SECTION 8.6

Environmental Appendix

Introduction

The Environment Element and Appendix implements the vision of Bremerton as a City enriched with valued shorelines and natural features that enhance the quality of life for the community. The Comprehensive Plan's Environment Element sets a policy framework that recognizes the relationship between the environment, land use planning, and a variety of regulatory and non-regulatory efforts. Impacts of development are minimized primarily through regulations on development, while most enhancements to the natural environment are primarily through non-regulatory and voluntary efforts.

Direction is provided through statewide planning goals, the Growth Management Act (GMA), and the Shoreline Management Act (SMA). Statewide Planning Goal 10 (RCW 36.70A.020) instructs jurisdictions to: "Protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water."

The Environment Appendix provides existing conditions and information on:

- Critical Areas:
  - Geological Hazardous Areas
  - Fish and Wildlife Habitat Conservation Areas
  - Wetlands
  - Aquifer Recharge Areas
  - Frequently Flooded Areas
- Shorelines
- Greenhouse Gases
- Urban Forestry

Geological Hazardous Areas

Topography

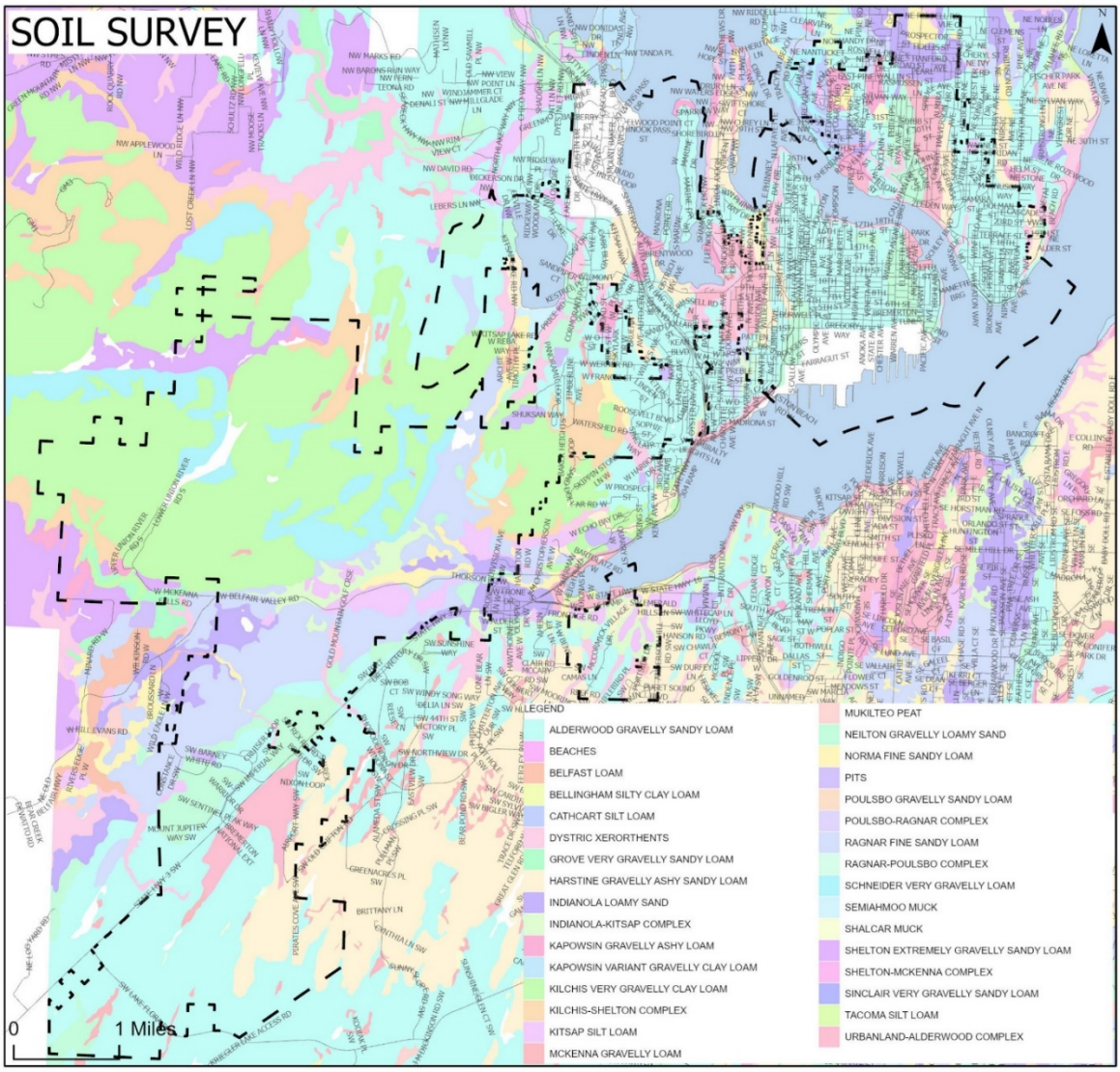
Bremerton is located within the Puget Sound Lowland. Geologic uplifting of the Cascade and Olympic Mountain ranges formed the Puget Sound Lowland. Erosion of these mountain ranges deposited sedimentary materials in the lowlands, and glaciation carved the low rolling hills, scattered lakes, islands and inlets. The Vashon Drift, composed of unconsolidated silts, sands and gravels, was deposited about 13,500 years ago by an ice sheet known as the Vashon Glaciation that advanced from Canada. These deposits are as much as 3,000 feet thick and normally are divided into three units. The upper and lower units consist of glacial drift deposited by the ice or glacial meltwater and are composed mostly of layers of sand and gravel alternating with layers of silt and clay. The middle unit consists of a non-glacial deposit of silt and clay that normally separates the other two units. The thickness of the upper unit is normally 200 to 400 feet. The middle unit ranges up to 260 feet but is commonly between 10 and 80 feet thick. The thickness of the lower unit is estimated to be between 2,000 and 3,000 feet.

The topographic features and waterways are generally oriented on a north-south axis corresponding to the orientation of the Cascade and Olympic Mountain ranges and the direction of advance and retreat of the Vashon Glaciation. Lands range from sea level to over 600 feet in elevation and include forested regions to the west in the vicinity of the Union River and Gorst Creek Watersheds. Bordering the marine shoreline are moderate to steep, irregular cliffs carved first by glaciation and then by erosion. Steep slopes also border the numerous small stream valleys that were the sites of glacial-melt water streams.

Soils

The soils of Kitsap County were formed mainly in glacial drift deposited by the most recent of several continent-sized glacial ice sheets. This 3,000-foot glacier, emanating from Canada, formed most of the topography and waterways of the area between 13,000 and 15,000 years ago. The predominant deposit, and therefore parent soil material, is glacial till. It generally consists of compact basal till covered by a thin discontinuous layer of ablation till. Bremerton's prominent soils are various silt loam, gravelly loam, sandy loam and muck.

Exhibit ENV-1: City of Bremerton Soils Map



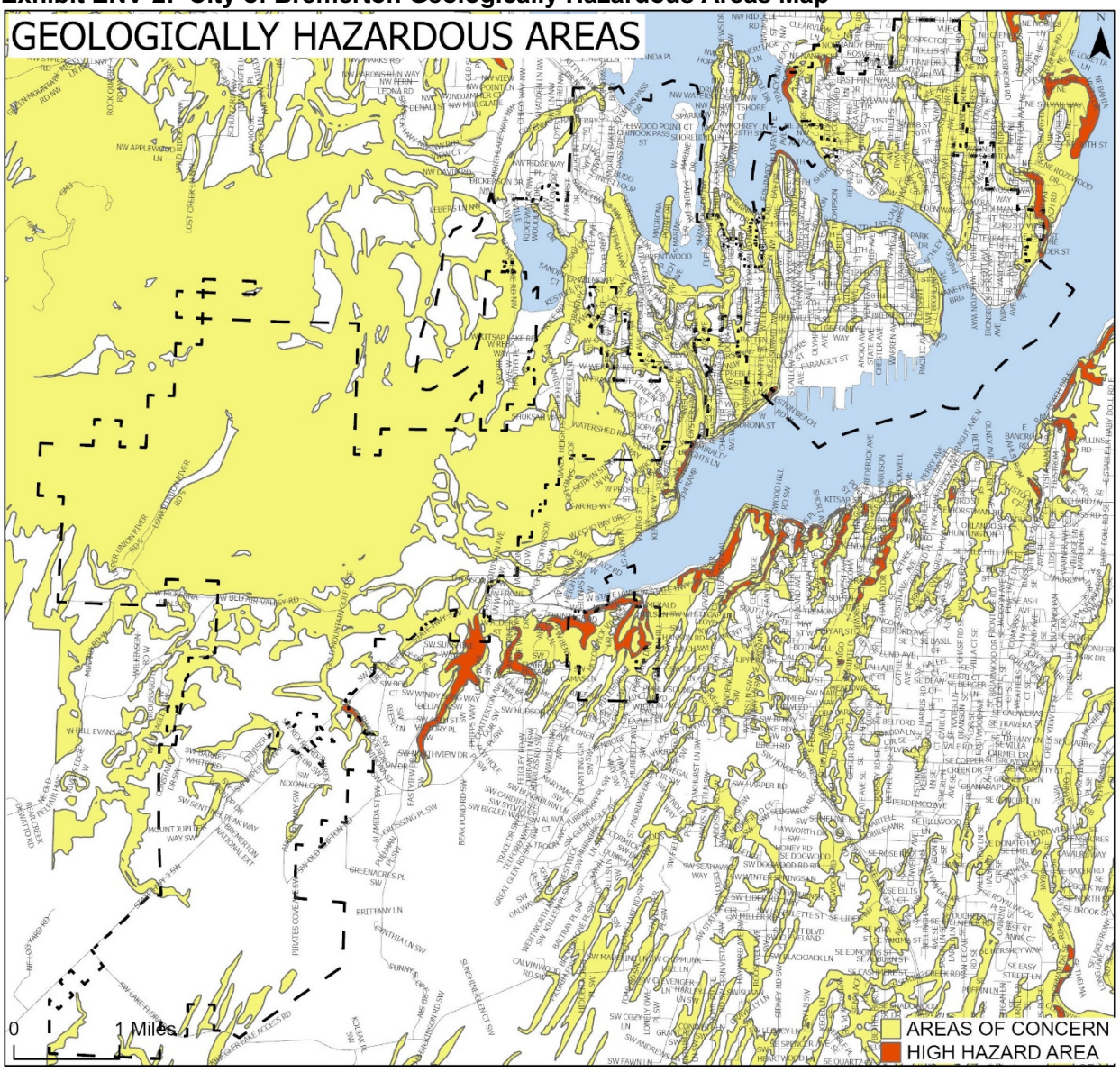
Geologically Hazardous Areas

Geologically hazardous areas are places highly susceptible to erosion, landslides, earthquakes, or other significant geologic events. In Bremerton, the most hazardous of these areas is typically found along the marine shorelines, stream ravines and ridges. The intent of identifying, classifying and designating geologic hazard areas is to evaluate whether development should be prohibited, restricted or otherwise controlled because of danger from geological hazards. In some cases, the risk from geologic hazards can be reduced or mitigated to acceptable levels by engineering design or modified construction practices and is completed through a site-specific analysis by a qualified professional.

Geologic Hazard Areas are defined in the Growth Management Act in WAC 365-190-120 and defined in WAC 365-190-030(9). WAC 365-190-120 designates four categories of Geologically Hazardous Areas: Erosion Hazard, Landslide Hazard, Seismic Hazard, and areas subject to other geologic events such as coal mine hazards and volcanic hazards.

The Bremerton Critical Areas Ordinance (CAO) regulates development in geologically hazardous areas as may be permitted when an approved geotechnical or geological report indicates that the development can be designed and/or engineered to pose no significant threat to public health or safety (BMC 20.14.600). Geologically Hazardous Areas are identified and mapped as Exhibit ENV-2.

Exhibit ENV-2: City of Bremerton Geologically Hazardous Areas Map

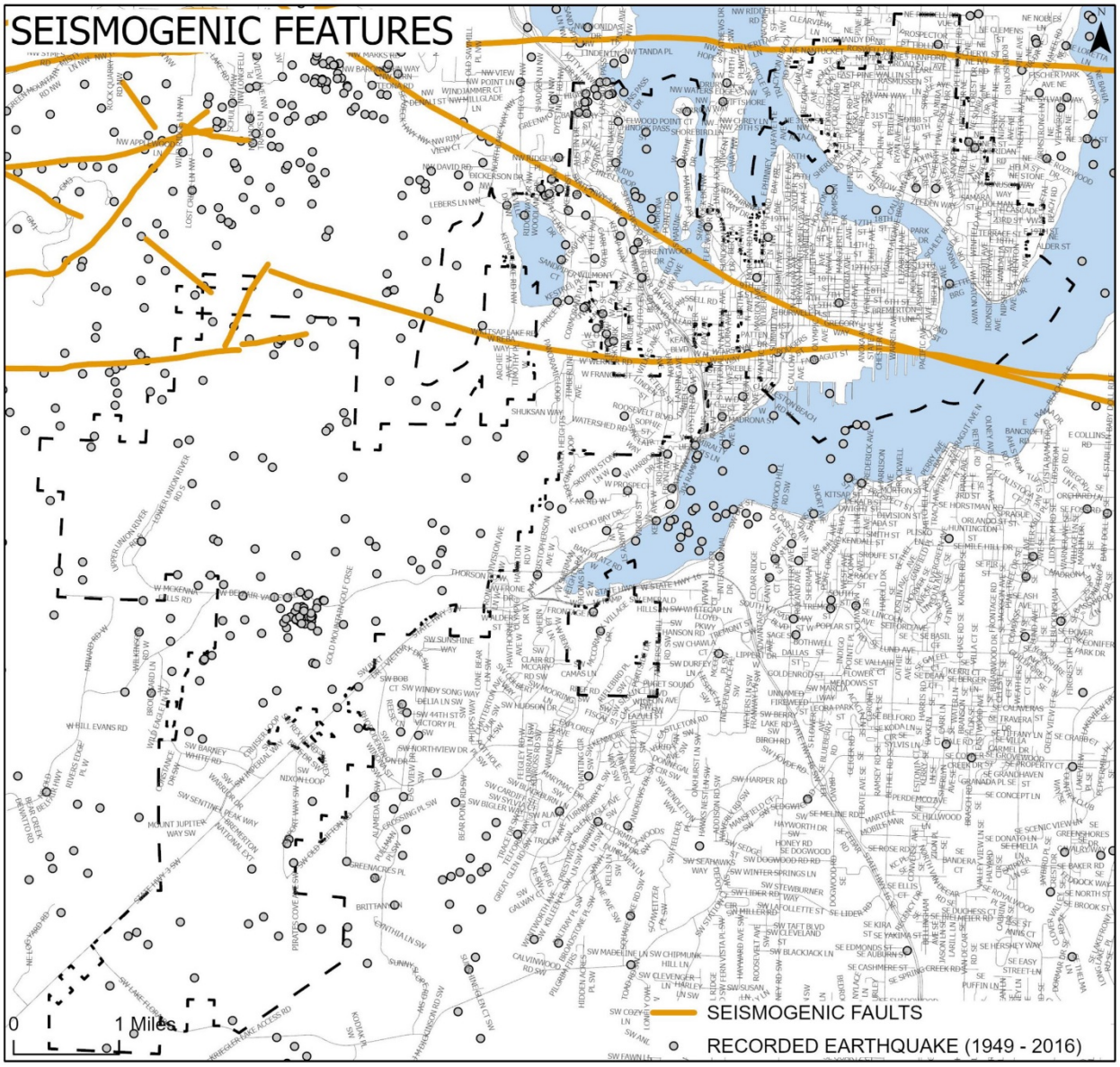


Erosion & Landslide Hazards Summary

Erosion hazard areas include soils susceptible to severe surface erosion, which can cause downslope movement of silt and sediment. Slopes with minimal vegetation are at an increased risk for erosion hazards. Channel erosion can occur along the banks of streams with steep slopes and high flow velocities.

Erosion and landslide hazard areas are defined and regulated in the City of Bremerton CAO (BMC 20.14) within the geologically hazardous area section. The development standards in this section are based on the protection of life, safety, and property. Development within the vicinity of a geologically hazardous area, including landslide and erosion hazard areas, may be permitted based on the site-specific analysis contained within a geotechnical or geologic report prepared by a geotechnical engineer, licensed geologist, or designated qualified professional.

Exhibit ENV-3: Faults and Earthquakes



Seismic Risk Zones are classified on a scale from zero to four, with four being the highest risk. The Puget Lowland, which includes Kitsap County, is classed as a Seismic Risk Zone 3. The largest of the recorded earthquakes in the region were the magnitude 7.1 Olympia earthquake in 1949, followed by the magnitude 6.8 Nisqually earthquake in 2001. The Nisqually earthquake was the most recent earthquake to cause significant damage to Kitsap County, causing minor to moderate damage to approximately 750 residents (FEMA Risk Report Kitsap County 2015). The duration of these high magnitude earthquakes varied with the strongest shaking during the 1949 Olympia earthquake lasting about 20 seconds and 40 seconds during the 2001 Nisqually earthquake.

Fish and Wildlife Habitat Conservation Areas

Bremerton has extensive areas of natural habitat, including protected watersheds and utility lands. Wildlife habitat can also be found in neighborhoods, parks, shorelines, and riparian areas. The City's habitats support a variety of species, including birds, mammals, amphibians, and reptiles. These habitats vary in density, with high-density, low-density, and forested areas, each offering different environmental conditions for wildlife.

Urban areas with more than 60% impervious surfaces support a lower diversity of wildlife. These areas favor generalist species and introduced species. High-density urban environments lack natural refuges and unique habitats like decaying logs, which many specialist species require. Generalist birds and mammals (such as rock doves, English house sparrows, gulls, mice, and rats) thrive in urban environments. Other species seen in urban settings include red-tailed hawks, swallows, and certain songbirds (American robins, chickadees, ruby-crowned kinglets, and bushtits). Non-native birds like European starlings and introduced mammals (house mice, squirrels, black rats, Norway rats) are common in these environments. Other native mammals include opossum, raccoon, and various species of bats.

Outside of the urban areas, habitats for wildlife tend to be residential neighborhoods, parks, and green belts, which have more trees and shrubs and higher frequency of water sources than in high density areas. Birds such as Stellar jays, flickers, Bewick's wrens, and hummingbirds augment the list of urban area birds. A variety of wildlife, including moles, bats, voles, mice, Eastern gray squirrels, beavers, muskrats, skunks, and larger mammals like deer, coyotes, and red foxes, inhabit the outskirts or forage within low-density urban areas. Amphibians like the Pacific tree frog, red-legged frog, and western redback salamander are prevalent in wetter parts of these areas.

Bremerton's western portion contains forested areas and undeveloped lands, including watersheds (Union River, Gorst Creek, Anderson Creek), which support a high diversity of species. These forests, typically second-growth mixed conifer and deciduous, are home to amphibian species like the tailed frog and Pacific giant salamander, as well as various small mammals (e.g., shrews, moles, flying squirrels, tree voles). Bird species in forested areas include the chestnut-backed chickadee, varied thrush, Steller's jay, winter wren, and golden-crowned kinglet. Forests also provide critical nesting and refuge habitats for many animals. Owls, woodpeckers, and waterfowl often use tree cavities for nesting, and there are reports of higher black bear populations in Gorst Creek compared to other Kitsap Peninsula areas.

Wetlands are critical for many species, including the beaver, muskrat, marsh wren, red-winged blackbird, Pacific tree frog, and several salamanders (e.g., northwest, long-toed, red-legged). Wetlands in Bremerton, such as those in the Gorst Creek estuary, serve as important habitats for shorebirds and waterfowl.

Fish Resources and Habitat

Puget Sound Chinook salmon were listed as threatened under the Endangered Species Act (ESA) in 1999. Only Gorst Creek within the Bremerton planning area provides habitat for Chinook salmon, although they may migrate through larger marine waters. Gorst Creek has undergone significant restoration and now supports populations of Chinook, chum, coho, steelhead, and cutthroat trout. Sockeye salmon are also occasionally seen, but their local origin is uncertain. A cooperative effort since 1981 between the Suquamish Tribe, City of Bremerton, and Poggie Club, has aimed to provide salmon for tribal and sport harvests through raceways and rearing ponds. The Chinook salmon returns in Gorst Creek are primarily from hatchery origin rather than natural production.

Four other creek systems are known to support anadromous salmon within Bremerton. Anderson Creek enters the south shore of Sinclair Inlet, and supports chum, coho, cutthroat and possibly steelhead. Ostrich Bay Creek is the only creek within urbanized Bremerton city limits known to support salmon. The creek is approximately 2 miles long and supports chum, coho, and cutthroat trout. Enetai (Dee) Creek flows into Port Orchard Bay and supports chum, coho, and cutthroat trout. However, its range for anadromous fish is limited due to culverts, which block fish passage. Illahee Creek Watershed includes mainstem Illahee Creek and two salmonid bearing tributaries. The basin enters the west shore of Port Orchard Bay approximately 1 mile north of Illahee State Park, and supports chum and coho salmon, as well as cutthroat trout. The other inlets, bays, and small estuaries in Bremerton are critical for juvenile salmon, providing food and protection as they migrate. These areas are also used by adult salmon for migration.

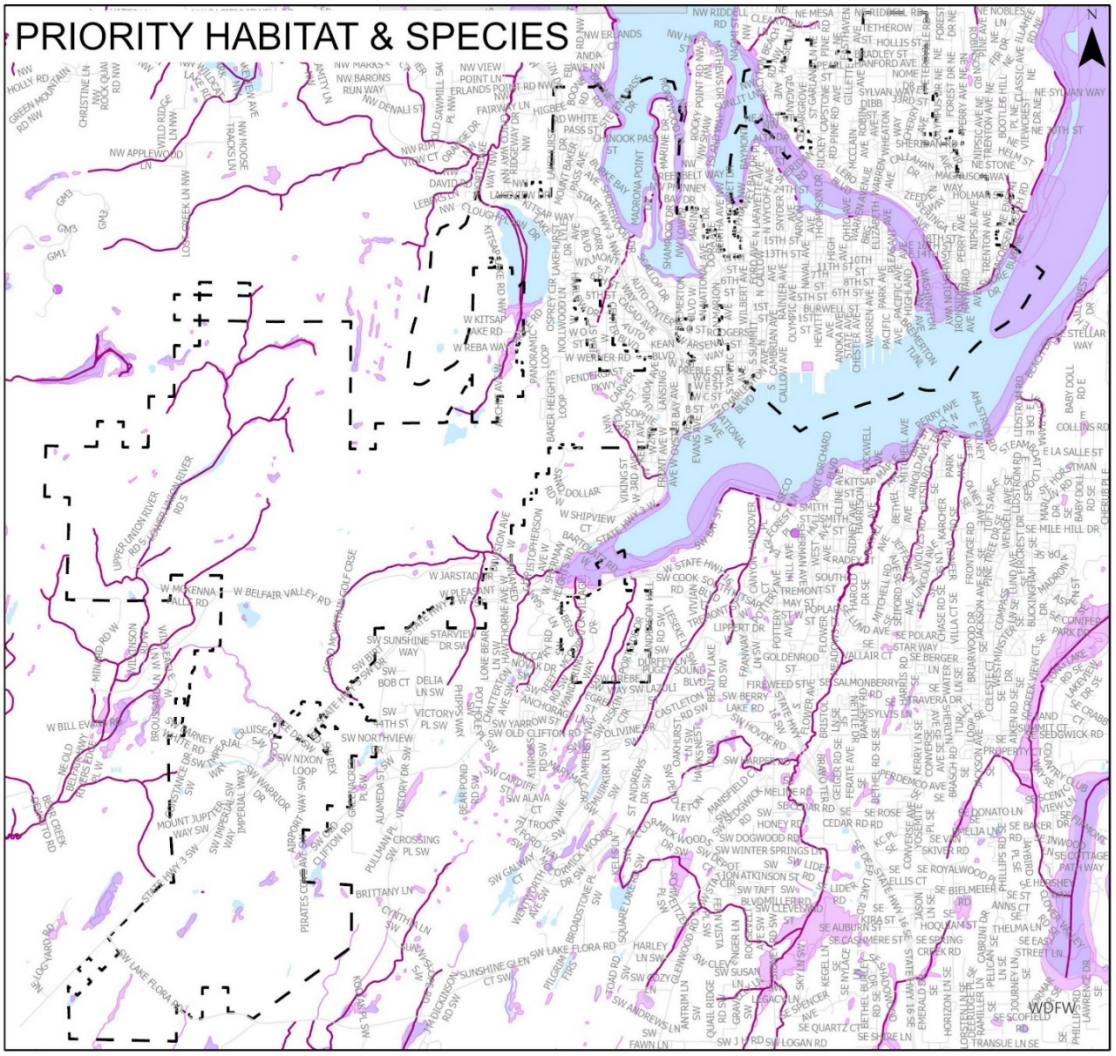
Priority Habitats and Species

A habitat is comprised of environmental elements that are critical for the survival of plants and animals including food, shelter, refuge from predators, and a place to reproduce and rear young. The type, size,

connectivity, and quality of habitat areas will determine where plants and animals live and the overall long-term survival of each species. Loss of historic habitat and habitat fragmentation has been widespread within the Puget Sound over time. Habitat areas in Bremerton have incurred alterations to their condition due to population growth and development activities. However, many locations still retain high-quality riparian, wetland, aquatic, and terrestrial habitats, including lands owned by the city. The City of Bremerton Critical Areas Ordinance is intended to preserve habitat functions and values along streams, wetlands and in other designated fish and wildlife habitat conservation areas.

Priority habitats are habitat types or elements with unique or significant value to a large number of species. A priority habitat may consist of a unique vegetation type like shrub steppe, dominant plant species like juniper savannah, or a specific habitat feature like cliffs. Identified priority habitats in Bremerton include wetlands, estuarine zones, and areas like Phinney Bay and the Washington Narrows, which provide essential foraging and resting areas for birds and other wildlife. Harbor seals use floats in Ostrich Bay as haulouts, and certain beaches, such as those near Marine Drive, serve as important surf smelt spawning habitats.

Exhibit ENV-4: Priority Habitats and Species



Wetlands

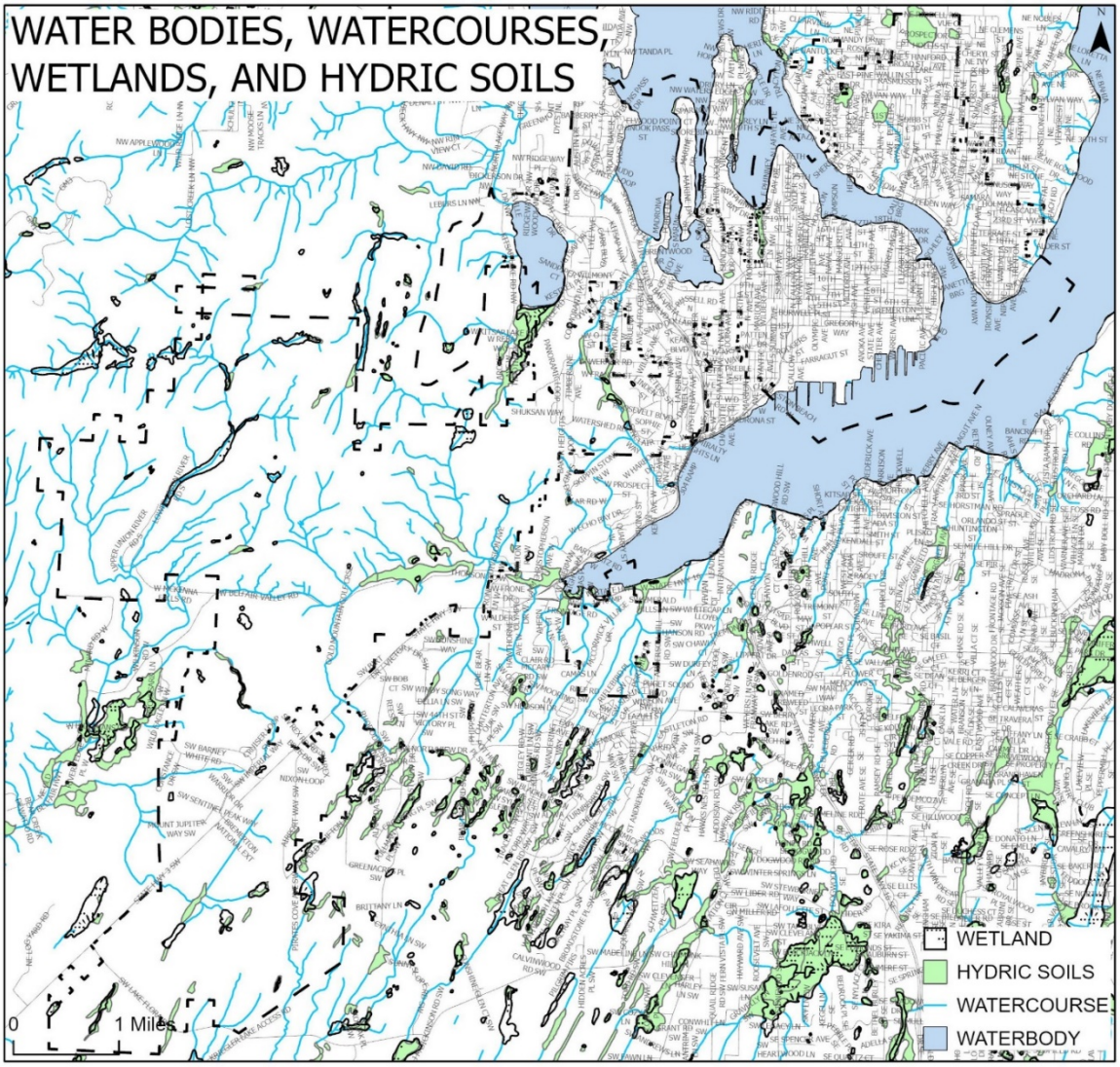
Wetlands play an integral role in the ecology of the City's watersheds. The combination of shallow water, high levels of nutrients and primary productivity is ideal for the development of organisms that form the base of the food web and feed many species of fish, amphibians, shellfish and insects. Wetlands serve

important stormwater quality, flood protection and groundwater recharge functions within the City's landscape and also provide essential habitat for fish and wildlife, including endangered species.

Wetlands, because of their unique position in the landscape, naturally receive stormwater. Past urbanization has altered the natural wetland hydrologic cycle in many locations due to increases in impervious area that increase the volume and rate of runoff, while decreasing groundwater recharge. Uncontrolled urban stormwater can cause erosion and channelization in wetlands, which ultimately adversely impacts the ability of wetlands to support aquatic habitat. Reductions in groundwater recharge within a watershed can also reduce dry weather flows in wetlands. Degraded wetlands can lose their capacity to remove excess sediments, nutrients, and other pollutants, and provide habitat for fish and wildlife, if they are not adequately protected.

Within the City, wetlands are protected by a combination of land use regulations (BMC Chapter 20.14) and stormwater regulations (BMC 15.04). City stormwater code requirements for wetlands mirror those in Ecology's Stormwater Management Manual for Western Washington, which require that wetlands be protected from pollutant loading and hydrologic impacts. Wetlands are often highly effective at filtration, and construction of artificial wetlands to treat stormwater can provide treatment as well as habitat and open space benefits.

Exhibit ENV-5: Wetlands and Hydric Soils



Aquifer Recharge Areas

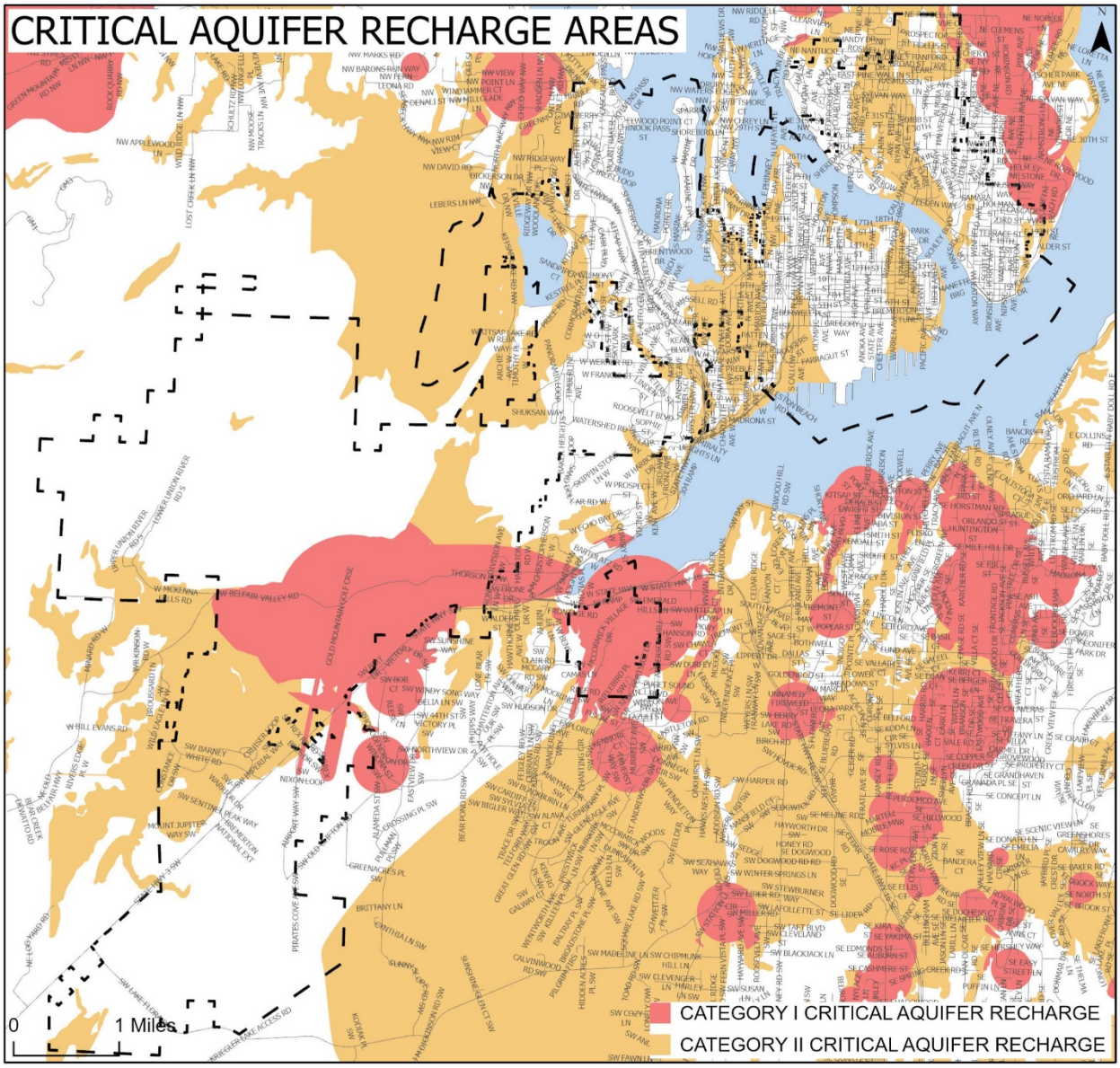
Groundwater is one source of water supply for the City of Bremerton. The quantity of water available for use depends on the flow of water into and out of its aquifer. Under natural conditions, aquifers are in a state of dynamic equilibrium among recharge, leakage to other aquifers, and discharge to streams or marine waters. In developed areas, impermeable surfaces divert water that would normally be absorbed to recharge the aquifer.

Critical Aquifer Recharge areas are geographic areas which provide the recharge to an aquifer(s) which is a current or potential source of potable water and, due to its geologic properties, is susceptible to the introduction of pollutants, or because of special circumstances, has been designated a Critical Aquifer Recharge Area in accordance with WAC 365-190-080. The City's CAO separates aquifer recharge areas into two categories of Critical Aquifer Recharge Areas.

The following criteria are used to designate Critical Aquifer Recharge Areas (BMC 20.14.420):

> Critical aquifer recharge areas may be established based on general criteria, specifically designated due to special circumstances, or based on scientific studies and mapping efforts. Factors considered in the identification of critical aquifer recharge areas include depth to water table, presence of highly permeable soils (specifically Group A hydrologic soils), presence of flat terrain, and the presence of more permeable surficial geology. Critical aquifer recharge areas may be placed in one (1) of the following categories:
>
> (a) Category I Critical Aquifer Recharge Areas. Category I critical aquifer recharge areas are those areas where potential for certain land use activities to adversely affect groundwater is high. Category I critical aquifer recharge areas include:
>
> (1) Areas inside the five (5) year time-of-travel zone for Group A water system wells, calculated in accordance with the Washington State Source Water Assessment Program.
>
> (2) Ten (10) year time-of-travel zones in wellhead protection areas are included as critical aquifer recharge when a well draws its water from an aquifer that is at or above sea level and is without an overlying protective impermeable layer.
>
> (3) Areas identified as regionally significant aquifer recharge areas and identified as such by the City are:
>
> (i) Gorst Basin Aquifer recharge area, and
>
> (ii) Other areas that may be identified in the future.
>
> (b) Category II Critical Aquifer Recharge Areas. Category II critical aquifer recharge areas are areas that provide recharge to aquifers that are current or potentially will become potable water supplies and are vulnerable to contamination based on the type of land use activity. These include the following:
>
> (1) Highly Permeable Soils (Group A Hydrologic Soils). The general location and characteristics of Group A hydrologic soils in the City is given in the Soils Survey of Kitsap County by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). The soil survey information is available at the Department of Community Development.
>
> (2) Areas Above Shallow/Vashon Principal Aquifers. Surface areas above shallow, principal aquifer(s) which are not separated from the underlying aquifers by an impermeable layer that provides adequate protections to preclude the proposed land use from contaminating the shallow aquifer(s) below, are considered aquifer recharge areas of concern.

Exhibit ENV-6: Critical Aquifer Recharge Areas



Frequently Flooded Areas

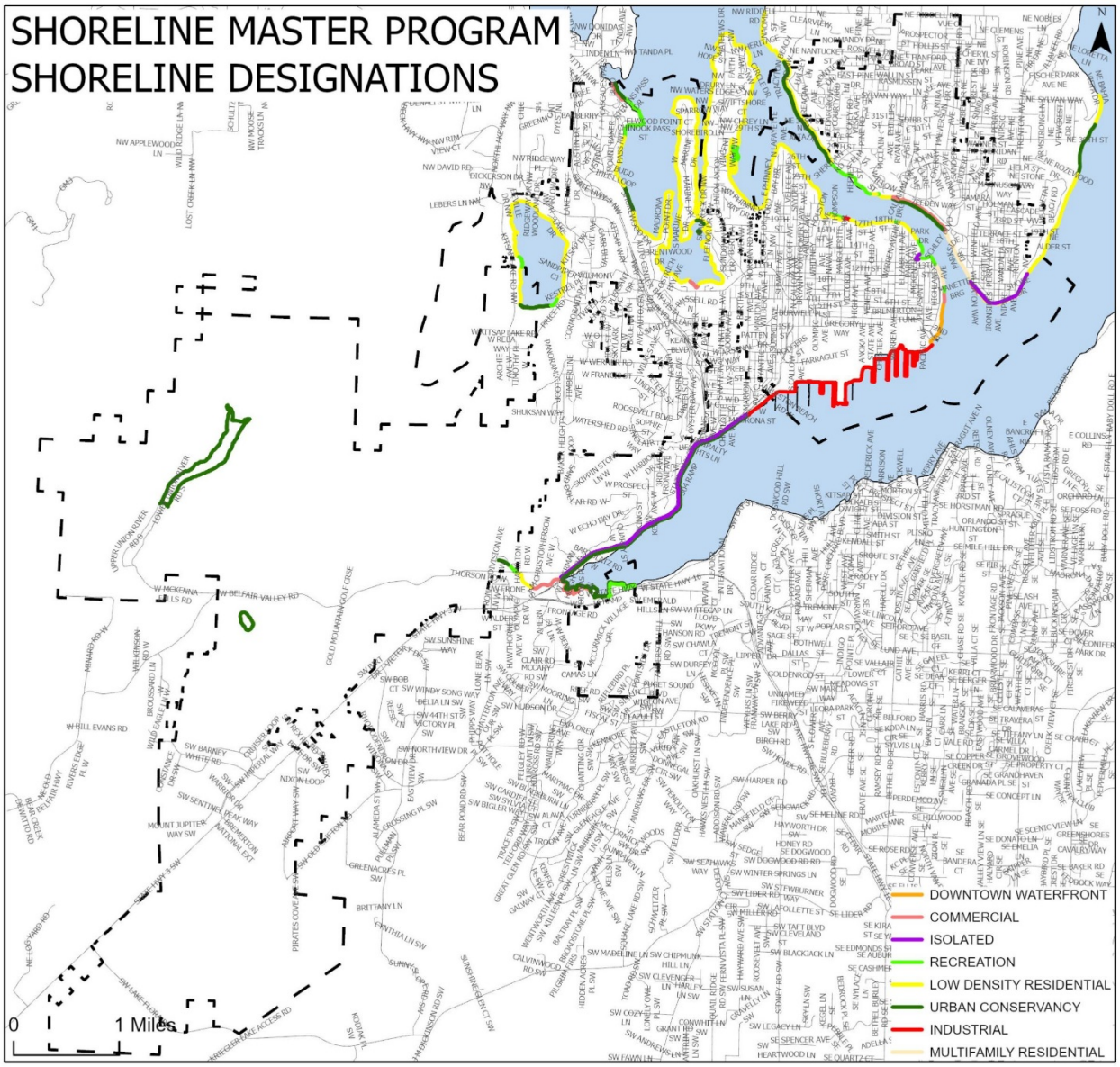
Frequently flooded areas are those areas established as areas of special flood hazard under Chapter 17.60 BMC, Floodplain Management. Under Chapter 17.60 BMC, this includes those areas of special flood hazard identified by the Federal Insurance Administration in a scientific and engineering report entitled "The Flood Insurance Study for Kitsap County and Incorporated Areas" dated November 4, 2010, and any revisions thereto, with accompanying flood insurance rate maps (FIRM), and any revisions thereto.

Shorelines

The Washington State Shoreline Management Act (SMA) requires all counties and most towns and cities to plan for how shorelines in their jurisdiction will develop through a Shoreline Master Program (SMP). The Bremerton SMP was updated in 2013 to comply with new state guidelines adopted in 2004. Additionally, the SMP was updated and adopted again on April 28, 2021. The Department of Ecology announced final approval, finding the SMP consistent with the policy and procedural requirements of the SMA and its implementing rules.

The SMP establishes a system of categorizing shoreline areas designed to provide a uniform basis for applying policies and use regulations for distinctly different shoreline areas. To accomplish this, a shoreline environment designation is given to specific areas based on the existing development pattern, the biophysical capabilities and limitations of the shoreline being considered for development, and the goals and vision of the local community. The SMP is designed to encourage a balance of preferred shoreline uses, ecological protection, and public access where appropriate.

Exhibit ENV-7: Shoreline Designations



Bremerton's shoreline designations include:

- *Aquatic*: The aquatic shoreline environment includes the water and lands waterward of the ordinary high-water mark within the city's jurisdiction, including public and private tidelands, state submerged lands, and areas designated as critical saltwater habitat.
- *Aquatic Conservancy:* The Aquatic Conservancy environment is intended to preserve tidelands and waters whose existing natural state is relatively free of human influence or whose resources, biological diversity, or other features are particularly sensitive to human activity. The Aquatic Conservancy is applied to those areas marine water bodies, waterward of the Ordinary High Water Mark, such as tidal lagoons, salt marshes and mudflats, as well as marine vegetation areas that

support a significant community of kelp, eelgrass and/or other vegetation that provides special marine habitat value.

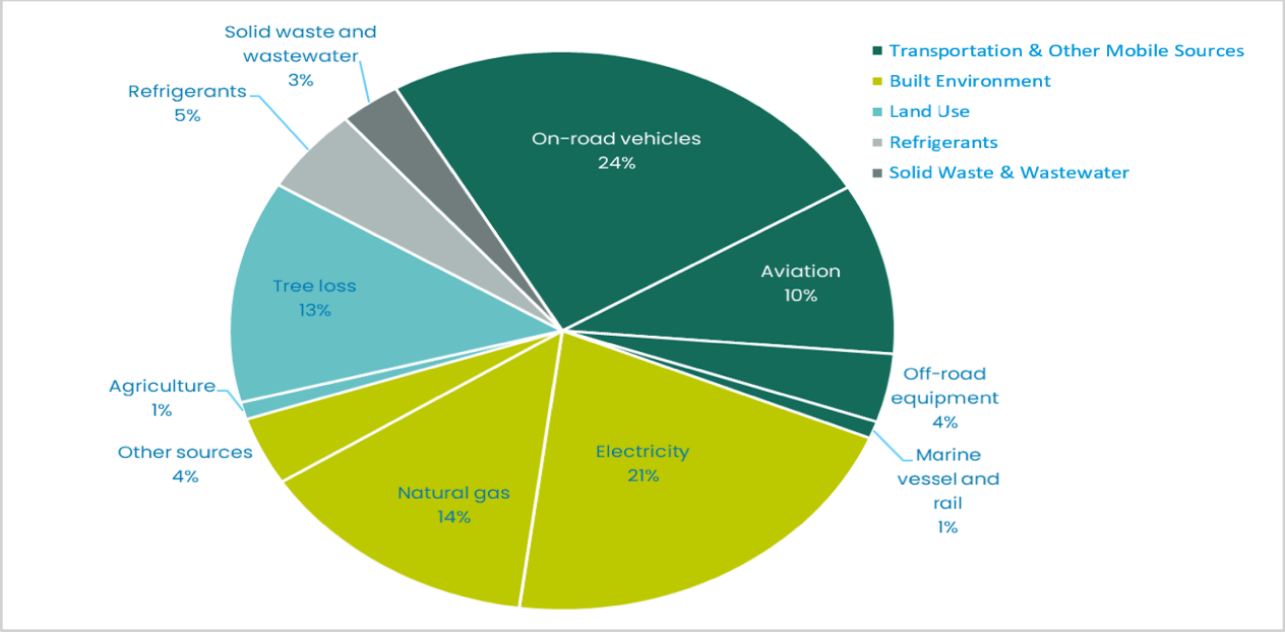
- *Commercial*: The Commercial environment is intended to accommodate high intensity business districts, light industry, and various commercial operations. The designation is suitable for existing and future high intensity water-oriented uses and water oriented commercial uses.
- *Downtown Waterfront*: The Downtown Waterfront environment is a commercial designation for the downtown shoreline area that is subject to the Downtown Regional Growth Center subarea plan. The designation provides for an array of uses related to the water, multimodal transportation facilities, residential, mixed uses, while maintaining view corridors and public access.
- *Industrial*: The Industrial designation is intended to provide for efficient utilization of shoreline areas suitable for water dependent commerce and industry consistent with the SMA.
- *Isolated*: The Isolated designation recognizes areas within the shoreline jurisdiction, which are isolated from the shoreline by intervening elements, such as roads.
- *Multi-Family Residential*: The Multi-Family Residential designation is intended for areas which are currently primarily multi-family residential or intended multi-family residential use.
- *Recreation*: The Recreation designation provides recreational and public access opportunities along Bremerton's shorelines, such as parks and marinas.
- *Low Density Residential:* The Low-Density Residential designation is intended for areas which are currently or planned for low density residential uses, as well as appropriate public access and recreational uses.
- *Urban Conservancy:* The Urban Conservancy designation protects and restores ecological functions of lands with the shoreline jurisdiction. These areas are identified as having biological or physical limitations or other unique or hazardous characteristics that are incompatible with intense development. These areas generally are not suitable for intensive water dependent uses.

Greenhouse Gas Emissions

Gases that absorb and trap heat in the atmosphere are called "greenhouse gases." As the amount of greenhouse gases in our atmosphere increases, the amount of heat trapped in the atmosphere also increases, causing the overall warming of the planet. The various impacts from this warming are referred to as climate change and include sea level rise; the adjacent image illustrates a potential 3-foot sea level rise experienced in the City of Bremerton. Consistent with HB 1181, the City will consider adoption of additional climate change planning efforts consistent with statute. Puget Sound Clean Air Agency's latest inventory of greenhouse gas emissions by sector is depicted in Exhibit ENV-8 and greenhouse gas emissions by sector and county Exhibit ENV-9.

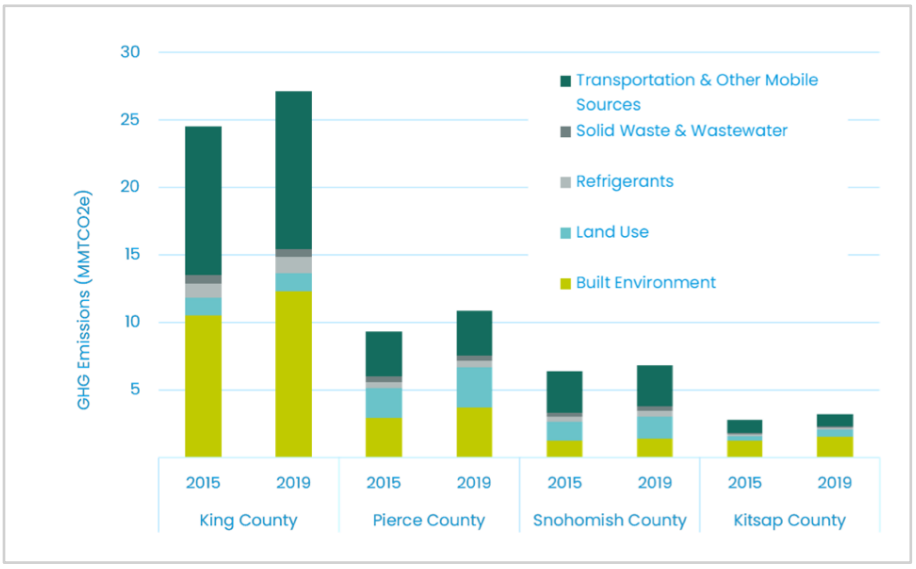
Exhibit ENV-8: Potential Sea Level Rise (left)
Source: Puget Sound Regional Council

Exhibit ENV-9: Regional Greenhouse Gas Emissions Inventory, 2019



Source: Puget Sound Clean Air Agency

Exhibit ENV-10: Regional Greenhouse Gas Emissions Inventory by Sector by County, 2019



Source: Puget Sound Clean Air Agency

Greenhouse gas (GHG) emission reduction strategies identify ways in which federal, state, and local governments can assess greenhouse gas contributions and set priorities to reduce fossil fuel dependence and the potential negative impacts of climate change. The main way local governments can reduce emissions is by encouraging and incentivizing more sustainable behavior among residents. As part of the Comprehensive Plan Update, Bremerton is required to review and update policies related to sustainability and climate change.

Legislation signed into law in 2023 (HB 1181) added a climate goal to the Growth Management Act and requires local comprehensive plans to have a climate element. Climate elements must maximize economic, environmental, and social co-benefits and identify environmental justice in order to avoid worsening environmental health disparities. A climate element can take the form of a single comprehensive plan chapter or be integrated into several chapters/elements such as housing,

transportation, and land use. HB 1181 provided a schedule for incorporation of a Climate Element, which will include a Greenhouse Gas emissions reduction sub-element, and Bremerton is required to have the new element in place by 2029. Washington State Commerce has developed guidance for jurisdictions in preparing the new element.

The following describes the sustainability and climate change requirements from the state and the Puget Sound Regional Council (PSRC). It also describes a range of sustainability strategies that could be adopted by City of Bremerton to reduce GHG emissions. The primary focus is to quantify their likely effectiveness, estimate their costs of implementation, and assess their feasibility and appropriateness in Bremerton. The Commerce guidance provides resources and a Menu of Measures which are examples of model climate goals and supportive policies the City will review and consider when preparing the Climate Element.

Background

To reduce emissions in Washington, the state has adopted legislation that sets emission reduction targets to:

- Return to 1990 levels by 2020
- Reduce emissions to 25% below 1990 levels, by 2035
- Reduce emissions to 50% below 1990 levels, by 2050

Bremerton has already taken steps to address climate change by joining more than a dozen other cities across the region in signing the U.S. Mayors Climate Protection Agreement. This initiative is supported by several sustainability actions Bremerton is engaging in citywide including:

- Performing energy efficiency audits on City owned buildings and facilities
- Working with Puget Sound Energy to retrofit City buildings
- Replacing City traffic lights with LED
- Encouraging City employees to find alternatives to driving alone and reduce emissions through their participation in the Commute Trip Reduction (CTR) Program
- Investing over $10 million in nonmotorized improvements over the past five years

It is important to note that some GHG reduction strategies can only be implemented at the state and federal level. Examples of these larger-scale actions that are currently under debate and that Bremerton can support include:

- Adopting stricter fuel economy standards
- Implementing market-based approaches that put a price on carbon such as cap-and-trade and a carbon tax
- Updating commercial and residential energy building codes and standards, as well as appliance and equipment energy conservation standards to be more energy efficient

Actions to Reduce GHG Emissions

Potential Strategies

The following section identifies a range of sustainability strategies that Bremerton could use to reduce GHG emissions in the transportation, energy, and waste sectors. The strategies are grouped by three alternatives. Each alternative is modeled off of a low, medium, and high target scenario. Although the state has set statewide reduction goals across all sectors and sources of emissions, there are currently no assigned targets regionally. The establishment of any target would go beyond what is required by law and would show Bremerton's commitment to sustainability. The Climate Element, due in 2029, will require the City to identify targets for reducing vehicle miles traveled (VMT) and goals, policies and strategies that will forward local action toward a VMT reduction goal. The potential strategies below will be evaluated and considered along with Commerce's Menu of Measures, during the Climate Element development and public review process. Many of the strategies identified in the table ENV-10 are included in Commerce's Guidance Menu of Measures, signaling that Bremerton's approach to greenhouse gas reduction is aligned and is in good position for the upcoming Climate Element development.

Low Target Scenario

A low target scenario assumes a GHG reduction of 1-5 percent from existing conditions. This level of reduction can be achieved by adopting a relatively simple and low-cost sustainability strategy that reduces vehicle miles travelled (VMT) by five percent per capita, reduces solid waste by five percent per capita, and supports energy efficient retrofits of existing buildings through low interest loan or grant programs.

To reduce vehicle miles travelled by five percent, Bremerton could adopt policies that increase land use diversity where possible, and invest in bicycle, pedestrian, and transit infrastructure. Having different types of land use near one another can decrease VMT as trips between land use types are shorter and may be accommodated by non-auto modes of transport. The difficulties of implementing these policies and strategies can range depending on public resistance to land use and zoning changes and non-auto oriented improvements. However, these strategies can achieve a combined VMT reduction of up to 5 percent (with minimal implementation difficulties and low costs) or 12 percent (with greater implementation difficulties and costs).

Medium Target Scenario

A medium target scenario assumes a target reduction goal of 6-10 percent. To achieve this level, Bremerton could adopt a sustainability strategy similar to the preferred alternative within the PSIC-Bremerton Subarea Plan, in addition to the requirements established within the low target scenario (reduce VMT by five percent per capita, reduce solid waste by five percent per capita), and are 10 percent better than the state's minimum requirements.

Comparable to the PSIC-Bremerton Subarea Plan, this strategy could include implementing a mandatory CTR program expanding vanpool/transit and requiring energy efficient outdoor lighting standards. At the city level these options would require minimal financial contributions, as the majority of the fiscal responsibility would rely on the employers, developers, and taxpayers. There are some challenges implementing a more robust vanpool service in Bremerton such as high fares compared to drivers, and difficulties finding riders and drivers. However, given the success of vanpool services between Kitsap Transit and NBK-Bremerton, this could be an advantageous option for Bremerton to reduce VMT.

High Target Scenario

A high target scenario for Bremerton would be to reduce GHG by more than 10 percent. This could be achieved by more ambitious baseline targets to reduce VMT by ten percent per capita, reduce solid waste by ten percent per capita, and adopt building efficiency standards that require a LEED gold level of certification or higher.

This strategy could be further supported by adopting land use strategies with more stringent growth restrictions, and which increase densities within Bremerton's city center. Increased residential and employment densities tend to have more concentrated trips and can be supportive of alternative modes of travel such as transit, whereas areas of low density tend to have dispersed trip patterns more conducive to trips made by personal vehicle. Implementing land use policies that support residential and employment densities are not without their implementation difficulties such as residents who fear increasing densities will damage the character of their neighborhoods. In addition, adopting an aggressive sustainability strategy requires a high level of funding. However, if these policies are adopted Bremerton could see a significant change in the way its residents travel and reduce total VMT by more than 10 percent.

Exhibit ENV-11: Greenhouse Gas Emission Reduction Potential Strategies							
Evaluation Criteria for Transportation Demand Management (TDM) Strategies	**Range of Effectiveness**	**Implementation Difficulties**	**Cost**	**Who Pays**			
				Taxpayers	Users	Employers	Municipality*
Transportation: Public Mode Support Measures							
Public Education and Promotion	Increases the effectiveness of other strategies up to 3%	None	Low-Medium	P		P	P
Area-wide Ride matching Services	0.1-3.6% VMT reduction	None	Low			P	P
Transit Services	Up to 2.5% VMT reduction	Ongoing competition for public funds	Medium-High	P	P	P	
Vanpool Service	Up to 8.3% commute VMT reduction	High fares compared to transit; finding riders & drivers	Medium		P	P	
Transit and Vanpool Fares	Up to 2.5% regional VMT reduction	Competition for public funds; equity concerns	Medium	P	P	P	
Non-Motorized Modes	0-2% regional VMT reduction	Minimal for low cost actions; great for high cost actions	Low-high	P	P	P	
HOV Facilities	Up to 1.5% VMT reduction & .2% trip reduction	High cost; public acceptance	Medium-high	P			
Park and Ride Lots	0-0.5% VMT reduction	None	Medium-high	P			
Increase active transportation capacity	Varies	Funding and political support required	Medium-high	P	P	P	P
Integrate “Complete Streets” principles into roadway designs	Varies	Funding and political support required	Medium				P
Transportation: Employer Based TDM Measures							
Monetary Incentives	8-18% trip reduction at site	Tax implications for some subsidies	Low-Medium			P	
Alternative Work Schedules	As much as a 1% regional VMT reduction	Employee or management reluctance	Low			P	
Commute Support Programs	0.1-2.0% regional VMT reduction	None	Low			P	

Exhibit ENV-11: Greenhouse Gas Emission Reduction Potential Strategies							
Evaluation Criteria for Transportation Demand Management (TDM) Strategies	**Range of Effectiveness**	**Implementation Difficulties**	**Cost**	**Who Pays**			
				Taxpayers	Users	Employers	Municipality*
Guaranteed Ride Home	Unknown	Liability concerns of employers	Low		P	P	
Parking Management	20-30% reduction in SOV trips	Employee opposition	Low to revenue producing		P	P	
Facilities Amenities	Minimal alone	Space: local zoning requirements	Low to revenue producing			P	
Transportation Management Associations	6-7% commute trip reduction*	Funding and political support required	Low to medium			P	P
Transportation: Pricing Strategies							
Congestion Pricing	Up to 5% regional VMT reduction	Public and political resistance; travel alternatives required; technical and enforcement difficulties	Revenue producing		P		
Parking Tax	1-5% regional VMT and trip reduction	Legislative action; negative public sentiment; opposition from private sector	Revenue producing		P	P	
Telecommunications Strategies							
Telecommuting	Up to 10% commute VMT reduction	Prevailing corporate culture	Low			P	
Land Use Strategies							
Development Impact Mitigation	Varies with mitigation requirements	Landowner and developer resistance	Low to Medium		P	P	
Mixed Land Use/Jobs Housing Balance	VMT reductions up to 10%	Public resistance; slow rate of effective change	Low to Medium	P	P		P
Transit-Oriented and Pedestrian Friendly Design	Increase in transit, bike, and pedestrian trips	Requires design review; developer resistance	Medium to High	P		P	
Residential Density Increases	VMT reductions of up to 10% per household	Public and developer resistance to required densities	Medium to High	P	P		
Employment Center Density Increases	SOV work trip reductions of up to 50%	Large increase in density often required to realize significant change	Medium to High	P		P	

Exhibit ENV-11: Greenhouse Gas Emission Reduction Potential Strategies							
Evaluation Criteria for Transportation Demand Management (TDM) Strategies	**Range of Effectiveness**	**Implementation Difficulties**	**Cost**	**Who Pays**			
				Taxpayers	Users	Employers	Municipality*
Parking Management	1 to 5% region-wide VMT reduction	Local council action required; public/retailer resistance enforcement issues	Low		P	P	
On-site Amenities	Unknown; probably reflects effectiveness of mixed-use development	Requires policy changes, public, and private inertia are barriers	Low to Medium		P	P	P
Increase site and parking lot landscaping, overall tree canopy and urban forests and open spaces	High	Public and developer resistance to additional regulations	Low	P	P		P
Prioritize infill development through zoning and permitting process	High	Developer resistance	Low				P
Policy and Regulatory Strategies							
Trip Reduction Ordinances	.1-4% regional VMT reduction	Legislative action required; resistance to expanded regulation	Low-Medium	P		P	P
Restrict Vehicle Access to Facilities and Activity Centers	2.8-10% VMT reduction	Political will to face public opposition	Low to High	P			
Parking Maximizing	1-5% trip reduction	Public, developer resistance	Low			P	
Energy							
Exceed Washington Building Envelope Energy Efficiency Standards by X%	(X is equal to the percentage improvement selected for the project)	Developer resistance to more stringent building codes	Medium-High		P	P	P
Install Energy Efficient Appliances	Up to 20% reduction		Medium-High		P	P	P
Install Programmable Thermostat Timers	BMP*	Minimal	Low		P	P	P
Establish Onsite Renewable Energy Systems	0-100%	High cost	High		P	P	P

Exhibit ENV-11: Greenhouse Gas Emission Reduction Potential Strategies							
Evaluation Criteria for Transportation Demand Management (TDM) Strategies	**Range of Effectiveness**	**Implementation Difficulties**	**Cost**	**Who Pays**			
				Taxpayers	Users	Employers	Municipality*
Install Higher Efficacy Public Street and Area Lighting	16-40%		Low-Medium	P		P	
Limit Outdoor Lighting Requirements	BMP*	Safety concerns	Low				P
Replace Traffic Lights with LED Traffic Lights	90% reduction		Low	P			
Prioritize the adaptive reuse of buildings	Varies	Funding	Medium-High		P		P
Waste							
Institute or Extend Recycling and Composting Services	BMP*	Funding and public support required	Low-Medium	P	P		
Recycle Demolished Construction Material	BMP*		Low	P	P	P	
Water							
Use Reclaimed Water	0-40% reduction	Technical feasibility, cost and public policy acceptance	Medium-High	P			
Use Gray Water	0-100% reduction	Financial support and public education needed	Medium-High	P			
Install Low-Flow Water Fixtures	17-31% reduction	Minimal	Low		P	P	P
Adopt a Water Conservation Strategy	Varies	Minimal	Low	P			P
Design Water-Efficient Landscapes	0-70% reduction	Minimal	Low	P		P	P
General Plan Strategies							
Fund Incentives for Energy Efficiency	BMP*	Funding and political support required	Low-Medium	P			P
Establish a Local Farmer's Market	BMP*	Minimal	Low				P
Establish Community Gardens	BMP*	Minimal	Low				P
Plant Urban Shade Trees	BMP*	Minimal	Low-Medium	P			P
Implement Strategies to Reduce Urban Heat-Island Effect	BMP*		Low	P			P
Miscellaneous							
Establish a Carbon Sequestration Project	Varies	Funding and public support required	Low	P			P

Exhibit ENV-11: Greenhouse Gas Emission Reduction Potential Strategies							
Evaluation Criteria for Transportation Demand Management (TDM) Strategies	**Range of Effectiveness**	**Implementation Difficulties**	**Cost**	**Who Pays**			
				Taxpayers	Users	Employers	Municipality*
Establish Off-Site Mitigation	Varies	Funding and public support required	Low	P			P
Use Local and Sustainable Buildable Materials	BMP*	Developer resistance to more stringent building codes	Low-Medium	P	P	P	P
Require Environmentally Responsible Purchasing	BMP*	Developer resistance to more stringent building codes	Low	P	P	P	P
Implement an Innovative Strategy for GHG Mitigation	BMP*	Funding and public support required	Low	P			P

** Costs required of the City for implementation of the strategies to City owned buildings and facilities*
*** These are listed as Best Management Practices (BMP*) since there is not adequate literature at this time to generalize the mitigation measures reductions*

Urban Forestry

Half of the incorporated area of the City of Bremerton is forest land, and a good portion of that (around 13 square miles) belongs to the Bremerton Water Utility. Beginning in 1917, forest lands were purchased to protect the source waters for Bremerton's drinking water supply. Acquiring land to both provide and protect water quality has continued to the present. Ownership of almost the entire Union River watershed above Casad Reservoir, allows the Water Utility to manage activities that maintain a safe, economic source of drinking water for Bremerton and the surrounding area.

More than two million trees, mostly evergreens such as Douglas fir, are growing in the Water Utility's forests. These trees and the forest stands they form provide benefits to our water supply, such as protection from erosion and cooling shade for streams. They also provide wildlife and fish habitat and economic returns through carefully managed, sustainable harvest. Revenue from harvest helps with capital projects to improve the water supply system for both current and future needs.

Although the Forestry is one of the smallest divisions within the Public Works & Utilities Department, its area of responsibility is one of the largest. The Water Utility's forest lands cover approximately 8,300 acres or 13 square miles, which includes the Union River watershed. This is over 40 percent of the incorporated area of Bremerton and the source of all its surface water and most of its groundwater supply. These lands lie west of Gorst and extend toward Gold Mountain near Mason County.

Forestry is responsible for:

- Water quality protection through best management practices and physical security of the watershed
- Management of the forest resource in a professional manner within the constraints of regulatory mandates
- Support for the operations of the Water Utility through revenue generation using sustainable harvest principles
- Management of the Biosolids Program for beneficial use to reduce cost and enhance growth on permitted forest lands
- Maintenance of forest roads to provide access for water supply, forestry and biosolids operations
- Cooperation with local Tribes, state agencies and other groups to protect and enhance salmon and wildlife habitat

- Management of communication site leases on City lands
- Operation of Jarstad Park near Gorst Creek

In 1986 the Bremerton City Council adopted a management plan for the Water Utility's Forest lands. This was updated and revised in 1996. Addendums were made in 2000 and 2006. These documents provide guidance for forest and land management activities with respect to the primary concerns of water quality and quantity protection.

Methods of sustainable management include selective use of even-age and uneven-age harvests. Uneven-age harvests consist of thinnings and selective harvesting for pole quality timber. These create greater revenues for the City Utility while minimizing the number of trees harvested annually. The University of Washington College of Forestry completed a Forest Management Analysis for the City's forest lands in May 2006. This document provides guidelines to adjust our annual harvest levels to match the targeted sustainable yields and harvest regimes identified in that plan. This will ensure we always correctly balance forest health management and water quality protection, as well as provide a source for ongoing revenue to the Water Utility. Additionally, reforestation of harvested areas is also the responsibility of the City's Forestry division, and about 30,000 trees are planted annually on Water Utility Lands.

Forestry works with the Bremerton Police Department to coordinate patrol and surveillance of the Bremerton Watershed. This helps protect the quality of the water accumulated in a special 3,000-acre zone of forest land that constitutes a protected watershed behind and adjacent to Casad Dam. Over 50 miles of forest roads and associated stream crossings are maintained by the Forestry division. The Forestry division operates Jarstad Park near Gorst and also cooperates with the Suquamish Tribe and the Kitsap Poggie Club with the salmon rearing program and annual Kid's Fishing Day at Gorst Creek. The salmon rearing program produces over 2 million Chinook annually. The division has been an active participant and sponsor of the family-oriented Kid's Fishing Day and has hosted the event on Water Utility lands for over 10 years.