availability in summer. **Heavier winter rainfall and flooding** can cause septic systems to overflow, threatening water quality. • Due to the City's **spring and deep well water sources** and high standards for water quality monitoring and purification, the **climate risk is relatively low** for Puyallup's municipal water supply. • Individual and private wells may be at a higher risk of water decline during summer drought months and at higher risk of contamination during extreme rainfall events in the winter.	• Puyallup's two main types of **underground water sources create redundancy** in some areas of the City. • The City implements **water conservation programs** to reduce consumption, monitors and invests in water storage and treatment infrastructure, and thoroughly tests the City's water supply. • Puyallup's **Water System Plan** delineates strategies to **address current and project water demands,** including applying for additional water rights to increase its capacity to meet maximum daily water demand by 2038.

CITY OF PUYALLUP ENVIRONMENT & SUSTAINABILITY ACTION PLAN

VULNERABILITY ASSESSMENT
Public Health & Economic Wellbeing

This factsheet presents climate risks to Puyallup's public health and economic wellbeing and the City's adaptive capacity to climate change. Climate risks are the exposure and sensitivity to climate change and adaptive capacity is what the City is doing to mitigate the impacts of climate change.

Emergency and Social Services

Puyallup's overall vulnerability in relation to emergency and social services is HIGH. The table below describes how climate change will impact the City's emergency and social services and what the City is doing to mitigate those impacts.

Climate Risk (Exposure + Sensitivity)	Adaptive Capacity
HIGH	MODERATE - LOW
• **Flooding, landslides, wildfire smoke, and heatwaves** can reduce access to social services, including physical and mental health care, emergency and relief services, and public facilities • During **extreme weather events,** social and emergency response services may not be accessible or experience disruptions in services.	• Puyallup will use funding from the State of Washington for projects to **improve livability and access to public services** in the South Hill and Downtown neighborhoods. • The City also has a variety of social services programs to **assist residents with food, housing, and transportation.**

WHO IS MOST AT RISK?

- **People who are elderly or very young** can be more sensitive to heat and smoke and have more difficulty evacuating during extreme weather events due to physical limitations.
- **People who have limited mobility or are differently abled** may not be able to evacuate during extreme weather events.
- **Community members with low income or without a car** who rely on public transit may be impacted due to unreliable transit access during extreme weather events.
- **Non-English-speaking residents** can have difficulty navigating and accessing emergency care and social services.
- **Residents experiencing homelessness** are exposed to the elements and will be most impacted by extreme weather events. They are also likely to have fewer options for evacuating and accessing emergency care and social services.

Local and Regional Economy

Puyallup's overall vulnerability in relation to local and regional economy is MODERATE – HIGH. The table below describes how climate change will impact the City's local and regional economy and what the City is doing to mitigate those impacts.

Climate Risk (Exposure + Sensitivity)	Adaptive Capacity
MODERATE - HIGH	**MODERATE - LOW**
• Puyallup has **5,022 structures in the 100-year floodplain** including local businesses, public facilities, and residential areas along the Puyallup and White Rivers and Clarks Creek. • A major flood event can negatively impact the local economy by significantly **hindering business operations, incapacitating transportation** to and from these areas, causing major **property damage,** and **decreasing housing value.**	• A significant challenge for Puyallup's economy is its high proportion of jobs in the service industry. These jobs often do not pay a living wage, causing workers in the service industry to have to rely on multiple jobs to support their families. • Historically the retail commercial hub for East Pierce County, Puyallup is facing competition in retail sales from larger retailers in unincorporated Puyallup.

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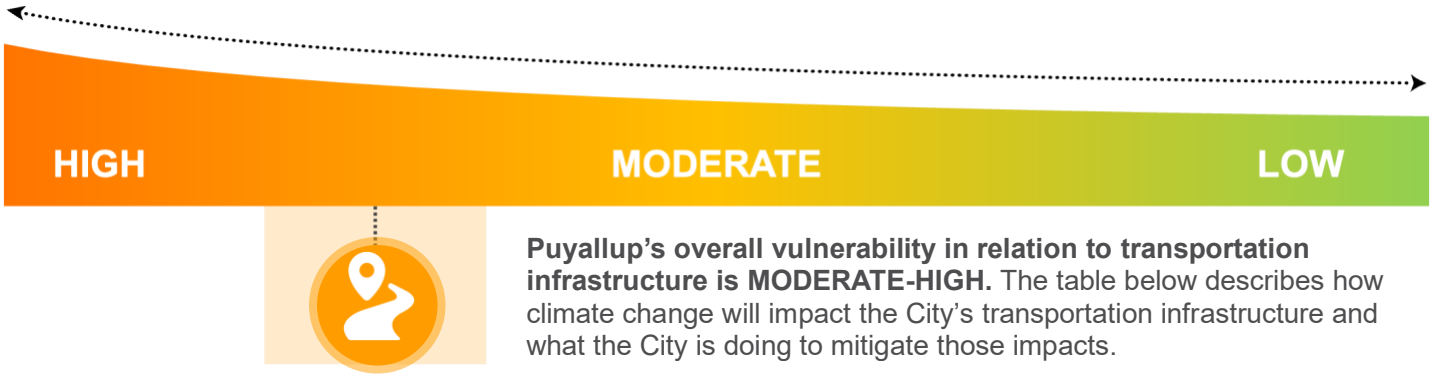
VULNERABILITY ASSESSMENT
Transportation Infrastructure

This factsheet presents climate risks to Puyallup's transportation infrastructure and the City's adaptive capacity to climate change. Climate risks are the exposure and sensitivity to climate change and adaptive capacity is what the City is doing to mitigate the impacts of climate change.

Transportation Infrastructure



Puyallup's overall vulnerability in relation to transportation infrastructure is MODERATE-HIGH. The table below describes how climate change will impact the City's transportation infrastructure and what the City is doing to mitigate those impacts.

Climate Risk (Exposure + Sensitivity)	Adaptive Capacity
HIGH	MODERATE
• **More frequent and intense floods and landslides due to heavier rainfall** could damage and close roads, which could temporarily impair Puyallup's transportation system. Roads in steep areas are more prone to landslides. • **Extreme heat** will also accelerate the degradation of transportation infrastructure, resulting in higher maintenance costs and greater threats to public health and safety.	• Puyallup has identified **areas at high risk of landslides**, but there is limited funding available to implement a landslide - and warning system. • Puyallup's Comprehensive Plan aims to **increase network redundancy, provide safer and more efficient transportation, and encourage public and active transport**. • The City's Active Transportation Plan (Puyallup Moves) and Americans with Disabilities Act (ADA) Plan aim to make a variety of transportation modes **more accessible to residents of all abilities**.

WHO IS MOST AT RISK?

- People in more **isolated neighborhoods** have less access to transportation networks and fewer routes for emergency transit during flooding and landslides.
- People who have **limited mobility or are differently abled** may not be able to evacuate during extreme weather events.
- **Community members with low income** who rely on public transit may be impacted due to unreliable transit access during extreme weather events.