BUILT ENVIRONMENT

VULNERABILITY TO CLIMATE CHANGE

Warmer temperatures and more extreme rain events may impact Shoreline's built environment as the city grows. Green building and infrastructure can help keep the city cool and soak up water.

Shoreline communities are likely to face the following impacts of a changing climate:

Buildings & Development

HIGH VULNERABILITY

Hotter temperatures and heavier rainstorms can increase risk of extreme heat and flooding in developed areas.

Housing

MODERATE VULNERABILITY

More extreme heat can raise the cost of energy to keep homes cool. Flooding and sea level rise threaten homes in some areas.

Transportation

LOW VULNERABILITY

More intense rainstorms may interrupt transit service and extreme heat could weaken infrastructure.

Solar panels at City Hall

BUILDINGS AND DEVELOPMENT

High vulnerability due to the need to prevent impacts of higher temperatures and increased flooding risk in the context of redevelopment and a growing population.

Between 2000 and 2018, Shoreline's population grew by 7 percent and is expected to keep growing to surpass 68,000 residents by 2035. Shoreline's population is aging as the baby boomer population retires. There has also been a shift toward smaller households. These population changes signal the need for higher-density housing and development to accommodate projected growth. High-density development can increase vulnerability to some climate change impacts. For example:

- As air temperatures get warmer in the future, roads, sidewalks, roofs, and other **hard surfaces absorb heat**, making it feel even hotter compared to areas with green space.
- Rainstorms are projected to become more intense and frequent in the future. **Hard surfaces increase flooding risk** because they prevent water from soaking into the ground and eventually into Puget Sound.

As Shoreline's community continues to grow, a transition from single-family homes—with lawns, trees, gardens, and landscaping—to denser housing developments with relatively less green space has the potential to exacerbate heat impacts. This transition may be most significant in areas currently developed at 40 percent or less of their zoned capacity.

However, high-density development and transit-oriented development (TOD) can also help reduce carbon emissions and vulnerability to climate change impacts. With sustainable and low-impact techniques, high-density development can help reduce energy use, mitigate urban heat island effects with features like green roofs, and mitigate flooding risks with features like rain gardens and bioswales. In addition, TOD improves efficiency and access to transit and services by centering development in multi-use areas that are walkable, bikeable, and near major transit systems.

HOUSING

Moderate vulnerability due to the need to reduce impact of extreme heat, flooding, and sea level rise while also keeping housing affordable.

TEMPERATURE CHANGES AND ENERGY DEMAND

Temperatures in the Puget Sound region are projected to get warmer, with summertime daily highs around 85°F by the 2050s. Pavement, sidewalks, and other hard, dark-colored surfaces absorb heat and make the air feel even hotter in urban places, called "urban heat islands."

Extreme heat increases the need for air conditioning (A/C) during the summer to keep homes and indoor spaces cool, which will likely increase energy use and associated costs for energy users. Lower-income populations have fewer resources to pay for A/C units and higher energy bills, making them more vulnerable to warmer temperatures.

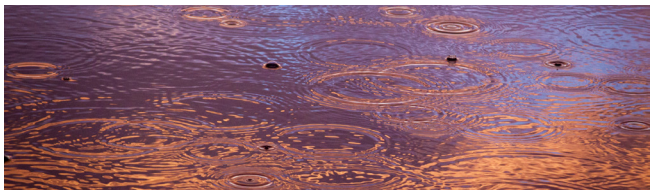
Winter temperatures in the Puget Sound region are projected to increase as well, with nighttime minimums increasing by approximately 5.4°F by the 2050s. Warmer winter temperatures may reduce heating costs for homes and indoor spaces, which may partially offset the impact of increased summer cooling costs.

Many of Shoreline's buildings and utilities are aging, with nearly 58 percent of Shoreline's housing stock being 50+ years old. Retrofitting homes, buildings, and infrastructure can help reduce vulnerability to impacts and mitigate rising energy costs.

Housing Affordability

Consistent and readily available housing can provide residents with the stability needed to respond and adapt to climate change impacts. The average Shoreline household spends 29 percent of their income on housing costs, which is roughly consistent with the regional and national average.

Households with lower incomes may spend over a third of their income on housing—leaving them with fewer resources to install and use A/C units, find alternative modes of transportation if streets are flooded, or take other steps to be more resilient.



HEAVIER RAINS AND FLOODING CONCERNS

Precipitation during the fall, winter, and spring is projected to increase in the Puget Sound region with climate change. Heavy rain storms will become more severe and more frequent. These extreme rain storms will increase the risk of flooding in low-lying areas. Homeowners and property owners in these areas may have additional costs to repair damages or modify their properties to be more resilient. Residents in these areas may face difficulties getting around if sidewalks and streets are flooded.

SEA LEVEL RISE

Shoreline is projected to experience between 2.0 feet and 2.5 feet of sea level rise by 2100 compared to 1991-2009. Sea level rise can increase coastal erosion and flooding, especially due to surges of water during extreme storms and high tides. Since most of Shoreline is protected from these impacts by the railroad, sea level rise and storm surge is expected to affect only a small number of households.

TRANSPORTATION

Low vulnerability due to multiple transportation options available to residents and the resilience of major transportation routes.

Higher temperatures, changes in precipitation, and extreme rain events are expected to impact transportation systems. For example:

- **Heavier rain events may cause more flooding and damage** to Shoreline's transportation infrastructure. Heavy rainfall can erode soil that support roads, bridges, and tunnels, and can disrupt evacuation or emergency service routes.
- **Warmer temperatures may cause pavement and rail tracks to soften, expand, and buckle**, cracking and damaging roads and sidewalks and posing a risk of train derailment.

Waterfront Railway at Innis Arden Reserve Park

These climate change impacts may place stress on transportation infastructure and interrupt transit services. As a result, people may have reduced access to healthcare, emergency services, food, and workplaces.

Climate change impacts may also make mobility more difficult for residents with accessibility needs (e.g., people who use wheelchairs) and residents who rely on transit, walk, or bike. While 18 percent of Shoreline residents use transit, walk, or bike to work, 95 percent own at least one car, indicating that most residents have more than one option in case of transportation disruptions. Multiple options for getting around, including public transit support for people with accessibility needs, enhance resiliency for all users in the transportation system. Link Light Rail expansion will provide even more transit options for Shoreline residents in the future.


Interurban Trail

WHAT IS SHORELINE DOING?

- **Deep Green Incentive Program:** provides incentives to residents and developers to implement energy and water conservation practices and other green building practices that go above and beyond what is required by code.
- **Green Building Requirements:** new development in areas surrounding future light rail stations are required to meet specific levels of green building certification.
- **Complete Streets Ordinance:** requires all City roads enable safe and convenient access and travel for all types of users including pedestrians, bicyclists, and transit riders.

Additional strategies that Shoreline is planning or could pursue to build climate resilience include:

- Working with local utility companies to **promote energy efficiency incentives and programs** to improve insulation and weatherization of buildings.
- **Enhancing tree canopy in developed areas** to naturally lower indoor temperatures by providing valuable shade and mitigating the urban heat island effect.
- **Encouraging the use of white or green roofs** to reflect heat and reduce the need for cooling, especially in more developed areas in Shoreline.