

# Natural Environment

# 6



# Chapter 6 – Natural Environment

## Introduction

The environment in Shoreline encompasses a blend of natural and human-made elements, Puget Sound panoramas, mature trees, vegetation, streams, wetlands, lakes, and tidelands are just a few attributes cherished by the community. These components profoundly influence the residents' quality of life. While Shoreline may not boast an untouched landscape, the city's name itself underscores the significance of the natural environment to its community identity. Preserving environmental quality depends on thoughtful decisions by government, businesses, and individuals, necessitating coordinated efforts to mitigate potential adverse impacts during development, redevelopment, or as a result of past practices.

Shoreline has evolved primarily as a suburban residential enclave, complemented by a mix of neighborhoods, schools, parks, community facilities, and commercial centers. Natural areas as further described in this chapter may border or interweave through these other land uses. These natural areas encompass the Puget Sound shoreline, bluffs, steep slopes, ravines, reserves, wetlands, streams, lakes, and clusters of mature trees. Spanning both private and public properties, including single-family residential lots and parks, these natural areas contribute to Shoreline's diverse and interconnected landscape.

The discussion of the natural environment and related features in Shoreline in this chapter of the DEIS focuses on those aspects of the environment that have the potential to affect or to be affected by growth and development that may occur over the next 20 years under the comprehensive plan.

Impacts of the alternatives would be considered significant if they result unmitigated degradation of the functions and values of critical areas or an increase in hazard from critical areas in conflict with adopted codes and best available science.

## Affected Environment

### Earth—Geologic History and Soils

Shoreline is located within the Puget Sound Lowlands—a wide low-lying region between the Cascade Range to the east and the Olympic Mountains to the west, known for rolling terrain, scenic coastlines, and a glacially related geologic history that has shaped the land and water features, soils and sediments, and other characteristics. Multiple glacial advances over the past 2 million years left glacial deposits including glacial till across the region. While glacial deposits are a primary parent material, included within these deposits are dense glacial till (hardpan), glacial outwash (clean sands and gravels) deposited by meltwater from the receding glaciers, and glacial lake sediments (silts and clays).

### Geologically Hazardous Areas

Geologically hazardous areas are areas susceptible to erosion, sliding, seismic activity, or other geological events. They pose a threat to the health and safety of citizens if sites with these areas are utilized by

incompatible development. These areas are classified by Shoreline based on the history of landslides, unstable soils, steep slopes, high erosion potential, or seismic hazards. The City has defined the following geologically hazardous areas in Chapter 20.80 of the Shoreline Municipal Code: landslide hazard, seismic hazard, and erosions hazard areas. **Figure 6.1** shows geologically related critical areas in Shoreline.

- **Landslide hazards areas** are areas potentially subject to landslide activity based on a combination of geologic, topographic, and hydrogeologic factors with slopes 15 percent or steeper, within a vertical elevation change of at least 10 feet. Areas with prior landslide activity regardless of slope are also considered landslide hazard areas.
- **Seismic hazard areas** are lands that, due to a combination of soil and ground water conditions, are subject to risk of ground shaking, lateral spreading, subsidence, or liquefaction of soils during earthquakes.
- **Erosion hazard areas** are areas with soils and with characteristic topography that are subject to severe erosion when disturbed. Typically identified in areas with slopes of 15 percent or greater and are comprised of, but not limited to the following soil types: Alderwood-Kitsap (AkF), Alderwood gravelly sandy loam (AgD), Kitsap silt loam (KpD), Everett (EvD) and Indianola (InD).

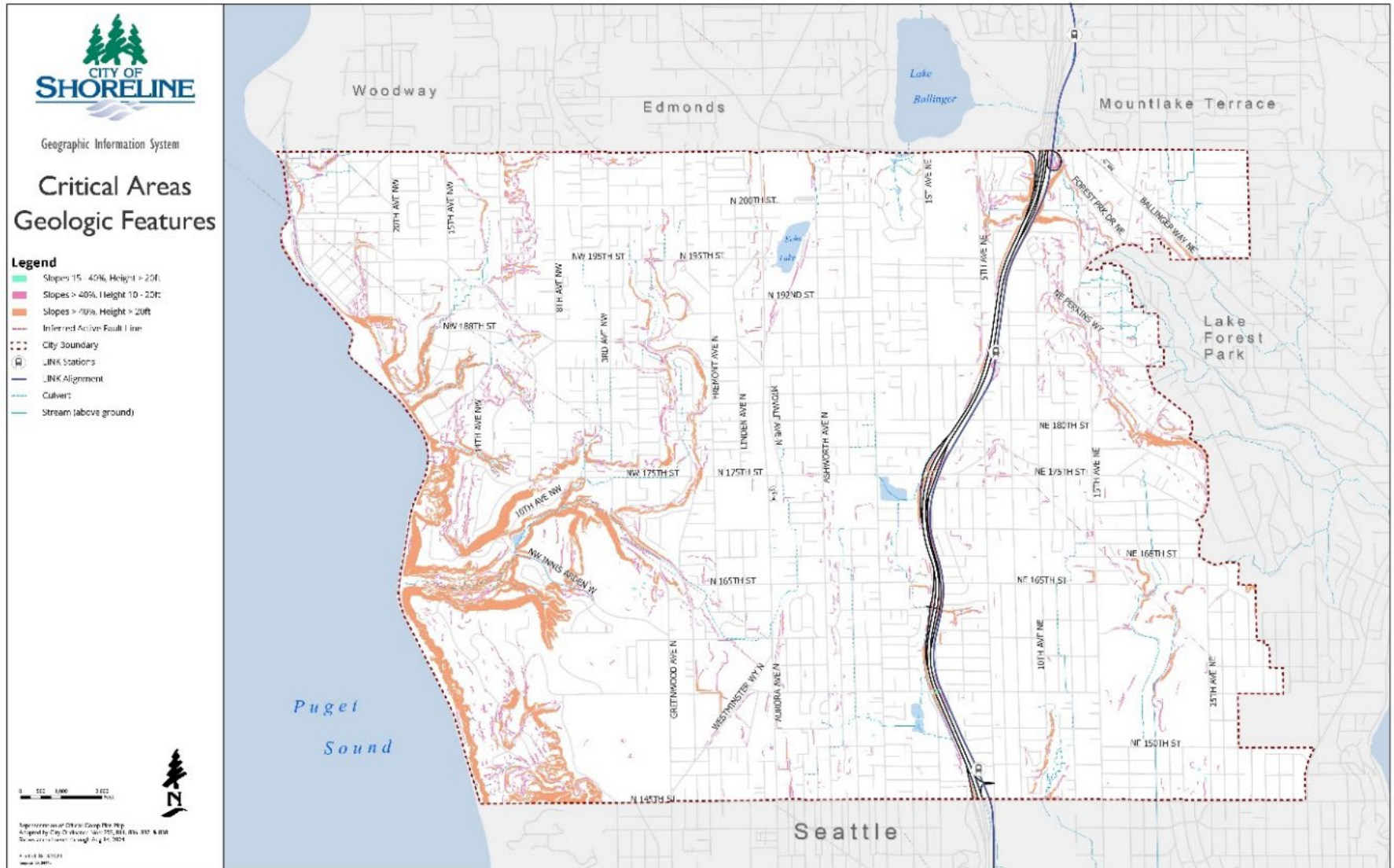
The term landslide refers to the down slope movement of masses of rock and soil. Landslides are caused by one or a combination of the following factors: change in slope gradient, increasing the load the land must withstand, shocks and vibrations, change in water content, ground water movement, frost action, weathering of rocks, and removal or changing the type of vegetation covering slopes.

Four types of landslides can potentially affect Shoreline: deep-seated, shallow, bench, and large slides. Puget Sound's shoreline contains many large, deep-seated dormant landslides. Shallow slides are the most common type and the most probable for Shoreline. Landslides are often triggered by other natural hazards, such as earthquakes, heavy rain, floods, or wildfires.

Shoreline contains areas of possible erosion and land slide hazard areas primarily located in the western portion of the City, along the shoreline of Puget Sound. The northeast corner of the City also contains potential erosion and land slide hazard areas.

Due to instability, visual impacts, and fire hazard, areas of steep slopes or unstable soils are not recommended for development without specific measures being taken to reduce or eliminate these potential impacts. Section SMC 20.80.224 contains restrictions on development in these areas.

Figure 6.1 Critical Areas Geologic Features in Shoreline



## Water Features

Water features and water bodies in Shoreline encompass wetlands, bogs, lakes, streams, creeks, and drainage ways, as well as considerations related to flood hazard areas. **Figure 6.2** illustrates water-related critical areas in Shoreline.

### Wetlands and Bogs

Wetlands perform valuable functions that include surface and flood water storage, water quality improvement, groundwater exchange, stream base flow augmentation, and biological habitat support. The approximate location and extent of wetlands are inventoried in a wetland data layer maintained by the City of Shoreline geographic information system (GIS) and depicted in Water Features Map at the end of this chapter. These wetlands range from the large estuarine system (a mixture of salt and fresh waters) adjacent to Puget Sound, to lakes and small excavated ponds. With the exception of the Puget Sound estuarine system, all wetlands in the city are palustrine systems (freshwater). The largest palustrine system is Echo Lake, located in the north-central portion of the city. Other large wetlands include ponds within Ronald Bog, Twin Ponds, Paramount Open Space Parks, and the Seattle Golf Club, as well as numerous undocumented wetlands of .5 acres or less. Most wetlands in the city are relatively isolated systems and surrounded by development.

Under the Shoreline Municipal Code, wetlands are designated using a tiered classification system (from Type I to Type IV) based on size, vegetative complexity, and the presence of threatened or endangered species. All wetlands, regardless of size, are regulated under the Shoreline Municipal Code. When a development is proposed on a site with known or suspected wetlands, a wetland evaluation is required to verify and classify wetlands and delineate boundaries and buffer areas. The State Department of Ecology mandates minimum wetland buffer areas based on typology and other factors.

### Lakes

There are four lakes in the city: Echo Lake, Ronald Bog, Hidden Lake, and Twin Ponds. Like most small urban lakes, Shoreline's lakes contain pollutants and contaminated runoff, including fertilizers and pesticides from lawns and gardens, oils, greases, heavy metals from vehicles, and fecal coliform bacteria. As urban development occurs, the process by which the nutrient level and vegetation in these lakes increases has accelerated. To combat this rapid acceleration, Ronald Bog and Twin Ponds have been historically dredged, but will eventually revert to bogs.

Hidden Lake has traditionally been used as a sediment storage facility and has significantly altered the stream function to accommodate this function. The lake was essentially an oversized detention pond that was routinely dredged by King County to remove accumulation of upstream sediments. The City of Shoreline recently removed the dam that created the impoundment which retained water and sediment to create the lake and has restored the previous sediment-laden lakebed to quality stream habitat with native plantings and buffers and restored natural sediment processes to improve nearshore habitat along the Sound. Hidden Lake no longer exists as a lake but is, instead, high value stream habitat that is part of Boeing Creek.

## **Streams, Creeks, and Drainage Ways**

There are six watersheds within the City of Shoreline boundary: Boeing, McAleer, Lyon, Thornton, Puget Sound Drainages, and West Lake Washington. McAleer, Lyon, Thornton, and West Lake Washington watersheds all eventually flow into Lake Washington. Boeing and the Puget Sound Drainages flow directly into Puget Sound. Each of these watersheds have numerous small streams and creeks, with the primary ones being Boeing Creek, Thornton Creek, McAleer Creek, and Lyons Creek.

Large portions of the watersheds drained by creeks in the city have been paved or otherwise developed. These hardscapes dramatically increases the volume of water in the creeks during storm surges and reduces in-stream flows during drier periods of the year. This combination of more intense storm surges and overall lower flows, causes numerous environmental problems including increased bank erosion; scouring and deepening of the stream channel; reduced water quality; sedimentation of gravel; damage to stream-side vegetation; and reduction or elimination of habitat for wildlife, fish, and the insects on which fish feed.

## **Groundwater Resources and Critical Aquifer Recharge Areas**

Groundwater is an important contributor to clean, cool water that supports streams and stream flow. Reduced base flows could result from changes in drainage patterns with development (although this is strictly regulated). Nevertheless, these impacts must be mitigated or could result in loss of flow carrying capacity, increased water temperatures, decreased supply of dissolved oxygen, loss of capacity to assimilate and dilute contaminants, loss of aquatic habitat, and creation of barriers to fish passage. Engineered surface water systems may not be effective in replicating natural processes or systems.

Critical aquifer recharge areas (CARAs) are critical areas that are important for protecting groundwater and drinking water supplies. CARAs are areas with permeable soils that can be susceptible to pollution and contamination. The goal of CARAs is to maintain the supply of drinking water and prevent pollution. The Washington State Department of Ecology's Growth Management Act requires the protection of CARAs.

Shoreline does not have any critical aquifer recharge areas (CARAs) within the city limits. Olympic View Water and Sewer District has identified a small area of the buffer zone associated with the Deer Creek Springs Wellhead as being located in Shoreline. A more thorough analysis of geologic, topographic, and subsurface conditions in the area of the Deer Creek Springs Wellhead buffer zone extending into Shoreline is needed to determine if additional protections within the wellhead buffer zone would be needed.

## **Flood Hazard Areas**

Due to its geographical positioning, Shoreline does not experience significant flooding from major rivers, however, certain areas of Shoreline are subject to periodic flooding events. The City is primarily drained by three minor streams: Boeing Creek, McAleer Creek, and Thornton Creek. Boeing Creek flows west through steep bluffs where it eventually outfalls to the Puget Sound. McAleer and Thornton Creeks both

outfall to Lake Washington. Similar to Boeing Creek, McAleer Creek flows through steep ravines, posing minimal hazards to the development above it. On the contrast, Thornton Creek flows through a swampy area parallel to I-5 on the west which leads to drainage issues and flooding susceptibility.

In Shoreline, flooding predominantly arises from surface water accumulating in low-lying regions with natural depressions with impermeable soils. To address these concerns, the City has developed a Surface Water Master Plan (SWMP) and has adopted the Department of Ecology Stormwater Manual for Western Washington as part of its strategy to manage surface water issues.

The Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM, or flood map) is the official map of a community on which defines any special flood hazard areas and the flood zones applicable to a community. This map is used by the National Flood Insurance Program (NFIP) for floodplain management, mitigation, and insurance purposes, and is the official source for determining flood risk within a community.

FEMA's National Flood Hazard Layer (NFHL) Viewer is a publicly available, interactive web map that can show the classification of Shoreline's surface waterbodies. Any area with a 1% or higher chance of experiencing a flood each year is considered to have high risk and are identified as special flood areas. Those areas have at least a one-in-four chance of flooding during a 30-year mortgage which impacts property owners with a federally backed mortgage. All home and business owners in high-risk areas with mortgages from federally regulated or insured lenders are required to buy flood insurance.

There are two types of flood zones identified by FEMA, located within the City: Zone AE and Zone A, both of which are classified as special flood areas, but differ in terms of how the risk was determined. In Zone AE, detailed studies were utilized to determine the base flood elevation (BFE) and the level of risk; whereas in Zone A areas, no detailed study has been performed, and the level of risk is determined based on approximate analysis.

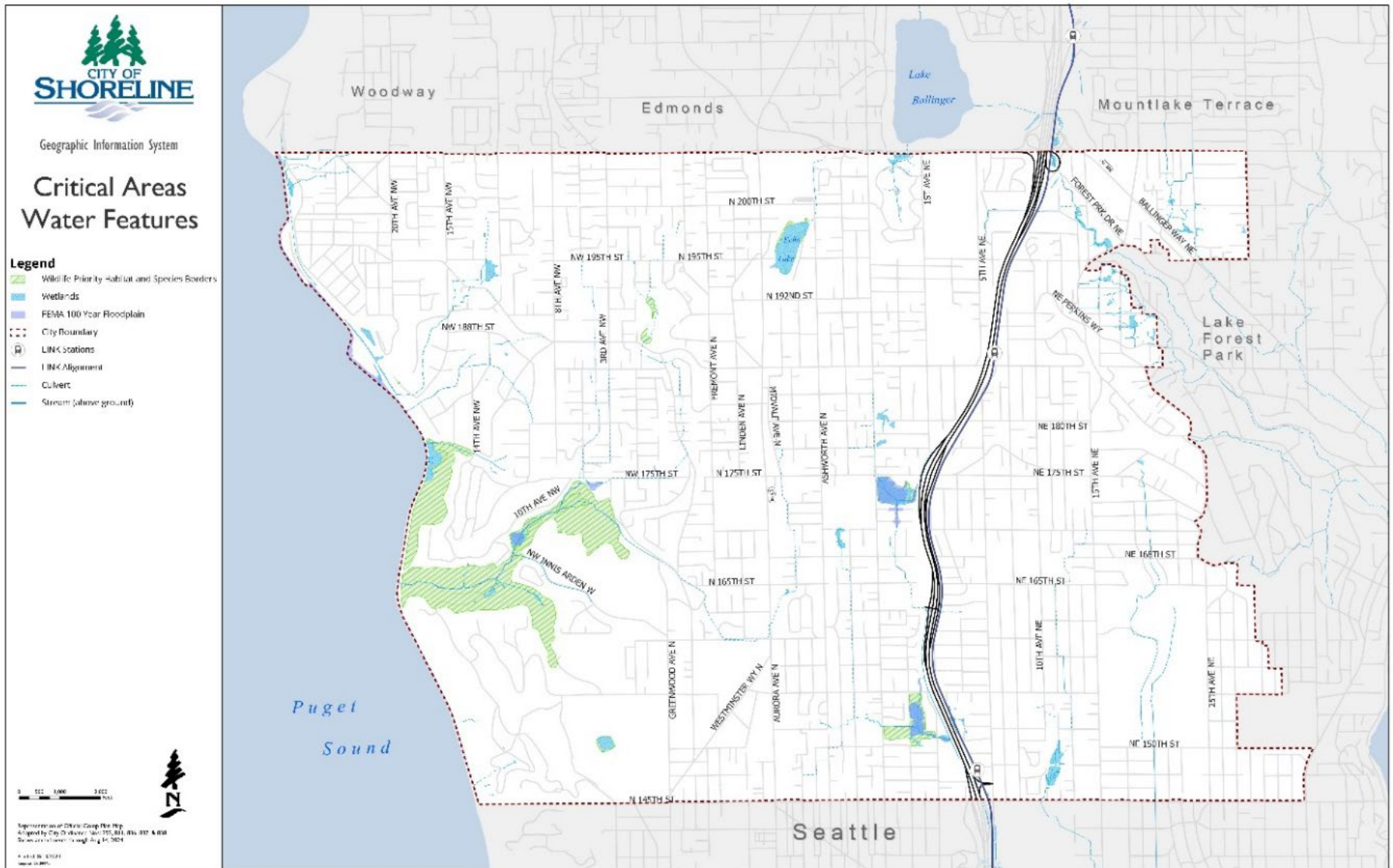
***Areas Designated as Zone AE in Shoreline:***

- Small portions of Puget Sound shoreline
- Ronald Bog

***Areas Designated as Zone A in Shoreline:***

- Boeing Creek
- Hidden Lake

Figure 6.2 Water Related Critical Areas in Shoreline





## Plants and Animals

### Vegetation

Aerial photos show that the community is a mosaic of various types of vegetation. Early accounts of Shoreline tell how Native Americans traveled along the shores of Puget Sound and local streams collecting sword fern and kinnikinnick at Richmond Beach, and wild cranberries at what are now Ronald Bog and Twin Ponds parks. Controlled fires were set in the Richmond Highlands and North City areas to create meadows for the cultivation of certain wild plants and to provide inviting, open spaces for small game (<https://www.shorelinewa.gov/our-city/about-shoreline/shoreline-history>).

Today, the Shoreline community highly values its trees and tree canopies. Large evergreen trees can be seen rising above residential neighborhoods, on hilltops, and even on the periphery of Aurora Avenue. As the city becomes more urbanized, it is a priority to maintain and enhance the tree canopy, and Shoreline has been recognized as a Tree City. The City has also developed Vegetation Management Plans for parks and will track tree canopy over time to gauge the effect of policies related to tree retention and replacement. Figure 6.3 shows Shoreline's Tree Canopy mapping.

The City encourages preservation and enhancement of forested open spaces, wetland habitat areas, and native vegetation found on steep slopes and larger residential lots. Trees help stabilize soils on steep slopes, and act as barriers to wind and sound. Plants replenish the soil with nutrients, generate oxygen, and clean pollutants from the air. Native vegetation provides habitat for wildlife. Wetlands and riparian vegetation provide surface water storage and help clean surface water of pollutants and sediment. The largest, most contiguous areas of native vegetation in Shoreline are primarily found in city parks, publicly owned open space, privately owned open space (such as the Boeing Creek area of The Highlands and the reserves in Innis Arden) and designated critical areas (such as steep slopes along the Puget Sound shoreline). These areas include the highest quality wildlife habitat found in the city. However, areas of less intensive residential development also contain mature trees and other native vegetation, which provide secondary wildlife habitat and substantially contribute to the quality of life in Shoreline. Native vegetation in residential areas that may be subdivided or otherwise more intensely developed is at the greatest risk of being lost.

### Habitat Areas

Urbanization and development very often lead to the elimination of wildlife habitats, posing a threat to various species' well-being. The decline of specific habitats can profoundly impact the health and survival of certain wildlife populations. Fish and wildlife habitat conservation areas are crucial for preserving species within their natural ranges, preventing the formation of isolated subpopulations. These designated habitats are linked to species recognized by state or federal agencies as endangered, threatened, sensitive, or candidate species.

Currently in the Puget Sound, the Chinook salmon and Steelhead are listed as threatened species by the federal government under the Endangered Species Act. Washington State Department of Fish and

**Figure 6.3 Tree Canopy Mapping in Shoreline**

Wildlife (WDFW) maps and the City's stream inventory indicate the presence of Chinook, Sockeye, Steelhead, Coho, and resident Cutthroat Coastal Trout salmon in portions of McAleer, Thornton, and Boeing Creeks. Other sources have indicated the presence of fish in other streams within the city, although the full extent of fish habitat has not been confirmed. To help restore healthy salmon runs, local governments and the State must work proactively to address salmon habitat protection and restoration.

WDFW has developed the Priority Habitats and Species (PHS) Program to help preserve the best and most important habitats and provide for the life requirements of fish and wildlife. Priority species are fish and wildlife that require protective measures and/or management guidelines to ensure their perpetuation. Priority habitats provide unique or significant value to many species. The WDFW has documented the locations of priority habitats and species. These PHS areas include wetlands, anadromous fish habitat, riparian areas, urban natural open space, habitat for priority bird species, and the point location of a priority bird species siting.

The City has developed a Geographic Information System (GIS) layer that includes detailed maps of PHS areas based on data provided by the WDFW and other mapping resources. WDFW provides management recommendations for priority species and habitats that are intended to assist landowners, users, and managers in conducting land use activities in a manner that incorporates the needs of fish and wildlife. Management recommendations are developed through a comprehensive review and synthesis of the best scientific information available. The City has reviewed the PHS management recommendations developed by WDFW for species identified in Shoreline and used them to guide the development of critical areas regulations that fit the existing conditions and limitations of Shoreline's relatively urbanized environment.

The City's Critical Areas provisions in Shoreline Municipal Code (SMC) Chapter 20.80 address Washington State priority habitats and species that are considered to be priorities for conservation and management. Priority species require protective measures for their perpetuation due to their population status, sensitivity to habitat alteration, and/or recreational, commercial, or tribal importance. Priority habitats are those habitat types or elements with unique or significant value to a diverse assemblage of species. A priority habitat may consist of a unique vegetation type or dominant plant species, a described successional stage, or a specific structural element.

Priority habitats and species are identified by the State Department of Fish and Wildlife in the Priority Habitats and Species List. Priority habitats and species known to be identified and mapped by the Department of Fish and Wildlife in Shoreline include, but may not be limited to, the following:

- Biodiversity areas and corridors identified and mapped along Boeing Creek and in and around Innis Arden Reserve Park;
- Chinook/fall chinook (*Oncorhynchus tshawytscha*);
- Coho (*Oncorhynchus kisutch*);
- Dungeness crab (*Cancer magister*);
- Estuarine intertidal aquatic habitat;
- Geoduck (*Panopea abrupta*);
- Northern goshawk (*Accipiter gentilis*);
- Pacific sand lance (*Ammodytes hexapterus*);
- Purple martin (*Progne subis*);

- Resident coastal cutthroat (*Oncorhynchus clarki*);
- Surf smelt (*Hypomesus pretiosus*);
- Waterfowl concentrations at Ronald Bog (Ronald Bog is not a shoreline of the State subject to the SMP); and
- Winter steelhead (*Oncorhynchus mykiss*).

## Air Quality and Greenhouse Gas Emissions

One of the basic characteristics of a livable city is clean air. Numerous federal, state, regional, and local agencies enact and enforce legislation to protect air quality. Good air quality in Shoreline, and in the region, requires controlling emissions from all sources, including: internal combustion engines, industrial operations, indoor and outdoor burning, and wind-borne particles from land clearing and development. In the Puget Sound region, vehicle emissions are the primary source of air pollution. Local and regional components must be integrated in a comprehensive strategy designed to improve air quality through transportation system improvements, vehicle emissions reductions, and demand management strategies.

Air quality is generally measured by the concentration of chemical compounds and particulate matter in the air outside of buildings. Air that contains carbon monoxide, ozone, and particulate matter can degrade the health of humans, animals, and plants.

Air quality in the Puget Sound region can vary between healthy and unhealthy conditions depending upon various influences and factors. Episodes of unhealthy air quality are usually the result of short-term PM2.5 and/or ozone pollution. PM2.5 describes airborne particles from a wide variety of sources (even natural ones) that measure 2.5 micrometers or smaller. Wind-blown dust, soot and ash from wildfires, chemicals from industrial complexes, and the burning of fossil fuels all constitute common origins of PM2.5.

Washington’s PM2.5 spikes are often attributable to forms of incomplete combustion, such as winter wood burning and wildfires. The latter is the reason for year-to-year fluctuations. For example, 2020 was a record-breaking year for fires nationally as well as within the state, causing more than a week of “unhealthy” or worse air quality in numerous Washington cities in the Puget Sound region. Wildfires are expected to become more frequent and severe with the planet’s warming climate, as are Washington’s smoky conditions. Steep mountains, strong winds, longer summer seasons, and drier conditions contribute to Washington’s wildfire problem, and have illuminated a clear trend of what is likely to come ([www.iqair.com](http://www.iqair.com)).

The direct risk of wildland fire to Shoreline is low as the city is not near the Wildland Urban Interface (WUI)<sup>1</sup>; however, the air pollution caused by wildland fires impacts residents across the state. Specific areas, such as Richmond Beach Saltwater Park, the Highlands neighborhood, and Innis Arden, may be vulnerable fires because they are highly vegetated areas with limited ingress and egress for emergency vehicles.

Beyond the influence of wildfires, seasonal winter wood burning is cause for greatly elevated PM2.5 levels in the months from November to February. An estimated 63 percent of particle pollution in the Puget Sound area in the winter is attributable to wood stoves and fireplaces (compared to 16 percent of emissions from motor

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<sup>1</sup> Washington State Department of Natural Resources, Wildland Urban Interface, Interactive Map

vehicles). During the winter months, urban cities in Washington commonly experience PM2.5 levels 3 to 5 times that of the levels experienced during the summer.

Ground-level ozone, commonly referred to as “smog,” is another air pollutant of concern in the Puget Sound region. Ozone is a highly corrosive gas formed in the atmosphere from ambient “primary” pollutants reacting in sunlight. Since abundant sunlight and heat (at temperatures 85 degrees or higher) are required for its formation, ozone occurs at heightened levels during the summer, worsening around the afternoon and typically dispersing in the evening and early morning.

Climate change is exacerbating wildfires and ozone. As temperatures rise, the ozone season becomes prolonged. Higher temperatures also accelerate ozone formation, making it even more prevalent on the hottest days. Shoreline is committed to climate change mitigation through its Climate Action Plan, described under Mitigation Measures later in this chapter.

While most areas in Washington meet federal attainment levels for ozone, the Seattle-Tacoma area often does not. Ozone has been on the sharp rise there, likely as a result of warming temperatures and increased vehicular traffic (the number one source of the ozone precursor pollutant, nitrogen dioxide).

A transition to a greater share of fuel-efficient, low-emission vehicles offers an opportunity to combat this ozone trend and additionally reduce PM2.5 levels. Moves toward cleaner energy and a reduced reliance on fossil fuels offers another significant opportunity for further reducing Washington air pollution levels.

The Puget Sound Clean Air Agency (PSCAA) provides a variety of tools to monitor air quality, including:

- **Air Sensor Dashboard:** A collection of web tools that provide data from air sensors, including a Community Reporter that generates summary reports, a Purple Air Downloader, and a Surface tool
- **Sensor Map:** An app that provides daily average data for the main site
- **Air Quality Index (AQI):** A color-coded tool that reports daily air quality, health concerns, and how to protect your health

Air quality monitoring stations are in place in the Shoreline vicinity and throughout the Puget Sound region and beyond. The air quality in Shoreline, Washington is currently good, with an Air Quality Index (AQI) of 19 US AQI. The main pollutant is PM2.5.

The City seeks long-term strategies to address air quality problems, not only on the local level, but in the context of the entire Puget Sound Basin, with coordination and major direction from the Puget Sound Clean Air Agency. In addition, Shoreline’s plans for growth call for intensifying the amount of people living and working near high capacity transit stations, which aligns with the region’s strategy to reduce vehicle miles traveled and related emissions and pollution.

## Potential Impacts

The following text summarizes potential impacts to the natural environment related to all three alternatives studied in this DEIS.

### Future Levels of Growth and Change Under the Alternatives

All three alternatives assume increasing levels of growth and related new development and redevelopment over the next 20 years. Alternatives 1 and 2 assume the same level and pace of growth and development would occur, reaching allocated targets in 20 years, while Alternative 3 assumes that growth and development would happen at a more rapid pace, reaching allocated targets in 10 years.

Alternatives 1 and 2 assume a population growth over the next 20 years, from the 2024 population of 61,910 (Washington State Office of Financial Management, April 1, 2024) to 2044 estimates ranging from 86,202 (Puget Sound Regional Council LUV-IT Model) to 91,789+ (37,372 x 2020 census household size of 2.4561 with the household size trending upward in Shoreline). That results in an increase in population of 24,292 to 29,879 more people or 39.23% to 48.26% over the 20 year period. The allocated targets for household units and jobs for that 20 year period are an additional 13,330 housing units and an additional 10,000 jobs.

Alternative 3 assumes that the same level of growth and development and related increases in population, housing units, and jobs will occur more rapid pace—occurring over 10 years instead of over 20 years. This means that if the same pace of growth were to continue over a 20 year pace, the level of population, housing units, and jobs and related development would double that projected under Alternative 1 and Alternative 2.

While the levels of growth and development under Alternative 1 or Alternative 2 could occur under existing zoning, the level of growth and development under Alternative 3 likely would require adjustments in zoning, particularly related to expanding the capacity for jobs in the future. The rate of growth and extent of new development and redevelopment would be influenced by market changes and property owner decisions, and as such, cannot be accurately predicted. However, growth would be expected to occur incrementally, year upon year under any of the alternatives.

The City of Shoreline will be monitoring growth closely on an annual basis in the coming years to determine how plans, capital improvements, transportation improvements, services, programs, and other pieces may need to be adjusted to respond to growth. While the next full periodic update of the comprehensive plan would occur in 2034, the City will complete a five-year review of growth trends and will make interim updates to the comprehensive plan as needed.

In summary, under Alternative 3 there would be more potential for impacts on the natural environment, requiring more mitigation measures than under Alternative 1 and Alternative 2 given that more growth and development would occur under Alternative 3 during the 20-year planning period. Alternative 1 would be disadvantaged as the “no action” alternative, because “no action” assumes the updated comprehensive plan would not be adopted, and as such, citywide planning would not be in alignment with the most recent state, regional, county, and local planning policies, provisions, and requirements.

## Addressing Project Related Impacts

As future development projects occur, impacts would be addressed on a project-by-project basis through city, state, and federal environmental requirements. Much of the development related impacts would occur during construction, and as such would be temporary but would still require adequate mitigation during construction. Critical areas are buffered from development through code requirements. A variety of other mitigation measures are already in place to address and minimize potential impacts, as noted later in this chapter.

## Effects Related to Grading, Erosion, and Water Resources

Potential impacts related to site development, grading, erosion, and drainage, water quantity, and water quality would need to be mitigated under all of the alternatives. Population growth and associated development and construction would result in increased impervious surface area and soil compaction, potential decreases in groundwater infiltration and recharge, and disruption to natural drainage patterns. However, there are stringent protections in place at the city, state, and federal levels to mitigate these potential impacts.

With redevelopment and new development, there is the potential that erosion and pollutants could be transported into downstream water resources in the watershed. Pollutant sources under all alternatives include traffic, construction and associated soil disturbance and vegetation clearing, and landscape uses of pesticides, additional to roadways and other surfaces that can transport urban pollutants to streams. Land clearing would reduce riparian canopy cover, which can increase summer stream temperatures above suitable thresholds for aquatic organisms including fish species.

Potential groundwater impacts are also stringently regulated. Development applications are required to show how their projects will maintain flows at pre-settlement levels and return water to the ground through natural or engineered systems and processes.

Regarding the Deer Creek Springs Wellhead Protection Area, where a small area of buffer zone extends into Shoreline, the City will be further analyzing this area to determine if additional protections may be needed.

One potential positive outcome that could occur with significant new development and redevelopment in the city would involve replacement of older surface water management facilities and installation of new facilities for water flow control, water quality treatment, and habitat protection as required under current regulations. Because many portions of Shoreline were originally built before current surface water management regulations were in place, new development would result in improving conditions in areas that currently experience poorly function stormwater management systems and facilities.

It also important to note that much of the area that would be subject to new development and redevelopment occurs in areas that are already developed and disturbed. New regulations would require maximum impervious surface area and lot coverage, as well as dedication of open space areas.

Areas subject to flooding can be modified by urban development and floodplain dynamics can influence hydrologic cycles in streams and wetlands. As noted above, flashy and erosive urban storm events can cause

streams to down-cut and disconnect from adjacent wetlands and floodplains. When areas are altered due to grading, increases in impervious surfaces, and/or loss of forest, increases in peak flow magnitudes and frequencies can occur. These types of impacts could occur under any of the alternatives but would be mitigated through stringent permitting and development requirements administered by the City and monitored by the Washington State Department of Ecology.

## **Effects Related to Plants and Animals**

Protected areas such as stream corridors, wetlands, and other open spaces serve as important habitat for plants and animals, including native and non-native species. Public parks, the urban tree canopy, and other areas also serve as habitat. Wetland hydrology can be affected by increases in impervious surface coverage in a watershed.

Increased development activities under the alternatives could result in direct temporary impacts from road or utility construction and increased indirect impacts. Potential impacts to wetlands associated with future development under each alternative could include impacts to wetland hydrology, degradation due to temporary construction impacts, and loss of wetland habitat, which directly affects plants and animals. These same types of impacts also can affect stream corridor habitat areas. However, given stringent regulations in place at the federal, state, and city levels, significant adverse impacts would not be expected.

Surface and stormwater runoff from impervious surfaces can carry sediments and pollutants into wetlands, which can adversely affect stream and wetland wildlife, such as amphibians that are sensitive to water quality conditions. If streams, wetlands, and/or buffers are altered related to development activities, if permitted by local, state, and federal agencies, additional losses to wetland functions and values could occur. However, stream and wetland impacts are stringently regulated and mitigation would be required to either avoid, restore, enhance, or create wetlands and buffer areas impacted.

Of all the alternatives, Alternative 3 likely would result in the most alteration of vegetated areas due to the level of redevelopment over the 20-year planning horizon. However, stream corridors, wetlands, and their surrounding buffers would be protected by city, state, and federal regulations, as administered through the Shoreline's critical areas code provisions. The City would closely monitor developments to ensure project-level environmental compliance under any of the alternatives.

## **Effects Related to Air Quality and Greenhouse Gas Emissions**

Air quality in the Puget Sound region, including Shoreline, is regulated and enforced by federal, state, and regional agencies including the Environmental Protection Agency (EPA), Washington State Department of Ecology, and the Puget Sound Clean Air Agency. Each of these agencies has a role in air quality regulation and monitoring. Impacts to air quality directly related to any of alternatives would not be expected to be significantly adverse given the level of air pollution monitoring and control that occurs regionally and federal regulations.

To understand the potential impacts of greenhouse gas emissions, vehicle miles traveled (VMT) is often a metric used and is influenced by transportation patterns in the community. For greenhouse gas emissions, the



vehicle miles traveled (VMT) under Alternative 3 would be higher over the 20-year period compared to Alternatives 2 and 1. That said, given the proposed development patterns in Shoreline, more people would live and work in closer proximity and would have access to high capacity transit in the future, resulting in less driving per household and job.

## Mitigation Measures

Shoreline is an environmentally-conscious community that sponsors and implements many plans and programs that help to mitigate potential environmental impacts in a variety of ways. These are summarized below.

Over the past decade, both the City of Shoreline and the Shoreline community have been dedicated to confronting and lessening the effects of the climate crisis. Shoreline authorities have prioritized sustainability and acknowledged the urgency of climate change, leading to a series of impactful measures. Demonstrating their steadfast commitment to sustainability, the city has actively engaged in various environmental initiatives and developed multiple programs aimed at tackling the escalating challenges posed by climate change.

## City of Shoreline Code Requirements, Plans, and Programs

### Shoreline Critical Areas and Code Provisions that Support Environmental Protection

As regulated by the State Growth Management Act, the City of Shoreline has adopted critical areas regulations (SMC Chapter 20.80) aimed at protecting the environment and managing land use in sensitive areas. These regulations cover Geologic Hazards, Fish and Wildlife Habitat, Wetlands, Flood Hazards, and Aquifer Recharge Areas.

#### ***Geologic Hazards***

Geologic hazard areas are those lands that are susceptible to erosion, landsliding, seismic, or other geological events as identified by WAC [365-190-120](#). These areas may not be suited for development activities because they may pose a threat to public health and safety.

Areas susceptible to one or more of the following types of hazards shall be designated as geologic hazard areas:

- Landslide hazard
- Seismic hazard
- Erosion hazard

The primary purpose of geologic hazard area regulations is to avoid and minimize potential impacts to life and property from geologic hazards, conserve soil resources, and minimize structural damage relating to seismic hazards. This purpose shall be accomplished through appropriate levels of study and analysis, application of sound engineering principles, and regulation or limitation of land uses, including maintenance of existing vegetation, regulation of clearing and grading activities, and control of stormwater.

### ***Fish and Wildlife Habitat***

Fish and wildlife habitat conservation areas (or habitat conservation areas) are lands managed for maintaining populations of species in suitable habitats within their natural geographic distribution so that the habitat available is sufficient to support viable populations over the long term and isolated subpopulations are not created. Fish and wildlife habitat conservation areas include areas with which State and Federal designated threatened, endangered, and sensitive species have a primary association as well as priority species and habitats listed by the Washington State Department of Fish and Wildlife, including corridors which connect priority habitat, and those areas which provide habitat for species of local significance, which have been or may be identified in the City of Shoreline Comprehensive Plan.

Fish and wildlife habitat conservation areas also include stream areas and buffers that provide important habitat corridors; help maintain water quality; store and convey stormwater and floodwater; recharge ground water; and serve as areas for recreation, education, scientific study, and aesthetic appreciation.

The purpose of fish and wildlife habitat conservation areas shall be to protect and conserve the habitat of fish and wildlife species and thereby maintain or increase their populations. The primary purpose of this section is to minimize development impacts to fish and wildlife habitat conservation areas and to:

- Protect Federal and State listed habitats and species and give special attention to protection and enhancement of anadromous fish populations; and
- Maintain a diversity of species and habitat within the City; and
- Coordinate habitat protection to maintain and provide habitat connections; and
- Help maintain air and water quality and control erosion.

### ***Wetlands***

Wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetlands help to maintain water quality; store and convey stormwater and floodwater; recharge ground water; provide important fish and wildlife habitat; and serve as areas for recreation, education, scientific study and aesthetic appreciation.

The City's overall goal shall be to achieve no net loss of wetlands. This goal shall be implemented through retention of the function, value and acreage of wetlands within the City. Wetland buffers serve to moderate runoff volume and flow rates; reduce sediment, chemical nutrient and toxic pollutants; provide shading to maintain desirable water temperatures; provide habitat for wildlife; protect wetland resources from harmful intrusion; and generally preserve the ecological integrity of the wetland area.

The primary purpose of the wetland regulations is to avoid detrimental wetland impacts and achieve a goal of no net loss of wetland function, value and acreage; and where possible enhance and restore wetlands.

### ***Flood Hazard Areas***

A flood hazard area consists of the special flood hazard areas and protected areas as defined in Chapter [13.12](#) SMC, which comprise the regulatory floodplain. The purpose of these regulations is to ensure that the City of Shoreline meets the requirements of the National Flood Insurance Program and maintains the City as an eligible community for Federal flood insurance benefits.

### ***Critical Aquifer Recharge Areas***

At the time of adoption of the last updated critical areas regulations, Ordinance 723, there were no identified critical aquifer recharge areas within the City of Shoreline.

As noted previously in this chapter, the City is currently reviewing if a small portion of a buffer area related to the Deer Creek Wellhead Protection Area which may require additional protections.

### **Shoreline 2044 Comprehensive Plan, In the Process of Being Updated—2024**

The Action Alternatives would adopt changes to the Shoreline 2044 Comprehensive Plan and the Natural Environment element, including updated goals, policies, and strategies related to protection of the natural environment

### **Climate Action Plan, 2022**

Over the past decade, both the City of Shoreline and its community have dedicated themselves to confronting and lessening the effects of the climate crisis. Shoreline authorities have prioritized sustainability and acknowledged the urgency of climate change, leading to a series of impactful measures. Demonstrating their steadfast commitment to sustainability, the City and Shoreline residents have actively engaged in various environmental initiatives and developed multiple programs aimed at tackling the escalating challenges posed by climate change.

In December of 2022, City Council adopted the Climate Action Plan (CAP). The CAP outlines strategies the City will take to achieve its three main goals: reduce greenhouse gas emissions, enhance ecosystem health and sequestration, and increase resilience and preparedness. To achieve these goals, the plan provides 90 actions across five focus areas the City will take through the year 2050 and beyond:

1. **Sustainable Transportation**
2. **Buildings & Energy**
3. **Zero Waste**
4. **Healthy Ecosystems**
5. **Community Resilience**

### **Hazard Mitigation Plan**

The City has a current Hazard Mitigation Plan in conformance with the Federal Disaster Mitigation Act (DMA), which requires state and local governments to develop such plans as a condition of federal grant assistance, and mandates updating these plans every five years. The DMA improves upon the planning process to emphasize the importance of mitigation, encouraging communities to plan for disasters before they occur. An

analysis of the environmental hazards that may impact Shoreline, and the mitigation strategies that have been identified for the City to work on are addressed in detail in the Hazard Mitigation Plan.

### **Energize Shoreline**

Energize Shoreline is a program that provides free educational workshops about heat pump technology and exclusive savings on heat pumps for Shoreline residents. Energize Shoreline includes the following benefits:

- Free educational workshops on heat pumps
- \$1,000 discount on select heat pump systems while funding lasts
- Installation and free site assessment by select heat pump installers
- Streamlined installation and customer support
- Guidance on available incentives and financing options

### **Communi-Trees**

Shoreline residents, schools, churches, and businesses can receive a FREE tree through Communi-trees. Communi-trees is the City's newest program to grow and maintain trees for a healthy Shoreline. Trees provide a wide range of benefits. They clean our air, create shade, relieve stress, and make our community more beautiful.

When you participate in Communi-trees, you receive:

- One free tree per property
- Help picking the right tree for your space
- Free planting supplies
- Training on tree planting and care
- Planting assistance for individuals with disabilities (*subject to volunteer availability*)
- Ongoing tree care reminders

### **Salmon-Safe**

On Earth Day 2019, the City of Shoreline proudly became the first Salmon-Safe Certified City in Washington State. This recognition honored Shoreline's dedication to preventing water pollution and enhancing the health of Puget Sound, which is vital for our local quality of life and the well-being of salmon and orca populations.

As of June 21, 2024, Shoreline has successfully achieved Salmon-Safe recertification.

This accomplishment reaffirms our ongoing commitment to sustainable practices and environmental stewardship. Salmon-Safe certification is a testament to our city's continued efforts to:

- Reduce Pollutants and Pesticide Use: We are dedicated to minimizing the introduction of harmful substances into our environment.
- Improve Erosion Control: By implementing best practices, we work to prevent soil erosion that can negatively impact water quality.
- Conserve Water: Our initiatives focus on using water resources responsibly and efficiently.
- Install Green Infrastructure: We are committed to the installation of rain gardens, bioswales, and other systems designed to filter and clean stormwater runoff.

### **Environmental Mini-Grants**

The City of Shoreline offers grants up to **\$5,000** per application to individuals, community groups, schools, churches, and business owners for projects that benefit our environment and community. Projects must:

- Make a real and easy-to-measure positive impact on our environment and community.
- Include at least a 20% match for eligible project costs (This means you need to contribute money, volunteer hours, or staff time that add up to at least 20% of the total grant funds).
- Be completed within the granting period.

The City prioritizes projects that:

- Address one or more of our focus areas listed below ([view full details for each focus area and example projects](#))
- Prepare our community for climate change impacts
- Prevent and reduce waste
- Protect and restore our natural habitats
- Use less fossil fuels in our cars and buildings
- Come from people or community groups who haven't gotten an Environmental Mini-Grant before
- Feature a partnership with a Shoreline organization, like a community group, school, neighborhood association, or business

### **Reusables/Compostable Products**

As of August 2023, the City of Shoreline adopted a new ordinance that requires all food service businesses to use reusables or compostable products.

### **Deep Green Incentive Program**

The Deep Green Incentive Program encourages the highest standard for green building within the city to address greenhouse gas emissions from new buildings. Two key incentives of this program are expedited permit review and waived/reduced building permit review fees. The following permits types are available for expedited permit review under the DGIP:

- Building Permit
- Clearing and Grading Permit
- Right-of-Way
- Site Development Permit

Reduced Building Permit Review Fee waivers apply only to building permits, including any miscellaneous structure permits. Fees associated with site development permits, ROW permits, Fire permits, and Wastewater permits are not eligible for fee waivers. In addition, the Building Permit Fee, inspection fees, and impact fees are not eligible for fee waivers.

### **Sustainable Transportation**

Transportation is Shoreline's largest source of greenhouse gas emissions and most of these emissions come from vehicles (55%). The City of Shoreline is taking steps to reduce emissions by increasing the availability, safety, and connectivity of multi-modal transportation options such as public transit, walking, and cycling.

### **Buildings and Energy Programs**

Energy use in buildings is the second largest source of greenhouse gas emissions in Shoreline. The City has several programs to help transition the built environment from natural gas and oil to more sustainable, electric

options. The City is updating energy codes, increasing energy efficiency in City buildings, and working on developing education programs for homeowners who are interested in making the switch to clean energy sources.

### **Zero Waste**

According to the Environmental Protection Agency (EPA), Municipal Solid Waste (MSW) landfills are the third-largest source of human related methane emissions in the United States, accounting for roughly 14% of these emissions in 2021.<sup>6</sup> On a local scale, roughly 70% of the waste that Shoreline and other communities send to the King County landfill could have been recycled, composted, repaired, reused, or kept out of the landfill some other way. There is huge opportunity to reduce landfill waste and to therefore reduce greenhouse gas emissions. The City of Shoreline has a number of programs to help reduce personal and city produced waste.

### **Healthy Ecosystems**

The natural environment of Shoreline is one of the City's greatest assets. The trees, forests, waterways, and other ecosystems help mitigate the impacts of climate change. They provide clean air, water, shade, help to reduce flooding, increase recreation opportunities, and provide habitat for local wildlife. As the City continues to develop and urbanize, it is a primary responsibility of the City to prioritize and protect natural spaces.

### **Resilient Communities**

As climate change progresses, its effects are growing in frequency, severity, and reach. Shoreline, much like neighboring cities in the Puget Sound area, is grappling with rising temperatures, intensified heatwaves, prolonged wildfire seasons, heightened wildfire risks and smoke exposure, as well as increased instances of localized flooding due to intense rainfall. Climate change exacerbates existing social and racial disparities, disproportionately impacting communities already vulnerable to these environmental changes and lacking adequate resources for adaptation. The 2022 Climate Action Plan focuses on addressing the impacts of climate change on vulnerable community members.

## **Federal, State, and County Programs**

### **United States Conference of Mayor's Climate Protection Agreement<sup>2</sup>**

A group of 1,066 mayors, including current Shoreline Mayor Chris Roberts, have enlisted in The U.S. Conference of Mayors' Climate Protection Agreement, initially spearheaded by Seattle's Mayor Greg Nickels. Pledging to cut carbon emissions in their municipalities to levels below those of 1990, aligning with the goals of the Kyoto Protocol, these mayors represent a nationwide commitment to combat climate change. Guided by The Conference's leadership, the Energy Efficiency and Conservation Block Grant (EECBG) Program was conceptualized, marking a historic milestone as it enabled cities, counties, and states to access grants expressly designated for financing energy efficiency initiatives, a first in U.S. history.

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<sup>2</sup> (The United States Conference of Mayors, 2024)

In addition to organizing around climate solutions, the Conference of Mayor’s advocates for solutions regarding the following topics: mental health, transportation and infrastructure, homelessness, reducing gun violence, immigration, and combatting antisemitism.

### **The Cascade Agenda, a 100 Year Vision for Pierce, King, Kittitas, and Snohomish Counties<sup>3</sup>**

The Cascade Agenda is a visionary plan developed by a large group of stakeholders to guide sustainable growth and development in the Puget Sound region. This ambitious initiative addresses a wide range of interconnected issues, including environmental conservation, economic prosperity, social equity, and community well-being.

At its core, the Cascade Agenda is a call to action on seeking balance between the region's rapid urbanization and the preservation of its natural beauty and ecological integrity. It emphasizes smart growth principles, such as compact urban development, transit-oriented design, and the protection of critical natural areas. By promoting sustainable land use practices and transportation alternatives, the plan aims to reduce greenhouse gas emissions, mitigate climate change impacts, and enhance the quality of life for residents.

The Cascade Agenda represents a holistic approach to long-term planning, recognizing the interconnectedness of environmental, economic, and social factors. By setting ambitious goals and engaging stakeholders in collaborative decision-making, the plan aims to create a resilient and sustainable future for generations to come.

### **The Green City Partnerships Program<sup>4</sup>**

The Green City Partnership program by Forterra is a collaborative initiative aimed at enhancing urban green spaces and promoting ecological resilience within cities. Forterra, a nonprofit organization dedicated to conserving and enhancing the natural environment in the Pacific Northwest, partners with local governments, community organizations, and volunteers to implement restoration projects and sustainable land management practices.

Through the Green City Partnership, cities work alongside Forterra to identify priority areas for restoration, such as parks, natural areas, and greenbelts. These areas are often degraded or underutilized due to urban development or invasive species encroachment. Forterra facilitates the coordination of volunteers, provides technical expertise, and secures funding to support restoration efforts.

The program focuses on restoring native vegetation, improving habitat for wildlife, and creating accessible green spaces for communities to enjoy. By engaging local residents in stewardship activities such as tree planting, invasive species removal, and habitat restoration, the Green City Partnership fosters a sense of ownership and connection to the natural environment.

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<sup>3</sup> (Forterra, Land for Good, 2024)

<sup>4</sup> (Forterra, Land for Good, 2024)

Overall, the Green City Partnership program by Forterra embodies a collaborative approach to urban conservation, striving to create healthier, more resilient cities that benefit both people and the environment.

### **King County-Cities Climate Collaboration<sup>5</sup>**

The King County-Cities Climate Collaboration is a partnership of local governments working together to accelerate climate action. It is a combination of knowledge, resources, and advocacy power to shape policy and programs that address the climate crisis in King County and across the State.

Partners work together to reduce harmful greenhouse gas emissions by sustainably increasing mobility, investing in renewable energy, promoting clean energy use in buildings and vehicles, and expanding farm and forest protection.

Since it began in 2012, the K4C has grown to 23 partners – King County, Bellevue, Bothell, Burien, Duvall, Issaquah, Kenmore, Kent, Kirkland, Lake Forest Park, Maple Valley, Mercer Island, Newcastle, Normandy Park, North Bend, Redmond, Renton, Sammamish, Seattle, Shoreline, Snoqualmie, Tukwila, and the Port of Seattle – who together represent more than 86% of the King County population.

### **Tree City USA<sup>6</sup>**

Being recognized as a Tree City USA by the Arbor Day Foundation signifies a commitment to effective urban forestry management and the enhancement of community green spaces. To earn this designation, a city must meet four core standards established by the Arbor Day Foundation and the National Association of State Foresters:

- 1. Tree Board or Department:** The city must establish a Tree Board or Department responsible for overseeing the care and management of its urban forest. This entity is typically tasked with developing a comprehensive tree care ordinance, creating a long-term urban forestry plan, and promoting public awareness and education about the value of trees.
- 2. Tree Care Ordinance:** The city must enact and enforce a tree care ordinance or policy aimed at protecting and preserving its tree canopy. This ordinance typically outlines regulations for tree planting, maintenance, removal, and replacement on public property and rights-of-way.
- 3. Annual Arbor Day Observance and Proclamation:** The city must celebrate Arbor Day annually by holding a public event and issuing an official proclamation recognizing the importance of trees. This event often includes tree planting ceremonies, educational activities, and community engagement initiatives to raise awareness about the benefits of trees and the importance of conservation.
- 4. Community Forestry Program:** The city must allocate financial resources and support for a community forestry program, including funding for tree planting, maintenance, and management activities. This

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<sup>5</sup> (King County, 2024)

<sup>6</sup> (Arbor Day Foundation, 2024)



program may involve partnerships with local businesses, nonprofit organizations, and volunteers to expand tree canopy coverage, enhance urban green spaces, and improve overall quality of life for residents.

## **Significant, Unavoidable Adverse Impacts**

While increased new development and redevelopment under the alternatives could create impacts to the natural environment, such impacts would be mitigated through the measures described above. As such, significant unavoidable adverse impacts would not be expected under any of the alternatives with ongoing implementation of code requirements, plans, programs, and project level mitigation measures. The City will continue to monitor conditions over time to ensure that the following issues and other environmental effects can be effectively managed and mitigated. In addition to ongoing focus on the programs and measures described above, specific areas of focus would continue to include the following.

- Reducing vehicle miles traveled and related greenhouse gas emissions and other monitoring as described above related to implementation of the Climate Action Plan;
- Reducing impervious surface areas;
- Avoiding loss of urban tree canopy;
- Avoiding loss of stream and wetland functions related to hydrology, water quality, and habitat;
- Controlling erosion and sedimentation of streams and wetlands due to increased flow rates and volumes, resulting in declining conditions; and
- Avoiding long-term cumulative reduction in groundwater recharge and associated discharge to streams.