Natural Environment Element Supporting Analysis

BACKGROUND AND CONTEXT

Shoreline's environment is comprised of both natural and built features. Puget Sound vistas, mature trees, vegetation, streams, wetlands, lakes, and tidelands are just some aspects of the natural environment that Shoreline citizens value. The relationships between these features, development, natural processes, and the condition of the resulting environment have profound impacts on the quality of life in Shoreline. Shoreline is not a pristine landscape, but the very name of the city reflects the importance of the natural environment to community identity. Preserving the quality of the environment depends on government, business, and individual decisions; and coordinated actions to minimize the adverse environmental impacts that can occur during development/redevelopment, or as a result of previous practices.

Environmental Conditions

Shoreline is a community that developed primarily as a suburban residential area with an associated mix of commercial centers, parks, schools, and natural areas. Natural areas are comprised of the Puget Sound shoreline, bluffs, steep slopes, ravines, natural reserves, wetlands, streams, lakes, native growth, and stands of mature trees. These areas are found on both private and public property, including single-family residential lots, and parks.

Portions of Shoreline contain the following environmentally critical areas: geological and flood hazard areas, streams, wetlands, and fish and wildlife habitat conservation areas. The city does not contain any known critical aquifer recharge areas that supply potable water. Drinking water comes from surface systems, which originate in the Cascade Mountains and flow predominantly through the Tolt River, and is distributed by the Shoreline Water District and Seattle Public Utilities.

Shoreline has adopted regulations to protect environmentally critical areas in the city. These regulations are referred to as the Critical Areas Regulations and are located in Chapter 20.80 of the Shoreline Municipal Code. These regulations are periodically reviewed and updated in accordance with state mandates.

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 (http://shorelinewa.gov/index.aspx?page=52). Excerpts from that analysis are included in the appropriate hazard areas below in this Supporting Analysis.

IDENTIFIED HAZARDS AND MITIGATIONS

Earthquake

In an earthquake, all of the city would experience potentially damaging ground shaking that may cause major structural

and/or non-structural damage to any non-retrofitted facility, and hamper its functionality. The city can be impacted by the following three source zones:

- Shallow earthquakes start within the crust of the overlying North America plate. Of concern are the South Whidbey Island Faults within the city and to the north, and the Seattle faults to the south.
- Deep earthquakes start below the interface between the subducting Juan de Fuca and Gorda plates and the overlying North America plate. The 2001 Nisqually Earthquake is the most recent example of this type of earthquake.
- The Cascadia Subduction Zone is the third zone and is on the interface between the subducting plates and the North America plate. Because of its great extent, it could break over an enormous area, causing chaos across all of Cascadia.

Secondary hazards from an earthquake event may be numerous, including fire, landslides, tsunamis, and possible hazardous material releases. Landslides do not always occur immediately following an earthquake, but can happen days later. Fires can be caused by downed power or ruptured gas lines that occur as a result of an earthquake; there may be leaks or breaks in natural gas. Hazardous materials can be spilled from ruptured containers, accidents can occur during ground shaking, and possible train derailment can occur from buckling tracks or landslides caused by an earthquake.

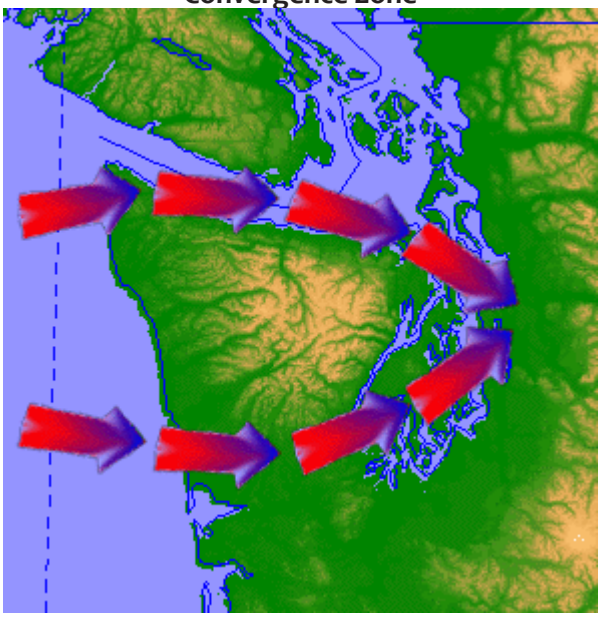
An additional area of identified seismic hazard is located in the Future Service Annexation Area at Point Wells. In this area, which is rated at the highest risk for liquefaction, Burlington Northern railroad tracks, petroleum storage facilities, and the Brightwater sewer outfall facilities may be at risk. Existing and future residential and commercial structures, and other public and private improvements may also be at risk. Access to the western portion of the area is via a bridge over the Burlington Northern railroad tracks, and a major seismic event could affect the bridge, thus limiting emergency response to the area.

Severe Weather

Severe weather is one of the most damaging natural hazards. Severe weather can bring heavy rain, high winds, snow and ice, and lead to storm surges that flood low-lying and coastal areas. Severe weather can lead to secondary effects, such as landslides, flooding from streams and poor drainage, fires caused by either ruptured gas lines or down electrical lines, and wildfires caused by lightning and spread by high winds. King County and the city are subject to various local storms that affect the Pacific Northwest throughout the year, such as wind, snow, ice, hail, and tornadoes. Although rare, tornadoes are the most violent weather phenomena known to man.

The entire city is susceptible to severe weather. Shoreline is located in what is commonly referred to as the "Puget Sound Convergence Zone." This generally means that the city tends to receive higher than normal precipitation and stronger winds compared to other cities in the region.

Figure NEA-1
Convergence Zone



Neighborhoods located on slopes near the coast, including the Highlands, Richmond Beach, Innis Arden, Hillwood, and Richmond Highlands are vulnerable because of their location. Limited ingress and egress points create a possibility of isolation during a severe weather event. Similarly, neighborhoods located on the slopes formed by McAleer Creek, including the Highlands, Highland Terrace, Ballinger, and North City are vulnerable, and have been isolated during extreme weather events.

Ice will more likely affect those areas at a higher elevation. Richmond Beach lies near sea level below the bluffs of the city, may be isolated during a snow or ice storm, and can also be affected by a strong storm surge. Properties located along 27th Avenue NW and the BNSF railroad tracks would be most affected by a storm surge.

Critical infrastructure is more likely to be impacted or damaged as a result of severe weather. Trees that are overgrown or have blown down can create problems for overhead power lines, resulting in downed lines cutting power to residents. Power is lost due to severe storms about four times a year for approximately four to six hours. A survey by the Public Works Department estimates that there are approximately 35,000 trees in City rights-of-way. Power outages could also result in disruption to the water systems. Sanitation and water systems could experience contamination or overflow problems. Given that electrical utilities and roads are most often affected by severe weather, all critical infrastructure managers and operators should plan for possible power outages, and how to access areas with difficult ingress and egress.

Climate Change

Governor Gregoire and the State of Washington, in recognition that the planet's climate is changing and that impacts of expected changes could be profound, have instructed cities to significantly reduce the State's contribution to climate change through the Washington Climate Change Challenge (Executive Order 07- 02).

In the report "The Preparation and Adaptation Working Groups" (PAWG), the State asked the City to incorporate climate change and its impacts into planning and decision-making processes. Extensive research done by the

International Panel on Climate Change (IPCC) and University of Washington Climate Impact Group confirmed that Washington's climate is changing, and the impacts of these projected changes will be far reaching. Although Washington State is working to significantly reduce its contributions to climate change, some changes are likely inevitable, although there is not clear consensus about exactly what those will be. One potential scenario for the Puget Sound region could result in hotter, drier summers; wetter winters with increasing rainfall and rain intensity; and increases in extreme weather events.

Additional potential hazards include increased chance of wildland/urban interface fires, heat waves, insect infestation, drought, potable water shortages, flooding, erosion, and landslides. The City and Emergency Services should develop plans to educate people who live in non-air-conditioned homes about the potential health risks associated with extreme heat, and encourage more homeowners, apartment complexes, and critical facilities to invest in alternative power. In 2013, the City expects to adopt a Climate Action Plan, which will delineate a strategy to reduce carbon emissions, and address potential methods of adaptation and mitigation.

Flooding

Due to its geographical location, Shoreline does not have any major rivers that are subject to severe flooding. Shoreline is drained by one minor stream on the west, Boeing Creek, which flows through steep bluffs and into Puget Sound, and two minor streams, McAleer and Thornton Creeks, which flow into Lake Washington. Boeing and McAleer Creeks flow through steep ravines, and do not pose much of a hazard to the development above them. Thornton Creek flows through a swampy area parallel to I-5 on the west, which has drainage issues and is subject to flooding.

Flooding in Shoreline is largely a result of surface water collecting in low-lying areas and natural depressions with impermeable soils. The City prepared a Surface Water Master Plan and adopted the Department of Ecology Stormwater Manual for Western Washington to address surface water concerns.

FEMA floodplains have been mapped in Boeing Creek and along the Puget Sound shoreline. Properties along the coast may experience coastal flooding during a strong storm surge. A flood study was conducted in 2009 along Thornton Creek between Ronald Bog and I-5 near Twin Ponds. This study was submitted to FEMA in 2012 to update the Flood Insurance Rate Maps for the city.

Landslide/Sinkholes

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. They are 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. Occasionally, large catastrophic slides occur along Puget Sound. Figure NEA-3 is a map of the landslide hazard areas for Shoreline and the structures located in the landslide hazard area. Landslides are often triggered by other natural hazards, such as earthquakes, heavy rain, floods, or wildfires.

The Holiday Blast Storm of December 1996 and January 1997 caused a large washout/landslide or "sinkhole" within Shoreline along NW 175th Street near 6th Avenue NW, which was a federally declared disaster (see Figure NEA-2).

The 100-foot long sinkhole cost $2,000,000 to repair. However, the sinkhole provided opportunities to implement a series of Low Impact Development concepts ultimately reducing flooding and water quality issues, while increasing fish habitat and providing recreation opportunities.

Figure NEA-2
Holiday Blast Storm Sinkhole - Shoreline

Wildland Fire

Wildland fires can be caused by lightning strike or human error, and spread to homes and businesses, block roads, and create significant economic and environmental damage if fuel loads and vegetation are not properly maintained. Specific areas, such as Richmond Beach Saltwater Park and the Highlands neighborhood are especially vulnerable because they are highly vegetated areas with limited ingress and egress for emergency vehicles. Vegetated areas in Innis Arden and south of Richmond Beach may also be of concern.

Volcanic Eruption

Shoreline has low vulnerability to volcanic hazards. Solid matter ejected into the air by an erupting volcano, otherwise known as tephra, can potentially cause the most damage. Ash only ½ inch thick can impede the movement of most vehicles, and disrupt transportation, communication, and utility systems. Tephra may cause eye and respiratory problems, particularly for those with existing medical conditions. Ash may also clog ventilation systems and other machinery. It is easily carried by winds and air currents, remaining a hazard long after the eruption.

When tephra mixes with rain it becomes a much greater nuisance because wet ash is much heavier, more difficult to remove, and can cause structures or utility lines to collapse. Wet ash may also cause electrical shorts. An ash fall may cause secondary hazards, such as fire or flooding.

Hazardous Material

Three major rights-of-way traverse Shoreline and are used to transport hazardous material. These are the BNSF railroad, which is located along the western shore of the city; State Highway 99/ Aurora Avenue N, which runs through the middle of the city; and Interstate 5, which is east of Aurora Avenue N. Although the identity and quantity of what is being transported is unknown, Shoreline has a similar vulnerability for spillage as the rest of King County, which has one of the highest probabilities in the state due to the large amounts of industry and port

facilities in the area. Hazardous material releases can affect both human and ecological health. The severity depends on the type and amount of chemical released, and the effects range from minor to catastrophic.

Tsunami/Seiche

Tsunamis affecting Washington State may be induced by an earthquake of local origin, or they may be caused by earthquakes at a considerable distance, such as from Alaska or Japan. Shoreline does not have any major lakes within its boundaries, but a severe quake could create seiches in the small ponds, such as Ronald Bog and Echo Lake, that could potentially cause damage.

There is a low probability of a tsunami or seiche occurring in Shoreline. It is unlikely that a tsunami or seiche generated by a distant or Cascadia Subduction earthquake would result in much damage in Shoreline. One computer model suggests that a tsunami generated by such an earthquake with a magnitude of 8.5 would only be 0.2 to 0.4 meters in height when it reached the Seattle/Shoreline area. This results from the shielding of the Olympic Peninsula and the Puget Sound islands. However, Puget Sound is vulnerable to tsunamis generated by local crustal earthquakes (such as along the Seattle or South Whidbey Island faults), or by submarine landslides triggered by earthquake shaking. This type of tsunami could impact Shoreline. The low-lying areas along the Puget Sound coastline could suffer damage. Warning vulnerable areas would be nearly impossible due to the close proximity to the origin of the tsunami.

Properties located along Puget Sound may be vulnerable to tsunamis. There are 32 parcels that could be affected and are located on 27th Avenue NW. Properties directly adjacent to ponds or the small lakes in Shoreline may be potentially affected by a seiche caused by a local or distant quake. Echo Lake has development surrounding it, as does Ronald Bog on its south side.

Vegetation Protection

Residents characterize the city as a wooded community; this is often cited as a key reason for locating in the area. 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 in 2012, the City took steps to be 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.

Forested open space, wetlands, and native vegetation found on steep slopes and larger residential lots are important resources that should be preserved. 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.

Aerial photos show that the community is a mosaic of various types of vegetation. 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 Protection

The process of urbanization can result in the conversion of wildlife habitat to other uses. The loss of certain types of habitat can have significant, adverse effects on the health of certain species. Fish and wildlife habitat conservation areas are those that are necessary for maintaining species within their natural geographic distribution so that isolated subpopulations are not created. Designated habitats are those areas associated with species that State or federal agencies have designated as endangered, threatened, sensitive, or candidate species.

Currently in the Puget Sound, the bald eagle and Chinook salmon are listed as threatened species by the federal government under the Endangered Species Act. The Washington Department of Fish and Wildlife (WDFW) indicates bald eagle territory in the Richmond Beach and Point Wells areas. WDFW maps and the City's stream inventory indicate the presence of Chinook 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 within the city. These PHS areas include wetlands, anadromous fish habitat, riparian areas, bald eagle territory, urban natural open space, habitat for a priority bird species, and the point location of a priority bird species siting. These areas combined comprise less than 5% of the total land area of the city and are often found within existing parks, public open space, and designated private open space.

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.

Wetlands

Wetlands perform valuable functions that include surface and flood water storage, water quality improvement, groundwater exchange, stream base flow augmentation, and biological habitat support. A review of background information, including aerial photos from 1992, identified 17 individual wetlands within the city. 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, and Paramount Open Space Parks, and the Seattle Country 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. No wetlands in the city have received a Class I rating. 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.

All of the documented wetlands within the city have experienced some level of disturbance as a result of development and human activity. Disturbances have included major alterations, such as wetland excavation, fill, or water impoundment. Some wetland areas occur within parks that receive constant use by people, threatening the wetlands with impacts from human activity, such as trash and trampling of vegetation.

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, and heavy metals from vehicles; and fecal coliform bacteria. The quality of the water in the lakes is a concern to many residents and City staff. Ronald Bog and Twin Ponds were historically dredged. As urban development has occurred, the process by which the nutrient level and vegetation in these lakes increases has accelerated. Ronald Bog and Twin Ponds will eventually revert to bogs.

Hidden Lake is currently used as a sediment storage facility, and has been significantly altered to accommodate this function. King County completely reconstructed this feature by removing the sediment eroded from sites further upstream in the basin. Hidden Lake has served as a sink for this sediment, was designed to permanently reestablish the lake in a way that increases habitat for fish and wildlife, and prevents the passage of fine sediments downstream.

Streams and Creeks

Numerous small streams and creeks are found within or adjacent to the city. Many of these streams have been placed in culverts, channels, or otherwise altered and degraded. Boeing Creek flows to the Puget Sound, and drains an area that includes Boeing Creek and Shoreview Parks. The headwaters of Thornton Creek originate north of Cromwell Park, flow through a series of stormwater pipes to Cromwell Park Stormwater Wetland, and then to Ronald Bog, near the geographic center of the city. South of Ronald Bog, the creek flows through a series of open stream channel segments and pipes to Twin Ponds, crosses the city limits, and emerges as an open channel in the City of Seattle's Jackson Park Golf Course. McAleer Creek flows in the southeasterly direction, and passes through the northeast corner of the city and into Lake Forest Park. Lyons Creek flows in a similar direction just outside of the city. Other features include small and unnamed creeks that flow into the Puget Sound in the Richmond Beach, Innis Arden, and Highlands neighborhoods.

Large portions of the watersheds drained by creeks in the city have been paved or otherwise developed. This development 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 gravels; damage to stream-side vegetation; and reduction or elimination of habitat for wildlife, fish, and the insects on which fish feed.

Groundwater

Groundwater aquifers are used for supplying water to lakes, wetlands, and streams during the dry season, and for a few private wells that supply water for irrigation and possibly drinking water in isolated instances. Wetlands and lakes are thought to be the main groundwater recharge areas in the city.

Water Quality and Drainage

Drainage in the city consists of nine separate drainage basins: Lyons, McAleer, Thornton, and Boeing Creeks; West Lake Washington; Bitter Lake; Seattle Golf Club; and 2 separate areas of the Middle Puget Sound Basin (north and south). Along the western half of the city, the Boeing Creek Basin drains directly into Puget Sound. The Middle Puget Sound basins drain into Puget Sound via small creeks and surface water systems. The McAleer Creek Basin in the northeastern portion of the city drains into Echo Lake and Lake Ballinger, and eventually into Lake Washington. The approximate eastern half of the city drains to Lake Washington via Thornton Creek. The Ballinger area drains to Lake Washington via Lyon Creek. Small portions of the city at the north and northeastern edges drain into Lake Washington through small creeks and surface water systems.

Drainage facilities in the city consist of a combination of conveyance pipes, ditches, and stream channels. Much of Shoreline's development took place in the 1940s and 1950s, prior to the implementation of stormwater mitigation regulations in the 1970s. Many water quality facilities have been constructed in the city, including Boeing Park stormwater pond, Cromwell Park stormwater wetland, dozens of raingardens and bioretention facilities, and proprietary water quality treatments systems associated with the Aurora Corridor Improvement Project.

Many natural creek systems have been stabilized or reconstructed to repair and prevent slope erosion or bank failures from urban stormwater runoff. The water quality of lakes and streams in the city has been adversely impacted by the urbanization of the watersheds and the associated stormwater runoff. Stormwater regulations are required of the City by the EPA and State Department of Ecology; these regulations require the implementation of stormwater management programs and regulations meant to improve water quality of the streams, wetlands, and Puget Sound that eventually receive the stormwater.

Air Quality

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 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. Human health risks from poor air quality range in severity from headaches and dizziness to cancer, respiratory disease, other serious illnesses, and even premature death. Potential ecological impacts include damage to trees and other types of vegetation. Quality of life concerns include degradation of visibility, and deposition of soot and other particulate matter on homes and other property.

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.

Sustainability

Shoreline residents, elected and appointed officials, and staff place a priority on sustainable land use and building practices, resilience of our natural systems, and reducing the city's carbon footprint. Following direction from a 2007 Council goal to "create an environmentally sustainable community," staff worked with a consultant team and the community to develop an Environmental Sustainability Strategy, which was adopted in 2008. The City also built a new City Hall facility, completed in 2009, that achieved a Leadership in Energy and Environmental Design (LEED) Gold certification.

By 2012, the City's interdepartmental Green Team, tasked with implementation of the Strategy, had completed 42 of the 50 recommendations. One of those recommendations was to "create baselines for all Sustainability Strategy focus areas and implement an indicator tracking system to track progress over time." In April 2012, the forevergreen web page (www.shorelinewa.gov/forevergreen) was launched. The page was organized according to the 5 focus areas identified in the Strategy: Climate Protection, Natural Habitat, Resource Conservation, Built Environment, and City Initiatives. It identifies 13 categories of performance measures and 43 indicators that will be tracked over time to quantify progress of City initiatives.

With the launch of the web page and substantial implementation of the Sustainability Strategy, the City shifted focus from incorporating sustainability into internal operations to communication about City initiatives, and providing information and resources for households to make sustainable decisions. The City recognizes the importance of contributing to sustainability through directing public projects to provide connectivity of trails and transit, land use to encourage commercial development that provides jobs and services to neighborhoods, and innovative stormwater and building practices that promote Low Impact Development. However, when examining Shoreline's overall carbon footprint, the portion that is attributed to City operations is small. If the community is to make a significant difference in their impact on local and global systems, it will be because of individual and household choices.

The focus of the City is also shifting from environmental sustainability to the other 2 prongs of a 3-pronged "triple-bottom line" approach: Environment, Economics, and Social Equity. This is reflected in Council Goals, Vision 2029, and Framework Goals for the Comprehensive Plan Update and Light Rail Station Area planning. Policies are implemented through functional Master Plans, the Capital Improvement Plan, and annual department budgets and work plans, and are thereby manifested in projects and programs.

Point Wells
Future Service
Annexation Area

Puget
Sound

Woodway

Edmonds

Lake
Ballinger

Mountlake Terrace

Echo
Lake

Ronald
Bog

Hidden
Lake

Twin
Ponds

Lake
Forest
Park

Seattle

NW 205TH ST
NE 205TH ST
NW 200TH ST
N 200TH ST
NW 195TH ST
N 195TH ST
N 192ND ST
NW 188TH ST
NW 180TH ST
NE 185TH ST
NE 180TH ST
NW 175TH ST
N 175TH ST
NE 175TH ST
NW 167TH ST
N 167TH ST
NE 168TH ST
NE 165TH ST
N 165TH ST
N 160TH ST
N 155TH ST
NE 155TH ST
N 152ND ST
NE 150TH ST
N 145TH ST
NE 145TH ST

20TH AVE NW
15TH AVE NW
8TH AVE NW
3RD AVE NW
ASHWORTH AVE N
1ST AVE NE
15TH AVE NE
25TH AVE NE
10TH AVE NE
5TH AVE NE
24TH AVE NE
FREMONT AVE N
GREENWOOD AVE N
MERIDIAN AVE N
DAYTON AVE N
14TH AVE NW
10TH AVE NW

NW RICHMND BCH RD
N RICHMND BCH RD
NW INNIS ARDEN W
WESTMINSTER WY N
NE PERKINS WY
BALLINGER WAY NE

99
5

City of Shoreline
COMPREHENSIVE PLAN

Potential Geologic Hazard Area

Geologic hazard areas shown include seismic hazards based on preliminary data from the Washington State Department of Natural Resources, Geology and Earth Resources Division (1993) and steep slopes and land slides based on data from the Puget Sound LiDAR Consortium and the City of Shoreline.

This map is for illustration and general planning purposes only. Actual conditions may vary and should be verified by a geotechnical investigation on a site by site basis.

0 500 1,000 2,000 Feet

This map is not an official map. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.

Potential Geologic Hazard Area

Figure NEA-5: Potential Geologic Hazard Area

Path: J:\GIS\Maps\PADS\CompPlan2012\NaturalEnvironment\Geologic Hazard.mxd

This page left blank intentionally

Point Wells
Future Service
Annexation Area

Puget
Sound

Lake
Ballinger

Woodway

Edmonds

Mountlake Terrace

Echo
Lake

Ronald
Bog

Hidden
Lake

Twin
Ponds

Lake
Forest
Park

Seattle

NW 205TH ST
NE 205TH ST
BALLINGER WAY NE
25TH AVE NE
NE 195TH ST
NW 195TH ST
15TH AVE NW
8TH AVE NW
3RD AVE NW
N 200TH ST
NW 200TH ST
AURORA AVE N
MERIDIAN AVE N
1ST AVE NE
5TH AVE NE
N 195TH ST
N 192ND ST
NW RCHMND BCH RD
NW 188TH ST
NE PERKINS WY
N 185TH ST
NE 185TH ST
NW 180TH ST
NE 180TH ST
24TH AVE NE
14TH AVE NW
10TH AVE NW
DAYTON AVE N
FREMONT AVE N
LINDEN AVE N
NW 175TH ST
N 175TH ST
N 172ND ST
10TH AVE NE
14TH AVE NW
NW 167TH ST
CARLYLE HALL RD N
N 167TH ST
NE 168TH ST
N 165TH ST
NE 165TH ST
N 160TH ST
GREENWOOD AVE N
WESTMINSTER WY N
N 155TH ST
N 152ND ST
NE 155TH ST
15TH AVE NE
25TH AVE NE
NE 150TH ST
NW N 145TH ST
NE 145TH ST

99
5

1. 25th Ave NE between NE 175th St and 24th Ave NE
2. 14th Ave NE between NE 195th St and NE 200th St
3. 23rd Ave NE near Ballinger Way NE
4. NE 196th St over McAleer Creek
5. 11th Ave NE and Paramount Park Open Space
6. NE 152nd St and Ashworth Ave N
7. Evanston Ave N / Dayton Ave N at N 178th St
8. Carlyle Hall Rd and M-1 Dam
9. Shorewood Hills I and II
10. Boeing Creek between North Pond and Hidden Lake
11. 17th Ave NW north of NW Springdale Pl
12. 17th Pl NW and Storm Creek
13. Panterra Pond

0 500 1,000 2,000 Feet

This map is not an official map. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.

Figure NEA-6: Landslides

City of Shoreline
COMPREHENSIVE PLAN

Confirmed by USGS *

Confirmed by City

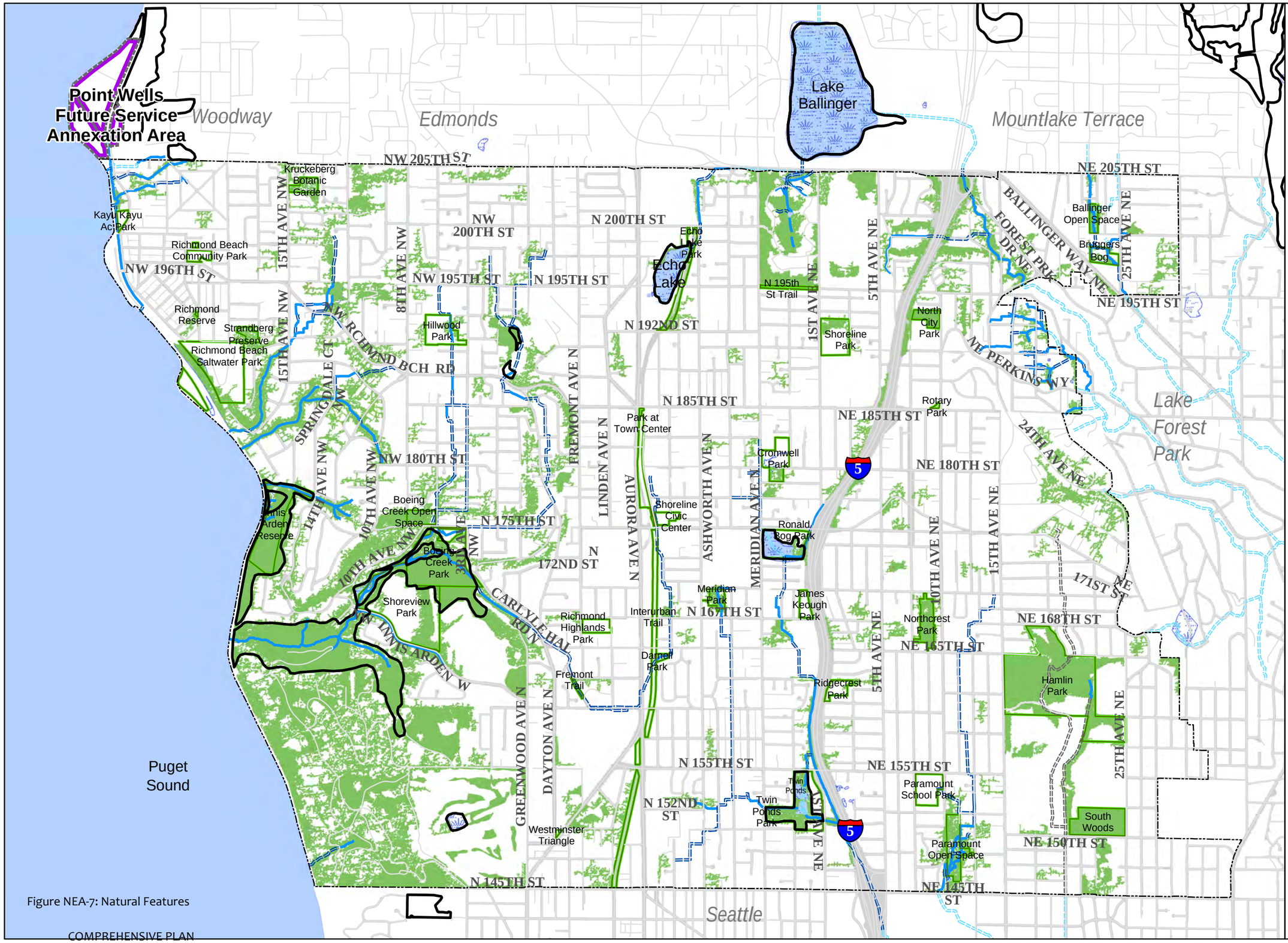
Slope (percent)

- more than 40 percent
- 15.01 to 40 percent
- 0 - 15 percent

Landslides

Path: J:\GIS\Maps\PADS\CompPlan2012\NaturalEnvironment\SlideAreasCompiledbyCity_v2.mxd

This page left blank intentionally



City of Shoreline
COMPREHENSIVE PLAN

Priority Habitat & Species

Urban Forest

Water Course

Other

TYPE

Open Stream

Piped Stream

Drainage Only

Wetland

Urban Forest Land is the result of an analysis of the 2010 Tree Canopy Study. This maps shows contiguous tree canopy areas of more than one acre.

The Washington State Division of Fish and Wildlife defines the Priority Habitat and Species areas.

0 500 1,000 2,000 Feet

This map is not an official map. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.

Natural Features

Figure NEA-7: Natural Features

Path: J:\GIS\Maps\PADS\CompPlan2012\NaturalEnvironment\NaturalFeatures2012.mxd

This page left blank intentionally

Point Wells
Future Service
Annexation Area

Middle Puget
Sound Basin

Puget
Sound

Lake
Ballinger

Echo
Lake

McAleer
Creek
Basin

Lyons
Creek
Basin

Boeing
Creek
Basin

Hidden
Lake

Ronald
Bog

Thornton
Creek
Basin

Twin
Ponds

West Lake
Washington
Basin

CITY OF SHORELINE

City of Shoreline
COMPREHENSIVE PLAN

Water Course

- Open Stream
- Piped Stream
- Drainage Only
- Regional Facility
- Wetland
- Open Water

Identified wetlands and water courses are shown based on data from the Draft Stream and Wetland Inventory prepared for the City of Shoreline by TetraTech, February 2003. This map is for illustration and general planning purposes only. Actual conditions may vary and should be verified by field assessment. Water courses shown include those that may be regulated as streams and those that may be exempt from stream protection.

0 500 1,000 2,000 Feet

N W E S

This map is not an official map. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.

Drainage Basins

Figure NEA-8: Drainage Basins

Path: J:\GIS\Maps\PADS\CompPlan2012\NaturalEnvironment\SurfaceWater.mxd

This page left blank intentionally